
PROCEEDINGS OF THE
5TH INTERNATIONAL SYMPOSIUM OF
ENTOMOLOGY

V SIMPÓSIO
INTERNACIONAL DE
ENTOMOLOGIA

UNIVERSIDADE FEDERAL DE VIÇOSA - UFV
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FEDERAL UNIVERSITY OF VIÇOSA
VIÇOSA, MINAS GERAIS
BRAZIL

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Schedule

MONDAY 10/08	TUESDAY 11/08	WEDNESDAY 12/08	THURSDAY 13/08	FRIDAY 14/08	SATURDAY 15/08
	08:30 - 09:30 Lecture: Forensic Entomology: The Other 2% Dr. M. Lee Goff	08:30 - 09:30 Lecture: Social parasites as a window on social evolution Dr. David Nash	08:30 - 09:30 Lecture: Biophysics of sound production and auditory frequency analysis in katydids (Orthoptera: Ensifera) and relatives Dr. Fernando Montealegre-Z	08:30 - 09:30 Lecture: Keeping cool: Thermal stress and thermoregulation in disease vectors Dr. Claudio Lazzari	08:30 - 12:00
	09:30 - 10:00 Coffee break	09:30 - 10:00 Coffee break	09:30 - 10:00 Coffee break	09:30 - 10:00 Coffee break	
	10:00 - 12:30 Panel discussion: Insect-Plant Interactions Dr. Paulo Zarbin Dr. Paulo S. Oliveira Dr. Jorge Zavala Mediator: Dr. Eraldo Lima	10:00 - 12:30 Panel discussion: Forensic Entomology Dr. M. Lee Goff Dr. Luiz Roberto Fontes Dr. Claudemir R. D. Filho Mediator: Dr. Simon L. Elliot	10:00 - 12:30 Panel discussion: Evolution of Eusociality in Insects Dr. David Nash Dr. Fernando Noll Dra. Solange Augusto Mediator: Dr. Og DeSouza	10:00 - 11:00 Lecture: Neuroetologia de triatomíneos: uma abordagem multidisciplinar Dr. Marcelo Lorenzo 11:00 - 12:30 Visit to Entomology UFV and Leica Microsystems Research Stereomicroscope Product Line Daniel Sávio	Workshop
	12:30 - 13:30 Lunch	12:30 - 13:30 Lunch	12:30 - 13:30 Lunch	12:30 - 13:30 Lunch	12:00 - 13:00 Lunch
	13:30 - 16:00 Panel discussion: Medical Entomology and Public Health Dr. Marcelo Jacobs-Lorena Dr. Claudio Lazzari Dra. Ana Bahia Nascimento Mediator: Dr. Gustavo Martins	13:30 - 15:00 Panel discussion: Scientific Dissemination Dr. William Magnunson Msc. Rafael Rigolon Mediator: Dr. Eugênio Oliveira	13:30 - 16:00 Panel discussion: Forest Entomology and Pest Management Dr. Ronaldo Zanetti Dr. Taderson Galvan Dra. Silvana Paula-Moraes Mediator: Dr. Marcelo Picanço	13:30 - 16:00 Panel discussion: Insects Phylogeny: morphology and molecular approaches Dr. Tony Robillard Dr. Fernando Montealegre-Z Dra. Vera Solferini Mediator: Dr. Karla Yotoko	13:00 - 17:00
"Auditório Fernando Sabino"		15:00 - 16:00 Lecture: Cupins e plantas: muito além da detritívoria Dra. Alessandra Marins			Workshop
16:00 - 18:00 Symposium Registration	16:00 - 16:30 Coffee break	16:00 - 16:30 Coffee break	16:00 - 16:30 Coffee break	16:00 - 16:30 Coffee break	
18:00 - 18:30 Opening session	16:30 - 18:00 Lecture: Women in Science Dra. Vera Solferini	16:30 - 18:00 Oral presentations	16:30 - 18:00 Oral presentations	16:30 - 17:30 Closing lecture: A wonderful journey: a lifetime in Entomology Dr. Jeremy McNeil	
18:30 - 20:00 Opening lecture: What can an insect brain teach us about learning, memory and cognition? Dr. Martin Giurfa	18:00 - 19:00 Poster section Agricultural & Forest Entomology (HF 01 a 108)	18:00 - 19:00 Poster section Agricultural & Forest Entomology (HF 109 a 121); Ecological Entomology	18:00 - 19:00 Poster section Education & Eneentomology; Forensic Entomology; Medical & Veterinary Entomology; Miscellaneous (others); Molecular Entomology & Genetics; Semi-chemicals & Behaviour; Syst., Morphol. & Biogeography; Urban entomology.	17:30 - 18:00 Closing session	
				21:00 Closing party	

Workshops

Biologia e Controle de Formigas-cortadeiras

Lailla Gandra, Joel Couceiro, Karina Amaral, Vanessa Seide

Tópicos abordados: A importância e a história de vida das cortadeiras; identificação dos principais gêneros de formigas-cortadeiras; organização social; comunicação química nas colônias; seleção e forrageamento; controle e perspectivas.

Ecologia da Polinização

Paula Netto, Camila Folly e Priscila Araújo

O minicurso terá como objetivo abordar questões relacionadas à evolução das interações entre plantas e animais no processo de polinização e associar diversos segmentos da biologia como ecologia, botânica e zoologia, em estudos que buscam entender os processos de reprodução das plantas, além de mostrar a diversidade de estruturas reprodutivas que existem nas flores e sua relação com a morfologia e comportamento dos polinizadores. Abordará a importância econômica dos serviços de polinização em plantas cultivadas e as implicações do panorama atual do desaparecimento das abelhas e déficit de polinização. Também serão desenvolvidas habilidades práticas para a realização de estudos experimentais em campo sobre biologia e ecologia da polinização.

Ecologia e Identificação de cupins

Alessandra Marins, Daniela Ruiz e Julieth Castiblanco

Tópicos abordados: Interações que os cupins estabelecem com outros organismos e com o meio ambiente; Características de identificação Isoptera: famílias neotropicais e principais gêneros; Técnicas de coleta: parcela e coleta em ninho; Prática de identificação.

Workshops

Evolução e história natural das formigas da Mata Atlântica

Laila F. Ribeiro, Júlio C. M. Chaul e Rodrigo S. de Jesus

O objetivo do minicurso apresentar um panorama completo a respeito da História Natural, Ecologia e Evolução das espécies de Formicidae mais recorrentes do bioma da Mata Atlântica. Desta forma, será exposto um conteúdo sobre o comportamento das formigas, as interações destes insetos com outros organismos, a sua importância em funções ecossistêmicas seguindo as hipóteses evolutivas do clado das formigas. Além disso, será apresentado aos alunos as várias técnicas de coletas utilizadas para o estudo dos diferentes grupos de formigas. Com uma breve aula prática, iremos amostrar uma parcela da fauna Neotropical em um dos fragmentos florestais de Viçosa, a Mata da Biologia.

Insetos em certos traços: Aplicações da ilustração científica na Entomologia

Helder Hugo, Nataly de La Pava

Desde o início dos tempos, ilustrações sempre ajudaram na disseminação de mensagens, idéias e conceitos. Na ciência não seria diferente. O uso de um desenho simples, um esquema ou mesmo um rabisco de uma cladograma (como o de Darwin), por vezes nos ajuda a entender de forma muito mais rápida uma mensagem que está sendo passada. Na academia, a Ilustração Científica tem se mostrado uma ferramenta poderosa, não somente em trabalhos descritivos de sistemática e morfologia, mas também no campo da ecologia, evolução e outras áreas. Além disso, comparada à fotografia, a ilustração é de certo modo um filtro, no qual é possível ressaltar o que se realmente se deseja. Sendo assim, o objetivo do minicurso será abordar as principais técnicas de Ilustração Científica, apresentando suas aplicações na Entomologia, bem como suas vantagens sobre a técnica de fotografia.

Workshops

Introdução à ecologia química de insetos

Hernane Dias Araújo e Manuel Alejandro Ix Balam

O objetivo desse minicurso é dar um panorama geral sobre a comunicação química em insetos. Serão abordados os seguintes tópicos: 1) O que é Ecologia Química? – Histórico e Conceitos; Comunicação em Insetos: da percepção de moléculas à ação; Semioquímicos de Insetos (Feromônios e Substâncias de defesa); Semioquímicos de Plantas (Interações Tritróficas). 2) Métodos em Ecologia Química – Extração e identificação de compostos; eletroantenografia; olfatométrica e túnel de vento. 3) Aplicação da Ecologia Química – Uso de semioquímicos na agricultura. Na parte prática iremos conhecer equipamentos e métodos de extração e identificação de semioquímicos, além de métodos eletrofisiológicos e comportamentais.

Noções básicas de fotografia com ênfase em macrofotografia

Prof. José Lino Neto

1- Teoria (4 h): - Luz e Fotometria: variação da cor da luz ao longo do dia. Direção da luz, direta, lateral, de cima ou contra luz. Dureza da luz, luz dura ou luz suave. Quantidade de luz. - Composição: será discutido os princípios de composição para se criar imagens onde o motivo da foto esteja claro e bem definido. Estes princípios são: momento, regra dos terços, sentido de leitura, diagonal, moldura, encher o quadro, primeiro plano, corte e profundidade de campo. 2- Prática A (2 h): Por em prática os conceitos técnicos discutidos na teoria como luz, fotometria e composição. 3- Prática B (2 h): Photoshop: preparo de imagens para impressão.

Workshops

Introdução ao qPCR: PCR em tempo real

Débora L. L. de Souza, Murilo S. Alves e Vanessa A. Barros

Nos últimos anos a técnica de qPCR tem sido amplamente utilizada nas mais diversas pesquisas em que se deseja analisar a expressão de genes. Neste minicurso serão abordadas as etapas de pré-preparo para o qPCR, desde a extração de RNA das amostras até a síntese de cDNA e a montagem das placas de qPCR. Além disso, iremos mostrar como diferenciar expressão relativa e absoluta dos genes, e alguns métodos de quantificação da expressão.

Noções básicas de preparo de amostras para microscopia de luz aplicadas à morfologia interna de insetos

Glenda Samara Dias Santos e Helen Cristina Pinto Santos

Neste minicurso abordaremos as técnicas básicas necessárias para o preparo de material biológico para a microscopia de luz, incluindo: Obtenção da amostra biológica (sol. tampão); Fixação dos tecidos biológicos; Desidratação; Infiltração; Inclusão; Microtomia; Coloração; Montagem permanente de lâminas.

Workshops

Noções básicas de sistemática filogenética: uma abordagem molecular

Hugo de Azevedo Werneck

O minicurso tem como objetivo fornecer ao aluno aspectos gerais sobre sistemática filogenética, abordando os seguintes tópicos: 1) O que é evolução; 2) Diversidade Biológica; 3) Histórico da sistemática; 4) Cladística; 5) Introdução à filogenia molecular; 6) Introdução às ferramentas de bioinformática e bancos de dados para análises filogenéticas. Espera-se que ao final do minicurso, o aluno seja capaz de, ao menos de forma introdutória, enxergar filogeneticamente a diversidade biológica, ter uma visão sobre o papel da sistemática entre as ciências e as diferenças entre suas escolas, e ser capaz de compreender um texto especializado sobre filogenia molecular.

Proteômica e atividade de proteases de *Anticarsia gemmatalis*

Juan D. R. Díez, Fabricio R. Ribeiro e Jenny D. G. Arrieta

O minicurso propõe abordagem geral sobre as proteínas do intestino médio presentes na lagarta da soja *Anticarsia gemmatalis*, Hübner (Lepidoptera, Nuctuidae), que interagem ou são alvo dos inibidores de proteinases, sua cinética, purificação e função.

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Density-dependent prophylactic immunity in *Melipona quadrifasciata*

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Density-Dependent Prophylaxis (DDP) predicts that organisms invest more in immunological defence when in high densities. We hypothesize that social insects will invest more in behavioural than in physiological plastic immune defence, for colony protection. To test this hypothesis, we evaluated physiological and behavioural parameters in a stingless bee *Melipona quadrifasciata*, kept at different densities for 10 days. The physiological parameters are encapsulation and haemocyte densities. For encapsulation, test workers were challenged with a colourless nylon filament, inserted through the lateral region of the thorax. Two measurements were taken: capsule area and capsule melanisation. To count haemocyte densities, test workers were decapitated in order to collect haemolymph and haemocytes were counted in a Neubauer chamber. To examine behavioural defences, workers from the same colonies were marked on their thorax and contaminated with spores of *Beauveria bassiana* and put in contact with one bee from each density treatment. As a control, we performed the same procedures for bees without fungi. We observed antennation, self-grooming, allogrooming and aggression. Per capita interactions among bees with density treatments showed that density is in accordance with connectivity, i.e., higher density leads to higher connectivity. Physiological variables were not affected by density. In behavioural parameters, without fungi only antennation was observed, and it was more frequent at higher density. With fungi, antennation was more frequent at lower density, and aggression was the behaviour most observed at high densities. This seems to happen because when in contact with a contaminated bee, tested bees should have other priorities (i.e. to exterminate contaminated bees). Our results show that, in this bee, DDP is more expressed in behavioural than in physiological plastic defences.

Keywords immune defence, social insect, density-dependent prophylaxis

Routes of exposure and behavioral effects of “Milone” essential oil against cutting ant

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Leaf-cutting ants of the *Atta* genus are important pests of agricultural and forestry crops. The main way to control this pest is the use of organo-synthetic insecticides, however, wholesale use has led to damage to the environment. The essential oils have been studied as a management alternative to various pests. The chemical diversity found in plants essential oil is seen as models for synthesis of safer pesticides to environment and society. The aim of this work was to evaluate the toxicity of *Aristolochia trilobata* essential oil and its major compounds on *Atta sexdens*. The compounds were identified by GC-MS-FID. The commercial standards was purchased from Sigma Aldrich Company; and sulcatyl acetate was isolated in laboratories. The toxicity of treatments was evaluated by two routes of exposure: contact by topical application and fumigation. To determine the treatment efficacy by these two routes of exposure, a dose of 10 μ g mg⁻¹ was used in the contact bioassay, and a concentration of 10 μ L L⁻¹ was used in the fumigation bioassay. The behavioral effects of the *A. trilobata* essential oil and its major components on ants were separated into repellency (avoidance without previous contact) and irritability (avoidance after contact). The essential oil and its major components were effective against *A. sexdens* workers when the route of exposure was fumigation. These components caused greater than 80% mortality after 48 h of exposure via fumigation. The essential oil of and its major components were repellent to *A. sexdens*. On average, 46% of the experimental time elapsed before *A. sexdens* individuals first contacted the treated surface. In general, the insects spent more than 92% of the total time on the untreated side after contact. The essential oil of *A. trilobata* and its monoterpenes may consist alternative to insect control, representing promising sources for new insecticides molecules.

Keywords Aristolochiaceae; monoterpenes; irritability

The colonization of tracajá nests (*Podocnemis unifilis*) by the fire-ant (*Solenopsis geminata*) at RDS Piagaçu-Purus, AM

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Nest predation is a common threat to turtles population. The intensity of predation is dependent of the identity of the predator, hanging from few eggs predated by lizards to nearly all offspring killed by ants. Recently, the nest colonization and egg predation of tracajá (*Podocnemis unifilis*) by fire ants (*Solenopsis geminata*) was reported in the RDS Piagaçu-Purus, AM, Brazil. Here we aimed to determine when the colonization of *P. unifilis* nests by *S. geminata* occurs. The ants were sampled in Sept. 2013 and Oct. 2014 (beginning of the breeding season) and in Dec. 2013 and 2014 (end of the breeding season). Overall 60 tracajá nests were monitored. The ants were sampled by 3 pitfalls established around each nest and at an adjacent area 20 m away from the nest, following the same spatial design. The pitfalls were partially filled with alcohol and left open for 48 h. We used paired t-tests to compare the abundance of *S. geminata* around the *P. unifilis* nest and at the adjacent area. A total of 4,945 ants were collected in tracajá nests and 2,396 ants were sampled at adjacent areas. *S. geminata* was the most abundant species, accounting for 45% of the ants sampled. At the beginning of the incubation period, the abundance of *S. geminata* in tracajá nests and at the adjacent areas was similar ($t = -0.379$, $p = 0.646$). However, at the end of the incubation period the abundance *S. geminata* around the nest was 2 times greater than in adjacent areas ($t = 1.754$, $p = 0.046$). After nest colonization, the ants killed all tracajá offspring. Our results suggest that *S. geminata* may be attracted to the tracajá nests during egg hatching. After hatching, the tracajá offspring can stay up to 30 days in the nest absorbing egg yolk, becoming an easy prey for ants. Management actions at the end of the *P. unifilis* breeding season are likely to be more effective for species conservation.

Keywords freshwater turtle, nest predation, flooded forest

Diel Flight Activity and Temporal Partitioning of Dung Beetles Community (Coleoptera: Scarabaeidae) in Atlantic Forest

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Temporal variation of dung beetle community can be considered a mechanism to avoid competition, allowing coexistence and maintenance of high levels of diversity in natural areas. We aimed to evaluate dung beetle community in Atlantic Forest areas, their diel flight activity and temporal distribution in the Parque Estadual dos Campos Altos' (PECA) buffer zone, Alto Paranaíba- MG. We tested the hypotheses: (i) there will be differences in dung beetles' species composition according to the day period; (ii) there will be higher diversity of dung beetles in diurnal periods than in nocturnal due to higher mammal activity in that period. The dung beetles were collected in four forest areas, using pitfalls traps baited with human faeces. The traps were verified at intervals of 3 hours (8 a.m., 11 a.m., 2 p.m, 5 p.m., 8 p.m., 11 p.m., 2 a.m., 5 a.m.) for 24 hours. We collected a total of 151 individuals of 14 species. There was dominance of two species: *Pseudocanthon* sp. (30% - roller) and *Eurysternus* sp.1 (30%- dweller). *Pseudocanthon* sp. presented exclusively diurnal activity. *Eurysternus* sp.2 (dweller) was the only species restrict to nocturnal period. The period of 11 p.m to 5 a.m. presented the lowest dung beetles' activity ($\chi^2 = 32.552$, $p < 0.001$). The period of 2 p.m. had the highest abundance: 56 individuals collected ($\chi^2 = 26.889$, $p < 0.001$). Species composition analysis detected two mainly groups: diurnal and nocturnal communities. Dung beetles community in PECA is predominantly diurnal composed by small species, probably due to mammal's habits living in the region.

Keywords Coexistence, functional guild, insect biodiversity

First report of *Wolbachia* infection in *Zaprionus indianus*: evidence of a recent symbiont acquisition

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Wolbachia is a highly diverse genus of intracellular, maternally inherited endosymbionts, found in many species of arthropods and nematodes. Estimates suggest that *Wolbachia* infects at least 70% of all insect species. *Wolbachia* have evolved several strategies such as male killing, feminization, parthenogenesis, and cytoplasmic incompatibility to manipulate host reproduction, and consequently increasing the female fitness in arthropod populations. The studies of *Wolbachia* in model species of Drosophilidae have been quite important to the current understanding about the evolution of this endosymbiont. *Zaprionus indianus* is a Drosophilid Afrotropical species that recently invaded South America causing economical issues in fig cultures. Its first record in Brazil was in 1998. Previous works tested for *Wolbachia* infection in native *Z. indianus* populations and found no evidence there. In this work, we captured the flies from Viçosa-MG using banana-baited traps, and individual females were transferred to culture medium to establish isofemale lines. The species status of collected *Z. indianus* was determined by using morphology and COI sequence bar coding. We extracted the total DNA of each single female and tested them for *Wolbachia* infection in PCR reactions using wsp, 16S, and ARM primers. All reactions were positive and the amplification of ARM provided a further evidence of infection by a supergroup A *Wolbachia*. To our knowledge, this is the first report of *Wolbachia* infection in *Z. indianus*. Our result provides a strong evidence of a recent infection of *Wolbachia* in *Z. indianus* acquired after its entry in Brazil. Beyond the evolutionary importance, this result also might be useful to future strategies of this species control.

Keywords *Wolbachia*, Drosophilidae, PCR-detection,

House infestation by *Triatoma infestans* and association with environmental variables on Municipality of Toro Toro (Potosi-Bolivia)

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The main vector of Chagas disease in Bolivia is *Triatoma infestans*. This species is still present in domestic and peridomestic structures of rural communities, as well as in wild ecotopes. The identification of areas persistently showing low and high house infestation by the vector is very important for the management of vector control programs. This study aimed at analyzing the temporal and spatial distribution of house infestation (HI) by *T. infestans* in the Toro-Toro municipality (Potosi-Bolivia) between 2009 and 2014 and its association with environmental variables (EV). The HI and *T. infestans* density was calculated according to standard procedures. The spatial heterogeneity of HI was evaluated using the SatScan statistics. Association among HI and EV and altitude was analyzed using a generalized linear model with a logit link. The final model was used to create a probability map of HI for the Toro Toro municipality. All calculations were carried out using R packages. A total of 73 communities and 16.489 HI events were analyzed. Presence of *T. infestans* was recorded on 480 house evaluation events, giving an overall HI of 2.9% during the studied period. Annual values of HI varied between 1.6% (2009) and 5.6% (2012). Vector density remained at about 1.25 insects/house. HI showed highly aggregated in 5 clusters including 11 communities. Relative risk of infestation within these clusters was 1.7-3.9 times the value for the regional average. Four EV were identified as good descriptors of HI, explaining 57% of HI variability. The results of this study show that a) there are residual and persistent populations of *T. infestans* that maintain low HI, representing a potential risk of HI resurgence in the area, b) it is possible to stratify HI risk using EV, and produce a risk map to guide the activities of vector control intervention in the municipality Toro Toro.

Keywords *Triatoma infestans*, house infestation, environmental variables

Insecticidal ecological selectivity on predatory wasps

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In South America, *Tuta absoluta* (Lepidoptera: Gelechiidae), is the most important pest of tomato crops, attacking leaves, stalks, flowers and fruits, resulting in losses up to 100%. The Chemical control is the most used method. However, natural control is also fundamental in regulating the natural populations of this pest. In this context, predatory wasps (Hymenoptera: Vespidae) represents an important factor to reducing the population density of *T. absoluta*. We aimed to verify the effect of three rain regimes on ecological selectivity of insecticides to predatory wasps. We tested four insecticides (spinosad, beta-cyfluthrin, chlorfenapyr and abamectin) in two predatory wasps species, *Protonectarina sylveirae* and *Polybia scutellaris*. The experimental design consisted of randomized blocks with four replications, conducted as a factorial (3 x 5), i.e., three different intensities of rain (no rain, 4 mm and 125 mm) and five treatments (four insecticides and water as control). The plants were divided in three groups. Two exposed to rain (4 mm and 125 mm) and one remained in greenhouse. The leaves were collected on the day 0, 5th, 10th, 20th and 30th day after the application and the wasps were exposed to them. The mortalities were observed after twenty-four hours. In the absence of rain, all the insecticides caused mortalities up to 80% in the first days after spraying. The mortalities caused by spinosad to both wasp species, beta-cyfluthrin to *P. sylveirae* and chlorfenapyr and abamectin to *P. scutellaris* declined when the plants received 4 mm of rain. Large reduction in the wasps mortality was observed in all treatments when the plants were treated with 125 mm of rain. The higher wasps susceptibility to insecticides justify the adoption of techniques that minimize its exposure. Therefore, the application of insecticide before the occurrence of rain or sprinkler irrigation can be an efficient method.

Keywords Natural enemies; rainfall; chemical control

Are honeybee glands affected by deformed wing virus?

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The deforming wing virus (DWV) is a viral pathogen associated with honeybees but the effect of DWV in *Apis mellifera* glands has not been studied, which was the aim of this study. The research was carried out in Salford, UK, where 30 honeybees with DWV symptom (SB) and 30 newly emerged honeybees without symptoms (NSB) (negative control) were collected. The salivary thoracic, salivary cephalic, mandibular, and hypopharyngeal glands, and brain were dissected, and the area (mm) was measured using ImageJ software. A total protein content was also performed on these structures using the Bradford method. ANOVA and Tukey's test ($p < 0.05$) were applied against the data. All glands studied in SB showed disruption of tissues forming a shapeless mass having only few intact structures, but no abnormalities were observed on the brains. The size of the glands and brain were statistically different ($p < 0.01$) with the glands and brain in NSB larger than in SB. The structures sizes in SB were: 40.59 mm (salivary thoracic), 7.07 mm (salivary cephalic), 36.96 mm (mandibular), 23.60 mm (hypopharyngeal), and 70.72 mm (brain). In NSB the structures sizes were 124.13 mm (salivary thoracic), 38.85 mm (salivary cephalic), 88.70 mm (mandibular), 62.43 mm (hypopharyngeal), and 132.80 mm (brain). The total protein (in microgram of protein in gland or brain) content in SB were: 24.61 (salivary thoracic), 3.44 (salivary cephalic), 18.87 (mandibular), 14.71 (hypopharyngeal), and 55.56 (brain). In NSB the total protein were 20.94 (salivary thoracic), 3.10 (salivary cephalic), 34.71 (mandibular), 35.77 (hypopharyngeal), and 64.70 (brain). The protein content was higher in SB in the salivary thoracic gland and similar between the two groups in salivary cephalic glands. However, the results showed that SB are unable to perform any activities in the colony because the glands were damaged which could be the reason that those bees die after three days.

Keywords DWV, *Apis mellifera*, pathology

1 Dynamics population sharpshooters-of-pastures (Hemiptera) in production systems conventional grassland and agroecological in Laranjeiras do Sul, Paraná

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Cattle with extensive productions rely on grasses for meat production. These pastures have been attacked by leafhoppers-of-pastures (Hemiptera), as important pests in several agricultural ecosystems because these insects generate a lot of damage due to sucking sap from injuries caused by the injection of toxic substances in host plants. The objective was to evaluate the population dynamics of sharpshooters-of-pastures of agroecological system in, graminea tifton 85 (*Cynodon dactylon*) and conventional system in graminea brachiaria type (*Brachiaria decumbens*). It was held fortnightly 26 collections on each property, in the period between october 2013 and february 2015. The adults sampling was conducted using an insect net (with a diameter of 40 cm curve). In each sample ten points were selected at random and each sampling point was made with a sweep net. The collected insects were placed in plastic bags and sent to the laboratory. During the study, we collected a total of 945 adults in both properties. There was an increased amount of the conventional system (65%) compared with the agroecologic (35%). The *Zulia entreriana* species were predominant in all samples. In agroecological property the peak population of insects was recorded in the month of november 2013, and in conventional property was observed in january 2014. The species of leafhoppers-of-pastures that occur in the properties were: *Zulia entreriana*, *Dalbulus maidis*, *Deois schach*, *Deois flavopicta* and *Mahanarva fimbriolata*. As *Zulia entreriana* predominant species, accounting for approximately 87% and 98% of the individuals listed in agroecologic system and in the conventional system, respectively. Other species of leafhoppers-of-pastures, there were an incidence of sharpshooters: *Empoasca* sp. and *Dalbulus maidis* in both areas studied.

Keywords *Zulia entreriana*, tifton, brachiaria, forage.

2 Control of *Vatiga illudens* (Hemiptera: Tingidae) with *Beauveria bassiana* in the cassava crops

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Cassava *Manihot esculenta* Crantz belongs to Euforbiacea family, the main product is the roots, as much starch as flour, consumed in several countries. Due to expansion of production areas, it intensified pest attack, demanding actions for the control. The objective of this study was to evaluate the income lacebug control *Vatiga illudens* with the implementation of biological control through the application of entomopathogenic fungus *Beauveria bassiana*. The experiment was conducted in Chapadão do Sul, Mato Grosso do Sul, in an area of 960 m², with two cultivars (Crioula and Fécula Branca), planted with 1x1 meter spacing divided into four homogeneous plots. The surveys of population fluctuation of income lacebug began in February 2014, counting 10 leaves / plant, five from the middle third, and five from the upper third plants, quantifying adults and Nymphs. The applications of *Beauveria bassiana* isolated IBCB 66, were done using backpack pump, with applications from April to June 2014, with the jet directed from the base to the apex of the plants. The experimental design was a randomized complete block, consisting on 2 treatments and 20 repetitions, representing each sampled plant. Data were analyzed using the Scot-Knott test at 5% probability. The number of nymphs and adults in middle and upper thirds of Crioula plants was higher than in Fécula Branca. Three applications of the entomopathogenic fungus *Beauveria bassiana* were efficient to reduce the insect population, particularly the lacebug nymphs present in the middle third of the plants.

Keywords *Manihotesculenta*; lace bug; biological control

3 Toxicity of essential oil from *Aristolochia trilobata* and four monoterpenes against *Atta sexdens*

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Due to abundance and great damage they cause, the cutting ants *Atta* sp. (Hymenoptera: Formicidae) are considered one of the main pests of agriculture and forest areas in neotropical regions. *Aristolochia* genus plants have high bioactive potential, but do not have accounts of its effects on cutting ants. In this work we analyzed the essential oil chemical composition of *Aristolochia trilobata* and test its toxicity and its major compounds on *Atta sexdens* ants. The toxicity of essential oil and its major components was evaluated by fumigation bioassays with workers and the mortality was assessed after 48 hours of exposure. The treatments were applied in a filter paper (1 cm²) suspended by a line fixed on the center bottom of a glass container lid, which was sealed. For each treatment were calculated the LC50 and LC90 (lethal concentration to cause 50% and 90% of mortality) using SAS software. Based on the LC90 were performed lethal time bioassays and determined the survival curves. Sulcatyl acetate, limonene, p-cymene and linalool compounds were found in larger quantities from 25 identified by GC/ MS/ FID. The essential oil of *A. trilobata* has ant activity. The LC90 of the essential oil and its major components ranged from 17.71 to 28,79 μ L L⁻¹. The survival of *A. sexdens* ants exposed to essential oil and its major compounds in a LC90 was significantly reduced over time. The essential oil, sulcatyl acetate, p-cymene, linalool and limonene caused 100% mortality at less than 35 hours of exposure. These substances acted quickly, causing mortality in the half population in less than 20 hours. The essential oil and its major components showed rapid and efficient ant activity against *A. sexdens*. The great potential of this study shows the need to investigate the practical application of *A. trilobata* essential oil to control these insects in the field and possibly the development of new insecticides.

Keywords Aristolochiaceae; fumigation; bioinsecticides

4 Atrativity of *Neoleucinodes elegantalis* (Lepidoptera: Crambidae) to electromagnetic radiation

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The tomato fruit borer, *Neoleucinodes elegantalis* (Lepidoptera: Crambidae), can cause direct damage to tomato crops leading to yield losses varying from 45 to 90%. Searching for alternative control methods with no residues on tomato fruits has led researchers to study the use of light traps for adult sampling and understanding population dynamics due to traps easy handling, with fast processing and low cost. Therefore, the objective of this study was to evaluate the attractiveness of *N. elegantalis* adults to the electromagnetic radiation produced on light traps with lamps with different wave lengths. Thus, we tested four different fluorescent tubular light bulbs: “Black Light Bulb” ($\lambda = 365$ nm) (QualityF15-2009.06/BLB) (BLBu); “Black Light/UVA” ($\lambda = 350$ nm) (Silvania, F15T8/350BL) (BL-UVA); “Black Light” ($\lambda = 385$ nm) (Taschibra, TKT 26-2 KAY) (BL); “Black Light Blue” ($\lambda = 365$ nm e 380 nm) (Xelux, F15T8/BLB) (BLB) placed individually on a light trap in a dark room (wide 3 x 3 length x 2,5 height). Ten adult moths were kept in a tube for 30 minutes next to the light trap. After that, the light traps were turned on and adults released. Light attractiveness for each trap was observed for a period of 12 hours, starting at 6:00 pm until 6:00 am of the following day, when the light traps were turned off. This procedure was repeated for 15 consecutive days, in a complete randomized experimental design. Data were submitted to analysis of variance and means compared by a Tukey test with 5% probability. Adults showed a decreasing attractiveness to the different light bulbs as follow: “Black Light/UVA” (3.67), “Black Light”, “Black Light Blue”, and “Black Light Bulb”, respectively.

Keywords tomato fruit borer; light trap; attractiveness

5 Evaluation of the pesticide use in combating aphids *Brevicoryne brassicae* L. (Hemiptera: Aphididae) and cabbage caterpillars *Ascia monuste orseis* (Lepidoptera: Pieridae)

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Many farmers from Muriaé (MG) use the Decis25 EC (Deltametrina) pesticide on their crops to control aphids and cabbage caterpillars. The dilution percentage may vary the oriented in the prescription and it may aggravate increasingly the poisoning rate in people who eat these vegetables. The goal of this work is to verify the amount of pesticides required, used in the solo for cabbage's cultivation in the control of aphids *Brevicoryne brassicae* L. and cabbage caterpillars *Ascia monuste orseis*, and to evaluate the amount necessary to kill these insects. This research was done in Farm Capolirãõ, located in São João do Glória, Muriaé. The pesticide used named Decis (Deltametrina), recommended for cabbage's cultivation. The caterpillars and aphids were put on the cabbage and submitted to different concentrations of the product to evaluate the effect. Decis25 EC (Deltametrina), in the indicated concentration (30 ml/ 100 L), (it was considered total quantity) was diluted in order to have concentrations of 50% and 75%. It was done 4 times to each concentration, in each they put on 20 individuals. In this research, it can be concluded that the concentration indicated in the prescription or in less quantity can exterminate caterpillars and aphids in view at all concentrations used had total kill after the first day of exposure of the product.

Keywords Pesticide; Control; Insects

6 Management of insect vectors viruses in tomato plants traps and density of yellow color

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The initial phase of tomato has been critical to the infestation of insect vectors of viruses, therefore, this study aimed to test the use of yellow traps surrounding culture for the management of insect vectors of viruses and test the best density of trap/tomato plants. The yellow traps (100 x 30 cm) were placed on the boundary of culture to capture adult insects vectors. The experiment trap density yellow/plant was conducted in 10 blocks at the following densities: 1/25; 1/50; 1/75; 1/100; 1/125; 1/150 trap/tomato plants. The monitoring was carried out in 1% of the culture for 60 days for 2011 and 2012 harvest. Treatments evaluated were conventional and Phytosanitary Pest Management (PPM). For the 2011 season only 6 insecticide applications were made on the PPM, against 14 for the conventional, a reduction of 133%. In the 2012 planting with PPM was subjected to 8 applications of insecticides, against 15 for the conventional, having a reduction of 87.5%. The PPM enabled a 90% reduction in the cost of application for insect vectors of viruses, obtaining a saving of R\$ 1.345.00/ha. Highest density was 60 plants/trap. We can conclude that the use of yellow traps in tomato farming, decreased infestations of insect vectors of viruses, thereby reducing the use of pesticides for the control of the same, increasing the profitability of the crop.

Keywords Vectors viruses; *Lycopersicon esculentum*; Trap yellow color

7 Population fluctuation of *Aleurocanthus woglumi* (hemiptera: Aleyrodidae) in citrus in the northern edge of Tocantins

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The citrus blackfly, *Aleurocanthus woglumi* is an important citrus pest of Asian origin. It was detected in Brazil for the first time in Belém-PA in 2001, being a threat to citrus growers from across the country because it is a quarantine pest A2. We have few reports on its occurrence in Tocantins. Regarding the incidence of *A. woglumi*, it was made the following questioning: what is the most favorable period for each stage of their life cycle in citrus in the northern edge of Tocantins? On this account, the study considered the hypothesis that there is a period appropriate for the population incidence of each phase. The objective of this study was to understand the occurrence and abundance of *A. woglumi* in citrus plants in the experimental area of citrus of the Federal Institute of Tocantins – IFTO, at the campus in the city of Araguatins, in the northern edge of Tocantins. The deployed orchard in 2011, has approximately 250 plants with several varieties Lemon (Tahiti and Galician), Orange (Pera, Lima of Pérsia, Bahia, Sanguínea, Atrifobata, Natal), Tangerine (Pocã and Morgote), its total area measuring 1 ha with spacing 5m x 5m x 5m staggered type. For sampling of *A. woglumi*, were selected 10 plants randomly, were collected 20 leaves per plant, from April 2014 to March 2015 and, every 15 days, recorded the numbers of laying. The sampling of the quantity of laying demonstrated that there is significant occurrence of laying from April to November with the highest rate occurring in October and declining from November. For *A. woglumi* adult, the inverse occurred after laying, there was a decreasing in population density until October, followed by an increase after this period, reaching a population peak in March. The nymphs Population fluctuation had a significant occurrence throughout the sampling period with the highest rate achieved in the months of October and January, and lowest in February.

Keywords Bioecology; citrus; pest

8 Insecticidal potential of essential oil from *Lippia gracilis* and its major compound on *Diaphania hyalinata*

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The melonworm Moth (*Diaphania hyalinata*) is a key pest of several crops such as cucumber, pumpkin and melon, which is controlled by the use of chemical insecticides. But indiscriminate use of these products has been causing many problems to the environment and human health. Therefore, essential oils from plants are being used as a viable alternative for combating of pest insects. The essential oil from *Lippia gracilis* has a high potential for synthesis of new insecticidal molecules. Thus this study aimed to evaluate the toxicity of essential oil from *L. gracilis* and its major compound thymol against *D. hyalinata*. In determination of LD50 and LD90 in different doses, the essential oil and its major compound were dissolved in acetone and applied by microsyringe at the dorsal region of 2nd instar caterpillars. The same procedure was performed to determine the lethal time using the LD90 determined in the previous bioassay. Twenty compounds, accounting for 100% of the oil, were identified by GC/MS/FID, and the major constituent was thymol (43.8%). The essential oil from *L. gracilis* was toxic to *D. hyalinata* and it affected the survival by killing 50% and 90% of the caterpillars, requiring only 5.90 μ g/mg and 18.43 μ g/mg, respectively. The major compound was about twice more toxic than essential oil, with LD50 of 2.99 μ g/mg and LD90 of 6.89 μ g/mg. The survival of *D. hyalinata* was significantly reduced over the time (log-rank test: $\chi^2 = 280,05$; df = 4, p < 0.001). The essential oil had a faster effect than its main compound, requiring 2.9 hours to kill 50% of the population. However, 6.2 hours of exposure to thymol were required to cause the same mortality. The essential oil and its major compound were toxic to *D. hyalinata* therefore they have great potential as a source for synthesis of new insecticide molecules.

Keywords Monoterpenes; Noctuidae; botanical insecticides

9 Toxicity of the essential oil of *Croton pulegiodorus* on *Sitophilus zeamais* on stored maize

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On stored maize, one of the main pests is the weevil *Sitophilus zeamais*, which causes weight loss, affects the nutritive value and decrease the vegetative power of the seeds. Although the chemical methods used to control this pest are effective, they can cause undesirable effects, such as intoxication on people who apply the product, resistance on insects and toxic residual on food. Then, new methods have been developing as alternative control to minimize the attack of these insects. This study evaluated the insecticide effect of essential oil of Zabele (*Croton pulegiodorus*) on the coleopteran *S. zeamais* in dosages of 0, 5, 10, 15 and 20 μ L/20g on storage maize. The maize seeds were stored in plastic containers and impregnated with oil, applied with an automatic pipettor, where the insect mortality was assessed after 48h. Significant differences were observed when dosages greater than 10 μ L was used and it eliminated significant quantities of the *S. zeamais* population. This experiment showed that the essential oil of *C. pulegiodorus* is promising method to handling the weevil *S. zeamais*.

Keywords Botanic Insecticides; Coleoptera; Stored grains

10 Sublethal effect of the essential oil from *Lippia gracilis* and carvacrol against *Cryptolestes ferrugineus*

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The beetle *Cryptolestes ferrugineus* is a secondary pest of great importance in stored products and its infestation causes severe damage, including reduction of product acceptance in the market. Populations of *C. ferrugineus* has become resistant by indiscriminate use of synthetic organic insecticides, thus alternative controls for this pest have been studied. Thereby this study aimed to evaluate the behavioral effects of essential oil from *Lippia gracilis* and its major compound carvacrol against *C. ferrugineus*. The leaves powder of *L. gracilis* underwent hydrodistillation in a Clevenger apparatus and the obtained essential oil was analyzed by GC-MS/GC-FID. The experimental design was completely randomized with 20 repetitions. Each repetition consisted by one *C. ferrugineus* adult in a petri dish lined with filter paper divided into two equal halves, one treated and the other untreated. The behavior of individuals was evaluated for ten continuous minutes. When the insect came in contact with treated side for less than 1 second, the behavior was defined as repellency and when it spent less than 50% of time on the treated side, the behavior was regarded as irritability. The major compound carvacrol was more repellent than essential oil, whose values were 82% and 80% of repellency respectively. Furthermore, the oil showed great irritability to *C. ferrugineus* which remained 96.1% of total time in the field of untreated arena. The essential oil of *L. gracilis* and its major compound are repellent, they cause irritability to *C. ferrugineus* adults and therefore they can be used to obtain new insecticide molecules

Keywords Cucujidae; Verbenaceae; carvacrol

11 Effects of temperature on the development and damage potential of *Achariafusca* (Lepidoptera: Limacodidae)

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The development, life history, and fecundity of *Achariafusca* (Lepidoptera: Limacodidae), an important oil palm pest, was studied at various treatments of temperatures ranging from 10 to 40°C, at a constant relative humidity of 75 ± 5% and a photoperiod of 12:12 (L:D) h. In addition, the amount of leaf consumed by larval instars was measured. Females and males successfully developed into adults within 15-35°C. However, no eggs were found at 10°C, and all adults died after exposure to 40°C. The developmental time from egg to adult ranged between 170.5 d at 15°C and 76.6 d at 35°C ($F_{1,97} = 56.2$; $P < 0.0001$). Temperature had a strong effect on the survivorship of *A. fusca* from the egg to adult emergence, increasing between 15 and 20°C, peaked at 25-30°C, and then declined slightly at 35°C. The different periods of the insect's total reproductive life varied between 15 and 35°C, with the preoviposition periods ranging between 6.82 and 3.24 d, the oviposition period between 17.5 and 4.89 d, and the postoviposition period between 5.29 and 0.82 d. Female longevity was greater than male longevity at all temperatures. The total amount of leaf area consumed by one larva was 402.3 cm². The results indicated that the development period from egg to adult death decreased with increasing temperature and the larvae maintained a high consumption rate on *Elaeisguineensis* leaves. The effect of temperature on development, survival, and reproduction of *A. fusca* can be useful for predicting its long-term population fluctuation as an invasive pest of oil palm plantations.

Keywords fecundity; leaf consumed; life history

12 Efficacy of isolates of *Nomuraea rileyi* for controlling *Spodoptera cosmioides* (Lepidoptera: Noctuidae)

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Soybean *Glycine max* (L.) Merrill cultures are susceptible to attack by various leaf-eating pests, including *Spodoptera cosmioides*. The use of insecticides is one of the most common methods for controlling pests; however, they are potentially toxic to humans and the environment. With the aim of reducing agrochemical use, biological control with entomopathogenic fungi has been used as an alternative in the context of Integrated Pest Management (IPM). The objective of this study was to assess the efficacy of *Nomuraea rileyi* isolates (UFMS 5, UFMS 6, UFMS 7, and UFMS 8) for controlling *S. cosmioides*. Second instar larvae were obtained from a mass production at the Entomology Laboratory of the Universidade Federal de Mato Grosso do Sul (UFMS). Five larvae were used per dish and 10 repetitions were used per treatment for each tested isolate and the control (without fungi). In the bioassay, a fungal suspension was standardized to a concentration of 1.0×10^9 conidia/mL in 1 mL of 0.02% Tween 80. Previously, disinfected soybean leaves were placed into glass dish (9-cm diameter) and the larvae were introduced into the dishes. Then, 1 mL of the fungal suspension was sprayed into each dish using potter tower, at a pressure of 15 pounds/inch². The plates were sealed and placed in a climatized BOD chamber at a temperature of $25^\circ \text{C} \pm 1^\circ \text{C}$ and relative humidity of $70\% \pm 10\%$ under a 12-h photoperiod. Mortality was assessed after 24 h and the number of dead insects and leaf replacements were recorded daily. Data were treated using the Abbott formula for the calculation of efficacy 26 days after the application of fungi. All fungal isolates caused the death of *S. cosmioides*, with efficacies of 57.9%, 63.2%, 52.6%, and 78.9% for isolates UFMS 5, UFMS 6, UFMS 7, and UFMS 8, respectively. Under laboratory conditions, UFMS 6 and UFMS 8 were the most effective, indicating their potential for controlling this pest.

Keywords microbial control; entomopathogen; soybean pods; armyworm

13 *Tetranychus ludeni* (Acari: Tetranychidae) control using entomopathogenic fungi in *Ipomoea batatas*

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Inadequate cultural practices and genetic materials (cultivars) susceptible to pests and diseases are causes of low productivity in sweet potato *Ipomoea batatas* (Convolvulaceae). The mite *Tetranychus ludeni* (Acari: Tetranychidae) was observed causing damage to this vegetable. The aim was to evaluate the biological control of *T. ludeni* using the entomopathogenic fungi *Metarhizium anisopliae* and *Beauveria bassiana* in a sweet potato genotype. The bioassay was in a completely randomized design with factorial 2 x 3 (two species of fungi at three concentrations). The genotype used was BD-29, highly susceptible to this mite. *T. ludeni* individuals were obtained from the mass rearing of the Laboratory of Biological Control of Insects - UFVJM. Commercial products used to obtain the fungi isolated were Metarril® WP E9 and Boveril® WP PL63 at concentrations of 106 and 107 conidia/mL-1 and the control treatment (water + Tween® 80 to 0.01%). Each plot consisted of a Petri dish with nylon foam, where ten leaflets with a diameter of 2 cm were placed and sprayed with solution of fungi conidia at two concentrations. Five newly emerged females of *T. Ludeni* were released in each circle. The evaluation was based on the observation of three factors: mortality, oviposition and repellency every 24 hours and 96 hours. The dose of 107 conidia/mL-1 of the fungus *M. anisopliae* caused 80% mortality and reduced by 60% the oviposition of *T. ludeni* after 96 hours. Both fungus concentrations of *B. bassiana* caused around 60% mortality and reduced oviposition by 88% after 96 hours. No differences in repellency between the three treatments were observed. Entomopathogenic fungi had negative effects on females of *T. ludeni*, causing mortality and reducing oviposition. These results are a contribution to the pest management program of this culture.

Keywords entomopathogenic fungi; mite; genotype

14 *Balclutha hebe* and *Curtara atomaria*, non-seasonal leafhoppers in a seasonal environment (Hemiptera: Cicadellidae)

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Analyzing relationships between environment and its species helps to comprehend which ecological factors are relevant to a specific population. From an anthropocentric point of view, these studies are relevant when they approach, for example, phytophagous insects within an agricultural region, helping on the detection of potential plague in this area. Mata do Paraíso (20°45'S; 42°51'W) is a secondary reserve of tropical rain forest on an advanced state of recovery, bonded to Universidade Federal de Viçosa (UFV), Viçosa municipality, Zona da Mata, Minas Gerais State, southeastern Brazil. Measuring 400 hectares, the reserve was once used as a source of wood and coffee crop site. Currently, Mata do Paraíso is administrated and protected by the Depart. de Engenharia Florestal of UFV and the usage of the resources available is no longer permitted. Based on study samples collected from 1981 to 1992 on Mata do Paraíso, it was possible to analyze the population variation of leafhoppers (Cicadellidae) that occur in the area. The samplings were performed in a twilight-night operation using a “Luiz de Queiroz” light trap, with UV light bulb (15W, 100V), positioned about 2.5 meters above the soil. The climatic seasons are a proven influence to the dynamics of many tropical insects’ populations. Seasons can be marked by the balance between precipitation and evaporation, which first would be the dry season (April to September) and the other being the rainy season (October to March). The majority of the leafhoppers’ species had the highest population values on the rainy season. However, some species did not follow this pattern, not presenting a significant numerical difference among the seasons. Between the species in the sampling with the constancy above 25%, the ones that apparently do not have a seasonal variation are *Balclutha hebe* (Deltocephalinae) and *Curtara atomaria* (Iassininae), both being characterized here as non-seasonal in the region of Mata do Paraíso.

Keywords Auchenorrhyncha; seasonality; Brazil

15 Influence of direct spraying of pesticides over adult samples of *Trichogramma pretiosum* (Hymenoptera: Trichogrammatidae)

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Trichogramma pretiosum (Hymenoptera: Trichogrammatidae) is an efficient biological control agent for the integrated management of pests. However, the use of pesticides is still needed in order to control pests, and so, selecting those with the lowest negative impact to the beneficial agents is needed. For this reason, the goal of this study was researching the toxicity of the pesticides (g i.a.L-1) teflubenzuron (0,01875), tiodicarbe (0,5), clorfenapir (0,9), flupiradifurone (120) and metomil (1,075), on *T. pretiosum*. The products were used in the concentrations indicated by the manufacturer and/or that are under research for pest control in cotton culture, being applied on adult plants through Potter tower. After 6 hours of exposition of the adults to the product, the mortality rate of the females was evaluated, and for those adults which survived, cartouches with *Anagasta kuehniella* (Lepidoptera: Pyralidae) eggs were offered, for a 24 hour period of exposition to parasitism. In sequence, the females were kept in the same tubes, with the objective of evaluating their daily survival, and the cartouches with the eggs were put in new tubes and kept in conditioned chamber for the development of parasitoids. Metomil was the most toxic product to the parasitoid adults, with the average lethal period (TL50) of 1 day. The teflubenzuron, tiodicarbe and flupiradifurone pesticides did not reduce the emergence of *T. pretiosum*, and were rated as selective. However, clorfenapir lowered this biological parameter and was rated as mildly hazardous. All the compounds lowered the number of parasitized eggs, while clorfenapir was the pesticide which most affected this biological parameter, and was rated moderately hazardous. Overall, metomil and clorfenapir were the most toxic pesticides for the evaluated parameters, demanding studies in conditions of vegetation house and/or country, to evaluate their toxicity.

Keywords Chemical control; Cotton plant; Direct contact

16 Population dynamics of the leaf-footed bug on sunflower

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True bugs can cause different types of damage to sunflower in Brazil, when a severe attack of these bugs from the initial flowering stage to the stage of the end of flowering, culture is markedly impaired because these insects will preferentially affect the region chapter insertion. In this context, the leaf-footed bug is an important pest for sunflower, especially when it is planted in the sequence of the maize. The experiment was conducted at the Fazenda Bom Sucesso, Imóvel Buritis, whose geographical coordinates 16 ° 51 '21' 'to 49 ° 58' 25 " w, with an average altitude of 569 m. The objective of this experiment was evaluate the infestation of leaf-footed in sunflower. This crop was sown, at 80 ha, on February 27, 2014 and the harvest was made to 110 days after sown. The sunflower cultivar used was Aguará 4 at Atlantic Seeds Company which is a simple hybrid of early cycle. The evaluations were carried out on 19 March to 4 June, in ten georeferenced points. The results showed that the highest population density of the bug leaf- feet was the assessment on 29 April, when the crop was in their 62 days at the beginning of their flowering, averaging 1.54 bugs per sample point. This date onwards, the average per point was 1.10 to 1.20 bugs per sample point. The bug leaf-footed, while sucking sunflower chapter reduces productivity by suction seeds, seared seed and opening the gateway to other insects and some diseases.

Keywords *Leptoglossus* spp.; *Helianthus annuus*; sampling

17 Toxicity of essential oils against *Acanthoscelides obtectus*

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Brazil is a major producer and consumer of beans, and much of the production is lost by the attack of *Acanthoscelides obtectus* (Coleoptera: Chrysomelidae), during the storage. This insect control is usually done with synthetic insecticides, which may cause human and environmental contamination. Therefore this study aims to find alternatives to control this insect, through essential oils. Thus, we evaluated the toxicity of oils of peppermint *Mentha piperita*, cinamon *Cinnamomum zeylanicum*, tea tree *Melaleuca alternifolia*, lemon grass *Cymbopogon citratus* and citronella *Cymbopogon nardus* by fumigation on the adults of *A. obtectus*. The experiments were done under control conditions ($25 \pm 1^\circ\text{C}$; $70 \pm 10\%$ RH; 12h of photophase). To check the mortality 10 adults (0-24-hour-age) were placed in a square Gerbox® (0.363 L), containing within a small piece of filter paper (2x5 cm) impregnated with the pure essential oil to be tested and placed in the upper region of the Gerbox® and closed with tulle fabric (40 mesh) avoiding the direct contact with the insect. After 72 hours of oil exposure the number of dead insects was counted. The mortality data were submitted to analysis of variance and the means submitted to Tukey (P=0.05). *M. piperita* and *M. alternifolia* had satisfactory insecticide effect, causing mortality of 97.5% and 82.5%. Other oils had lower mortality, *C. citratus* (45%), *C. zeylanicum* (40%) and *C. nardus* (30%).

Keywords Stored grains; pest; control

18 Bioactivity of aqueous extracts of *Coussarea hydrangeifolia* (Benth.) on fall armyworm

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The objective of this study was to evaluate the effects of extracts from the leaves and stem bark of rubiaceae *Coussarea hydrangeifolia* to *Spodoptera frugiperda* (J.E. Smith, 1797) (Lepidoptera: Noctuidae) in no-choice test. It was estimated the median lethal concentration (LC50) of each collected plant parts. Thus, the aqueous extracts were added to artificial diet at concentrations 1%, 2%, 4% and 6% (v/v) and offered to the caterpillars 1st instar. Mortality was assessed daily until the pupal stage. For the second assay, the aqueous extracts of these plants were added to the artificial diet at concentration on the LC50 and offered to the caterpillars 1st instar of *S. frugiperda*. The biological parameters evaluated were: survival during the larval stage at every 24 hours, larval and fecal weight and food intake of larvae after sixteen days of the experiment assembly, duration of larval period, and pupal weight and survival. To construct the caterpillar growth curve, the insects were weighed ten days after beginning the experiment, and the subsequent weighings were made every 48 hours until the 16th day after the initiation of the experiment. Nutritional indices were calculated to measure consumption and use of food by the caterpillars. The method used to determine the indexes was gravimetric according to Waldbauer methodology (1968) and modified by Slansky Scriber (1985). For the tests were used 40 larvae per treatment. The control was composed of diet plus water. The data on cumulative mortality underwent to survival curve procedure using the Kaplan-Meier estimator. Values associated with the growth curve of larvae were analyzed using the logistic model and Lack- of-fit test. With regard to the duration of the larval stage, survival and duration in the pupal stage, pupal weight and nutritional indices data were subjected to Shapiro-Wilk test for normality and then to one-way ANOVA. The treatment means were separated using the Scott-Knott test. Aqueous extracts from the bark and leaves of *C. hydrangeifolia*, caused mortality and negative changes on biological parameters of *S. frugiperda*.

Keywords Military caterpillar; Botanical insecticide; *Coussarea hydrangeifolia*

19 Insecticide action of essential oil wort-Santa-Maria on *Sitophilus zeamais* (Coleoptera: Curculionidae)

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Brazil is a great grain producer, being the corn a grain of great economic importance. The corn's woodworm, *Sitophilus zeamais* (Coleoptera: Curculionidae) is one of the main plagues in the storage, causing the weight reduction and the grain nutritional quality loss. The control becomes a problem, and then the insecticide use, due to its toxicity, makes the grain consumption impracticable. This way the use of plants with insecticide action is standing out as an alternative for the plague control, thus, this assignment's objective was to evaluate the santa maria herb essential oil's insecticide potential (*Chenopodium ambrosioides* L.) to the control of the *S. zeamais*. The *C. ambrosioides* essential oil extraction was made by vapor with Clevenger. The assays were kept under the temperature of $25 \pm 1^\circ\text{C}$, humidity of $70 \pm 10\%$ and dark photoperiod. In order to verify the mortality, ten adults (age: 0 – 24 hours) were conditioned in a square gerbox (11x11x3 cm) with 0,363 L of capacity and closed with lids and laterally enclosed with two PVC layers. On the gerbox lid was added one filter paper tape (2x5 cm) soaked up with the essential oil (no dilution) to be tested and covered by fabric tulle (40 mesh) avoiding the direct contact with the insects. The oil was applied with the help of an automatic pipette, corresponding to the concentration of 8,3; 11,1; 25,0; 33,3; 47,2; 69,4 and 100 $\mu\text{L L}^{-1}$ of air, more control (0 $\mu\text{L L}^{-1}$ of air). It was realized nine repetitions along the time. After 72 hours of exposure to the oil, it was accounted the number of dead insects. To confirm the mortality it was evaluated the thigmotropism caused by the touch of a slender brush. The data to confirm the LC50 and LC90 were analyzed by Probit Regression. It was estimated the LC50 and LC90 of the *C. ambrosioides* oil over *S. zeamais* being 21,3 and 45,2 $\mu\text{L L}^{-1}$ of air respectively. The *C. ambrosioides* essential oil presents insecticide activity by fumigation over the *S. zeamais*.

Keywords Corn woodworm; essential oil; alternative control

20 Influence of pupae age of *Tenebrio molitor* (Coleoptera: Tenebrionidae) in progeny of *Tetrastichus howardi* (Hymenoptera: Eulophidae)

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Tetrastichus howardi (Hymenoptera: Eulophidae) has been studied to possibly be used in biological control programs of *Diatraea saccharalis* (Lepidoptera:Crambidae). In Brazil, it has been found parasitizing *D. saccharalis* pupae in sugarcane and corn crops. Due to the high cost of its large-scale production in the natural host *D. saccharalis*, we used the alternative host *Tenebrio molitor* (Coleoptera: Tenebrionidae). The aim of this study was to evaluate in which pupae age of the host *T. molitor*, the parasitoids *T. howardi* better developed. *T. molitor* pupae, at the ages of 12, 24, 48, 72, 96 and 120 hours, were individually exposed to parasitism of 7 *T. howardi* females. The parasitism percentage by *T. howardi* on *T. molitor* pupae was 70 ± 6.15 , 88 ± 4.42 , 52 ± 6.11 , 54 ± 6.00 and 42 ± 6.29 % at the ages of 12, 24, 48, 72 and 96 hours respectively. Parasitism occurred in only 2 pupae at the age of 120 hours and there was no emergence. The emergence percentage varied among 44 ± 7.18 , 76 ± 6.53 , 36 ± 4.99 , 54 ± 6.00 and 24 ± 5.81 % at the ages of 12, 24, 48, 72 and 96 hours, respectively. The life cycle duration of *T. howardi* was 22.31 ± 0.63 days at the age of 12 hours and 15.90 ± 3.49 days at the age of 96 hours. The progeny per pupa has reached the highest rates at the ages of 24 and 72 hours, and an average of 112.19 ± 8.72 and 119.27 ± 17.96 of descendants per pupa, respectively. The sex ratio of *T. howardi* varied between 0.65 and 0.90%. Pupae of *T. molitor* at the age of 24 hours were the most suitable for the creation of these parasitoids.

Keywords larval and pupal parasitoids; biological control; parasitoids age

21 Size nest, number of individuals and biomass foraged by *Atta sexdens* (Hymenoptera: Formicidae)

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Eucalyptus is the most important crop for Brazilian forest sector and its major pest are the leaf-cutting ants. The external area of the nests is the most important parameter of control, because it is the basis to estimate the dosage of chemicals, although this parameter it is not very accurate, since these insects have a great structural and social complexity. Thus, the aim of this study was to investigate the relationship among nest size, number of ants and vegetal biomass, transported by workers of *Atta sexdens* in eucalyptus crops. The study was conducted in Eucalyptus spp., in Araraquara-SP, Curvelo-MG, Eunápolis-BA and São Borja-RS, which are respectively located in a transition area of Atlantic Forest and Savanna, Savanna, Atlantic Forest, and Pampa. The evaluations were conducted between October 2013 and October 2014, with an evaluation by season. Five nests were selected by field of study. In each colony, we observed the number of workers returned to the nest with and without load (plant fragments transported) for 2 minutes at every two hours, for 24 hours, in a nest entrance with the highest foraging activity. Samples of plant fragments transported by each worker were collected after monitoring the individuals during the stipulated time, and stored in paper bags. The plant material was dried under 60° C for 48 hours, weighed in analytical digital balance (0.0001 g) and glued in white paper to be scanned. For measuring the leaf area was used the software ImageJ (v. 1.49). Data were subjected to analysis correlation and regression. The nest size had low correlation with the number of ants and leaf area and mass of fragments transported. However, the number of ants with fragments was strongly correlated with the area and weight of the transported fragments. These results indicate that the control of leaf-cutting ants based only on nest size can lead to inappropriate taken of decisions in the integrated management of leaf-cutting ants, since the size of the external nest does not represent the population density of this pest.

Keywords leaf-cutting ants; management; eucalyptus

22 Effects of plant aqueous extracts on the feeding preference against diamondback moth

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Plutella xylostella is an important pest of cruciferous plants. This pest is notorious for its ability to rapidly evolve resistance to all classes of insecticides. Alternatively, the use of plant extracts with insecticide and/or insecticidal activities has been investigated, showing promising results for the diamondback moth control. Therefore, the aim of this research was to evaluate the feeding preference of *P. xylostella* in cabbage leaves treated with aqueous extract of *Alibertia sessilis*, *Annona coriacea*, *Duguetia furfuracea*, *Serjania marjinata*, *Schinus terebinthifolius* and *Trichilia silvatica*. The treatments were comprised of aqueous extracts of the leaves of plants. For the experiment, leaf discs from cabbage were immersed in each extract at the concentration 10% (weight/volume) for 30 seconds were arranged in Petri plates, and five larvae of third instar released and kept within the plate for 24 hours. The consumed leaf area was determined after this period. The experimental design was completely random, with four replicates (each repetition consists of 10 subsamples). The data obtained were statistically analysed by applying analysis of variance (ANOVA) and comparing means using Duncan's test at 5% probability. The effect produced by the plants extracts was evaluated using the Kogan & Goeden's (1970) index, since values below 1 indicate activity phagodeterrent. The results indicated that all plant species showed a phagodeterrent effect, being that the species that presented the lower preference index were *S. marjinata* (IP = 0.59). The phagodeterreny observed in all extracts tested is justified by the presence of secondary metabolites that can restrict the palatability or make the insect avoid plant. Therefore, it is concluded that the tested plant extracts are promising for the control of *P. xylostella*.

Keywords Phagodeterreny; natural inseticides; *Plutella xylostella*

23 Natural mortality of *Liriomyza huidobrensis* by ants and wasps predators

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The leafminer, *Liriomyza huidobrensis* (Diptera: Agromyzidae) is an important pest in many crops worldwide. As many pest over the world, one of the causes of pest populations increasing is the reduction of their natural enemies. In this context, is important the preservation of biological control agents of this pest. A important group of natural enemies of *Liriomyza huidobrensis* are predators, especially ants and wasps. Thus, the aim of this study was to evaluate the natural mortality of *Liriomyza huidobrensis* caused by Formicidae and Vespidae predators during the seasons. The study was conducted at Universidade Federal de Viçosa, MG during the four seasons of the years 2011/2012 and 2012/2013. For that, we established 10 cohorts using 20 plants of tomato. A group of two plants constituted one repetition. Each repetition was infested with approximately 100 eggs of *Liriomyza huidobrensis*. Daily, we evaluated the causes of natural mortality of *Liriomyza huidobrensis*. The mortality data of *Liriomyza huidobrensis* by natural enemies during the season were submitted to analysis of variance and means compared by Tukey test at $P < 0.05$. Our results do not show significant differences in mortality caused by Vespidae during the seasons ($F_{3; 8} = 0,668$; $P = 0,595$). However, the mortality caused by Formicidae varied significantly during the seasons ($F_{3; 8} = 8,33$; $P = 0,008$). The higher predation of *Liriomyza huidobrensis* by Formicidae occurred in the autumn (44%) and the lowest in spring (37.47%). The control agents observed were adults *Camponotus* sp. and *Solenopsis* sp. Therefore, the main regulators agents of *Liriomyza huidobrensis* are the Formicidae *Camponotus* sp. and *Solenopsis* sp. and the higher predation occurs during the autumn.

Keywords natural enemies; *Liriomyza huidobrensis*

24 Natural control in the larval stage of Soybean Looper in bean

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The natural control is one of the main factors regulating the insect populations. Many components are associated with these factors, including natural biological control, especially done by predators and, environmental elements such as the rainfall. These components affect directly the insect by mortality or indirectly favoring other regulatory factors. Among the pests that currently cause the greatest damage to the common bean, Soybean Looper caterpillar *Chrysodeixis includens*, has difficult control, especially due to the numerous cases of population outbreaks in recent years. In this sense, it is clear the importance of knowing the factors that regulate populations of this pest. The aim of the study was to determine the key factors of natural mortality of *C. includens* in the larval stage. The experiment was conducted at the Universidade Federal de Viçosa. To carry out this experiment, ecological life tables were conducted during the summer. Were established 10 cohorts of *C. includens*. Each cohort was established initially with 50 caterpillars of 1st instar of *C. includens*. Daily, was evaluated the natural mortality factors until the end of insect larval stage. Mortality data for each factor observed were submitted to analysis of variance and means compared by Tukey test at 5% probability. The natural mortality factors of *C. includens* observed were predation by wasps, spiders, ants, thrips and bugs and, rainfall action. The effects of predation and rain did not differ significantly ($F_{1, 18} = 0.412$, $P = 0.53$). Predation and rainfall exerted a very similar mortality, showing that both represent fundamental role in the natural control of this pest. Therefore, the key factors of natural mortality of *C. includens* are predation and rain.

Keywords Biocontrol; life table; climatic elements

25 Pathogenicity and virulence of entomopathogenic nematodes obtained in IFNMG- Campus Januária soils *Spodoptera frugiperda*

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The corn armyworm is among the most important agricultural pest in regions where it corn, due to various factors such as polyphagia associated with multivoltine characteristic of these insects. Several studies have shown the occurrence of natural enemies to this pest, but few dedicated to entomopathogenic nematodes (Neps). The Neps have enormous potential for the control of *S. frugiperda* because of their special features such as: high lethality at different stages of development of the caterpillar, endoparasitism being little influenced by external factors, possibilities of occurrence of infections due to horizontal transmission which is currently highly desirable, in addition to enabling the reduction of environmental contamination by pesticides. This study aimed to assess the biotic potential of entomopathogenic nematodes obtained from soils at IFNMG- Campus Januária on larval instar 7 *Spodoptera frugiperda*. We evaluated two strains of neps (LCBI and LCBP). The tests consisted of inoculation of filter paper with 2 ml water containing different amounts of neps in petri plates, with 50 neps 200 neps per plate and then the caterpillars were added. The evaluations were performed every 24 hours. The results demonstrate that all treatments had a mortality after 48 hours of exposure, there was a significant difference in the quantity of neps and between lineages. The LCBI strain showed about 83% mortality while LCBP about 36% after 96 hours of exposure to 200 neps. However in exposure to 50 neps there was no significant difference between lines being LCBI 53% and LCBP 56% mortality after 96 hours of exposure. The results show that the use of neps may represent a viable alternative once the studied strains showed high mortality of *S. frugiperda* larvae in the evaluated conditions, being the LCBI the most promising one.

Keywords Biological control; *Spodoptera frugiperda*; entomopathogenic nematodes

26 Injury evaluation of (*Cydia tonosticha* Meyrick) (Lepidoptera: Olethreutinae) over (*Cassia leptophylla* Vogel) (Fabaceae: Caesalpinioideae) seeds in Santa Maria-RS

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The arboreal specie (*Cassia leptophylla* Vogel) (Fabaceae: Caesalpinioideae), also known as “falso-barbatimão”, occurs naturally in the states of São Paulo, Paraná, Santa Catarina and Rio Grande do Sul. As part of the atlantic forest biome which is in advanced state of degradation, giving to this specie a high importance in the reforestation of permanent preservation areas and urban forestry. However, its seeds are easily attacked by insect pests, especially those belonging to the orders Coleoptera, Diptera and Lepidoptera. Within the order Lepidoptera, the microlepidopteran are the main cause of damage to the seeds of arboreal species, since they attack consuming the endosperm, causing depreciation and promoting reduction in the rates of germination and vigor. In the absence of information about the injury caused by insects on (*C. leptophylla* Vogel) the objective of this study was to evaluate and quantify the injury caused by (*Cydia tonosticha* Meyrick) (Lepidoptera: Tortricidae) in seeds of *C. leptophylla* in the urban area of Santa Maria- RS. Were collected 430 fruits of *C. leptophylla* totaling 1763 seeds. The seeds were stored in a cold and dry chamber with temperature maintained at 10 ° C. All the collected seeds were classified as healthy, faulty and injured. To therefore be calculated the percentage of each class in the total value. The injury quantification was obtained with the average difference between the weights of healthy and injured seeds. The amount of each class was 1269 healthy seeds, 124 faulty seeds and 370 injured seeds, resulting respectively in 72%, 7% and 21% of the total. The average value of the difference between the weight of healthy seeds and the weight of injured seed was 3,1g, resulting in 44,2% of weight loss. The results showed that the *Cydia tonosticha* was primarily responsible for the injury caused to the seeds.

Keywords barbatimão; microlepidopteran; economic damage

27 Ant guilds (Hymenoptera: Formicidae) and other invertebrates in sugarcane cultivation fertilized with vinasse

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Brazil is the largest producer of sugarcane in the world, and the process of making products of this raw material generates many waste pollutants such as vinasse. This bioproduct is used as fertilizer for own culture, avoiding release in adjacent areas. The soil macrofauna is of great importance for data collection on soil toxicity and ants can be good bioindicators. Along with other invertebrates, these insects provide valuable information on environmental conditions. Eighteen areas were selected at the southeastern of São Paulo state (6 with irrigated with vinasse, 6 with no vinasse irrigation, and 6 fragments of semi-deciduous forest / control), with the aim of studying the guilds of ants and their association with other invertebrates because they can be potential prey for adults and immature ants. Pitfall and Berlese-Tullgren were used as collection techniques. Were recorded a total of 92 species / morphospecies of ants. Areas of cultivation without application of vinasse are richer (42), than that with the use of this biofertilizer (22). Seven guilds were recorded. The surface omnivorous guild was the richest in all areas. The species richness in each guild does not differ significantly between the areas ($H = 4.23$, $df = 2$, $p > 0.05$). Regarding the other invertebrates, were recorded 14.472 individuals belonging to 27 taxa. Collembola and Acari were the most abundant, especially in irrigated crops with vinasse (5.383 and 1.554 individuals, respectively). Significant correlation was observed between the richness of ants and the abundance of invertebrates ($r_s = 0.191$, $df = 1$, $P > 0.05$), showing that other resources are being more favorable to maintaining the diversity of ants in crops of sugarcane.

Keywords guilds; sugarcane cutlive; vinasse

28 Insecticide action used in tomato crops against *Trichogramma pretiosum* (Hymenoptera: Trichogrammatidae)

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The biological control and the use of insecticides need to be reconciled in order to preserve the community of beneficial insects in the production system. In this way, the aim of this study was evaluate the biological alterations of *Trichogramma pretiosum* (Hymenoptera: Trichogrammatidae), subjected to parasitism of *Anagasta kuehniella* (Lepidoptera: Pyralidae) treated with insecticide recommended for tomato crops for selectivity tests. The experiments were carried out at NUDEMAFI, in climatic chambers (25°C ±1°C, 70% ±10 %RH and photoperiod of 14 h). One *T. pretiosum* neonate female was used in each Eppendorf tube with cards containing 20 unfeasible eggs of *A. kuehniella* which were previously emerged in insecticide. Fifteen repetitions were conducted for each treatment. The eggs were subjected to parasitism for 24h and after the emergence of the offspring; the biological characteristics of parasitism and emergence of individuals were checked. Insecticide with the active ingredient PIRIPROXIFEM, TEFLUBENZURON, ACETAMIPRID 1, LAMBDA-CIALOTRINA and CHLORANTRANILIPROLE + LAMBDA-CIALOTRINA were considered the most selective for *T. pretiosum* parasitoid.

Keywords Biological control; Phytosanitary product; Selectivity

29 Insecticide control failure likelihood on *Euschistus heros* in the State of Goiás (Brazil)

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Among the complex of pentatomid pests that attack soybean fields, the brown stink bug *Euschistus heros* (Heteroptera: Pentatomidae) is the most prevalent in the State of Goiás (Brazil). These insects directly attack the pods, affecting the physiological and sanitary quality of the seed and reducing yield. For several years, lack of new molecules has led farmers to use of insecticides with similar mode of action against *E. heros* within a single season, which might have favored the selection of resistant populations. Thus, this study was carried out to assess the efficacy and thus the control failure likelihood of different insecticides (imidacloprid, lambda-cyhalothrin, thiamethoxam, beta-cyfluthrin and acephate) to control *E. heros* collected in counties throughout the State. The insects were collected from 27 sites (distributed among 14 counties) during the 2014/15 season and were taken to the laboratory (at Embrapa Arroz e Feijão, Santo Antonio de Goiás GO, Brazil) for a 5-days acclimation ($27 \pm 2^\circ$ C, $60 \pm 20\%$ relative humidity, 14h photoperiod). After that, the insects were exposed to dried insecticide residues at the recommended field dose. Commercial formulations of the insecticides were used to coat the inner walls of 250 mL glass-vials. In the control treatment, the insects were exposed to vials treated with distilled water. Ten adult insects were placed in each vial and mortality was assessed after 48 hours. Ten replicates with 10 insects each were used for each combination of insecticide and *E. heros* populations. Excepting two *E. heros* field-collected populations (Alto Paraiso and Santo Antônio de Goiás) that exhibited mortality below 80% for imidacloprid, all the insecticides killed more than 80% of all *E. heros* populations. Thus, our findings suggest that most control failures reported in Goiás are likely due to reasons other than insecticide resistance.

Keywords Neonicotinoid; Chemical control; *Glycine max*

30 Sublethal exposure to chlorantraniliprole affects mating behavior of *Euschistus heros*

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The control of the brown stink bug *Euschistus heros* rely heavily on the use of insecticides. These insects can also be target of unintended exposure to insecticides. For example, they can be exposed to chlorantraniliprole used to control lepidopteran pests in soybean fields. Even when this unintended exposure does not kill the insects, it can induce a range of sublethal effects that may adversely affect the insects' survival and health. Here, we evaluated whether the exposure to chlorantraniliprole would affect the mating behavior of *E. heros*. Four combinations of couples (both sex treated; both sex untreated; only female treated and only male treated) were observed. The insecticide concentration was of 10 mg of a.i./ha. Commercial formulation of chlorantraniliprole (or distilled water for the control treatment) was used to coat the inner walls of 250 mL glass-vials. The exposure time was of 48h. After that, the insects were separately transferred to Petri dishes and reared up to the mating occasion (i.e., 10 days after insecticide exposure). Virgin females and males were allowed to mate and filmed for 13h, allowing the evaluation of the number of mating times and the duration of each mating. There were no difference between treatments at elapsed time until first copulation, length of first copulation and the sum of all copulation time. The number of copulation attempts was higher in couples where only the male was treated than in couples where only female was treated. However, the average of copulation duration per couple was shorter when only male was treated compared to both sex untreated and both sex treated. Furthermore, the number of copulations per couple was higher when only male was treated than when both sex were treated. Collectively, our findings suggests that sublethal exposure to chlorantraniliprole mainly affects mating behavior of *E. heros* males.

Keywords Neotropical brown stink bug; Diamide insecticides; soybean

31 Forest fragment effect on the diversity and abundance of leafhoppers-of-pasture in the city of Araguatins, extreme north of Tocantins

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The population of leafhoppers occurring in northern Tocantins is little known and are rare information about the factors that may influence its population, for example, the interaction between forest and pastures. This study aimed to verify the effect of forest fragment on the diversity and abundance of leafhoppers located-the-pasture (Latitude 5 ° 38'35,81 "S and Longitude 48 ° 04'25,89" W) in the Federal Institute of Tocantins in the city of Araguatins. For samples of leafhoppers, one transect of 100 m was installed from the edge of the forest fragment toward the pasture area. Along the transect were delimited 11 sample points in every 10 m, the first point starting at 0 m. Adult leafhoppers were collected with the sweep net, with standard 10 beats in each point. The data were submitted to regression analysis. Every two weeks samples of sharpshooters were made from September / 2014 to April / 2015. Seventeen samples were carried out, being observed total of 1 359 individuals and 47 morphospecies distributed in 5 families. The results showed that the wood influences the fragment population leafhoppers area, and according to the regression analysis, the nearer the larger fragment in abundance ($r^2 = 0.69$) and diversity ($r^2 = 0.74$) of leafhoppers. It was possible to demonstrate that 68% of collected leafhoppers are close to the woods and 74% of morphospecies are near the forest fragment. The forest fragment positively influences the abundance and diversity of leafhoppers in pasture areas.

Keywords Morphospecies; population; interaction

32 Toxicity of essential oils of *Artemisia* sp. to melonworm

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The melonworm, *Diaphania hyalinata*, is the key pest of plants of the family Cucurbitaceae, such as watermelon and cucumber. The larvae of this pest feed on various plants tissues (fruits, branches and leaves) causing serious damages. The melonworm is controlled mainly by using synthetic insecticides. Frequent applications of these products lead to undesirable consequences, such as the development of resistance in melonworm populations. Thus, the development of new insecticides molecules becomes important. The objective of the present work was to verify the toxicity of essential oils extracted from *Artemisia annua* (A) and *A. absinthium* (B) to melonworm. The plants were grown in the greenhouse under different doses of NPK fertilizer. The NPK doses used were 0% (1), 50% (2), (3) 100% and 150% (4). The relative proportion of the main constituents of the essential oils oscillated with the dosage of NPK fertilizer applied. To evaluate the insecticidal activity of the synthesized compounds, biological assays were conducted with second-instar larvae of *D. hyalinata*. The experimental design was completely randomized with four replicates. Each experimental unit consisted of a 100mL round plastic container containing ten larvae. Bioassays were conducted by topical application of the oils dissolved in acetone. The dose used was of 20 μ g of essential oil per mg of larva. In a control experiment, carried out under the same conditions, 0.5 μ L of acetone was applied on each insect. After application, the insects were supplied with appropriate food. The mortality counts were made 48 h after treatment. Mortality data were analyzed using Tukey test at 0.05 probability level. The oil A2 (*A. annua*, NPK dosage of 50%) was the one that caused higher mortality (86.11%). The remaining oils caused low mortality of *D. hyalinata* larvae (< 31.00%).

Keywords IPM; *Diaphania hyalinata*; insecticide

33 Biochemistry mechanisms involved in physiological selectivity of spinosad to *Solenopsis saevissima*

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Insecticides are the main control measure used for pest control in agriculture. For conservation of natural enemies, it is important to use selective insecticides. An important group of natural enemies are the predators. One way of to study the insecticides impact on natural enemies is the use of synergists. Thus, the aim of this study was to determine the biochemistry mechanisms involved in the physiological selectivity of insecticides to *Solenopsis saevissima*, an important predator in agricultural ecosystems. The bioassays were carried out in the laboratory of Integrated Pest Management of Universidade Federal de Viçosa. The treatments were the insecticide spinosad (0.432 mg de a.i. / mL) single and in combination with the synergists triphenyl phosphate (an esterase inhibitor), diethyl malate (a glutathione S-transferase inhibitor) and piperonyl butoxide (an inhibitor of cytochrome P450-dependent monooxygenases). The experiment was performed in a completely randomized design with six replicates for each treatment. Each replicate consisted of a disc leaf treated and ten adults ants. We assessed the mortality to *Solenopsis saevissima* after 48 hours on exposure. The results were corrected via natural mortality and submitted to Student's t-test ($P < 0.05$). The mortality caused by insecticide spinosad to *S. saevissima* increased in combination with piperonyl butoxide ($t_{10} = 18.72$, $P < 0.001$) and diethyl maleate ($t_{10} = 12.53$, $P < 0.001$). The synergism obtained with piperonyl butoxide and diethyl maleate can be due the involvement of cytochrome P450-dependent monooxygenases and glutathione S-transferases in the selectivity of the predator *S. saevissima* to spinosad. Thereby, that there are multiple actions of the enzymes in the detoxification insecticides process to the ant predator *S. saevissima* to spinosad.

Keywords ant predator; synergists; insecticide detoxification

34 Fluctuation of *Bemisia* sp. nymphs in tomato commercial greenhouses in the city of Bandeirantes-PR

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In Brazil, the main representative of the Solanaceae is the tomato (*Solanum lycopersicum*), since it is the most consumed fruit by the populace. Many species of insects attack the tomato and the use of agrochemicals is very frequent for their control. The whitefly (*Bemisia* sp.) stands out as a pest, because besides causing direct damage by sap sucking, as well as provoke indirect damage with the introduction of virus. The objective of the present research was to elaborate a graphic of the population fluctuation of the whitefly nymphs during the period of a year (June, 27 of 2013 to July, 7th of 2014). Four Londrina model commercial tomato greenhouses were chosen at the city of Bandeirantes/PR, where samples were taken fortnightly, in a total of 15 leaves randomly per greenhouse. Those leaves were taken to the Entomology Lab of the Universidade Estadual do Norte do Paraná, Campus Luiz Meneghel, where it was done the identification and accounting of the nymphs present in the lower face of the trefoil, in a total of 45 leaves. The accounting was done using a microscope stereoscope (20x). Average monthly temperatures were obtained by data from the Bandeirantes Weather Station (<http://clm.uenp.edu.br/tempo/>). With the data we elaborated a population fluctuation graph, where it was observed that insects were present throughout the trial period. Population peaks were observed and the most defined in the evaluation was made in 04.17.2014, when we counted 1027 nymphs with the average temperature being 22,8 °C. Such increase could be caused due to the reduction of phytosanitary care, when the culture within the greenhouse was in the end of cycle and the temperature could not be considered ideal, since these insects grew better at higher temperatures, in a range between 28 to 33 ° C. The insects *Bemisia* sp. were present throughout the 24 samples taken and the lower temperatures were considered the ideal for the development of the pest.

Keywords complex *Bemisia* sp.; *Solanum lycopersicum*; setting-up

35 First report and evaluation of injury of *Gymnandrosoma* sp. in fruits and seeds of *Lafoensia pacari* in Rio Grande do Sul

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The dedaleiro (*Lafoenia pacari* Saint-Hilaire) is an arboreal species with natural occurrence in montane forests and cerrado, found in the Federal District, Rio de Janeiro, Minas Gerais, Bahia, Tocantins and Rondônia. It has several uses such as urban forestry, mixed reforestation to recovery of degraded areas and logging. The seeds of *L. pacari* are recalcitrant so can be stored for a short time before lose their viability. In addition, the insect infestation is another limiting factor for the production of plants of this species. Among these, the order Coleoptera, Diptera and Lepidoptera are of the greatest importance due to intense attack on seeds of this tree species. Among the order Lepidoptera, the microlepidopterans of Tortricidae family are highlighted due to the large number of species that damage important fruit crops, exotic and native trees causing considerable economic damage in some of them, threatening the viability of production. Thus, the aim of this study was to identify the microlepidopteran species found in *L. pacari* seeds and to evaluate the injury caused by this insect. After the collection in FEPAGRO / Forest the fruits were analyzed to find those attacked by insects. The 20 fruits that had perforations had their seeds removed, totaling 1375 seeds which were separated into healthy and injured. The creation of some specimens until they reach maturity was carried out. Among them, four adults were transfixed and sent to Dr. Victor O. Becker of Uiracũ Institute in Bahia for identification. Among the seeds analyzed, 893 were classified as healthy and 482 as injured resulting in a 64.94% and 35.05% respectively. The insect found in *L. pacari* seeds was identified as belonging to *Gymnandrosoma* genre. Therefore the occurrence of a genre never reported before in this tree species was confirmed, demonstrating potential to establish itself as a new pest in the production of *L. pacari* seedlings.

Keywords Dedaleiro; microlepidopteran; pest

36 Insects collected in light trap in sunflower

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The light trap is an instrument used for sampling of insects in different cultures. The experiment was conducted in the good success farm, farmland buritis, whose geographical coordinates 16 ° 51 '21' 'to 49 ° 58' 25" w, with an average altitude of 569 m. The objectives of this research were to evaluate the insect pests in sunflower culture were drawn and collected by light traps. This crop was sown, at 80 ha, on February 27, 2014 and the harvest was made to 110 days after sown. The sunflower cultivar used was Aguará 4 at Atlantic Seeds Company which is a simple hybrid of early cycle. Samples with a light trap in the center of the area, were held on March 19, March 31, April 02, April 17, April 29, May 08, May 15, May 23, May 31 and June 4. The results showed that the Coleoptera order, with 64% of the collected insects, was the largest population among the insects collected with a total of 222 insects, and the day with the highest population density was the 02 of April with 105 insects. With a percentage of 13%, the Lepidoptera is the second largest population, with a total of 47 bugs. The largest population of Lepidoptera found on the fifth day installation of the trap, April 29, with 18 insects. Later, with 11% appears the Hemiptera, with a total of 38 insects, and on 23 and May which showed the largest population with 11 insects. The gaúcho bedbug bug was also the most densely populated, at the beginning of this insect culture obtained a population of five insects on March 19, reaching six insects on March 31, when the crop was at the beginning of your cycle . But the Neotropical bug alydid was on average 1 insect per trap, and on May 31 reaching four insects. The small rice stink bug and brown stink bug its population did not exceed more than one insect per trap. Being the small rice stink bug was found on April 2 at the beginning of the culture and the brown stink bug on 15 May and 23 May, at the end of culture.

Keywords Light trap; Sampling; Sunflower

37 Study of the potential utilization of moringa's green seed extract upon spider mite management

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The spider mite, *Tetranychus urticae*, is considered one of the mites with major economic importance worldwide, due to losses it causes on crops. From all methods used for controlling spider mite, the chemical control is the most common. However, the intensive use of pesticides can cause contamination of the environment and intoxication of the population. Aiming the reduction and/or substitution of synthetic agrochemicals for ecologically correct products, was studied the potential of the liquid extract of *Moringa oleifera*'s green seeds, for its activity upon *T. urticae* as a miticide. Two laboratorial tests were conducted: direct application and determination of the lethal concentration (LC50) from extracts of *M. oleifera* upon *T. urticae*. The concentration of the aqueous extract was 10% (w/v). The control treatment was treated with distilled water. For the trial, the concentration was in a logarithmic scale (from 0.01% through 10%) for determining the lethal concentration. In the sequence, leafs' disks of "feijão de porco" with 4cm of diameter populated with 12 female mites were sprayed with the solution. An airbrush SW-130K was used to spray the treatments, it was connected to a compressor calibrated with a constant pressure of 25Lb/inche², and the solution volume of 3ml for each repetition. It was eight repetitions for each treatment. The trial was conducted in a controlled chamber, evaluating the mortality at 24, 48 and 72 hours after sprayed. For the estimative of the lethal concentration (LC50) there was an increment on the mortality rate of the mites according to the concentration, higher the concentration higher the mortality. The lethal concentration required for causing death of 50% of the population of *T. urticae* was estimated to be 0.0694% with variation between 0.0607 and 0.0780% (w/v). The aqueous extract of *M. oleifera*'s green seed showed potential for agricultural use in the alternative mite management.

Keywords Alternative control; spider mite; miticide

38 *Trichoderma* volatile effects on *Leucoagaricus gongylophorus* growth

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Leaf-cutting ants (*Atta* and *Acromyrmex*) are eusocial insects found in tropical and subtropical regions and considered important pests. They cultivate their own food, the fungus *Leucoagaricus gongylophorus* that grows from decomposition of fresh plant material that the workers incorporate in it. The main control method of these insects is chemical, however, due to negative impacts of this method for human beings and the environment, new control alternatives are needed. Endophytic fungi can be used to protect plants from attack of ants. To determine the potential of *Trichoderma* as biological control agent of leaf-cutting ants, it is important to know how it affects *Leucoagaricus*. Some fungi of the genus *Trichoderma* have specific volatiles that can be damaging for *Leucoagaricus*. In order to determine the ability of these volatiles to affect the *L. gongylophorus* growth, tests were performed *in vitro*. The bases of two Petri dishes containing PDA were individually inoculated with discs of *L. gongylophorus* and *Trichoderma* sp. The bases were adjusted (one base placed over the other) and attached by Parafilm®. The control sets did not contain the antagonist. The cultures were incubated at room temperature (25 ± 2 ° C), and radial fungal growth was measured after 10 days. The volatiles produced by *Trichoderma* were found to affect negatively the growth of *L. gongylophorus*. We concluded therefore that this isolate of *Trichoderma* can potentially harm the symbiont fungus and so may be of interest for control of leaf-cutting ants.

Keywords Leaf-cutting ants; symbiont fungus; antagonism

39 **Avaliation of the entomofauna in conditions of conventional tillage in maize (*Zea mays* L.) culture**

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The Knowledge of the entomofauna present in the soil is important to advance on ecologic studies and integrated pests management. Given this fact, this study aimed to identify the abundance of the entomofauna found in no-till (NT) and conventional tillage of the soil (PCS). The study was conducted at the Instituto Federal do Espírito Santo Campus Santa Teresa (19°48'24"S and 40°40'33" W) during the year 2013. The Samples were collected with pitfall traps in a total of five traps spaced 12m x 10m, containing a solution of 200 ml of 10% formaldehyde with a few drops of mild detergent. Each planting system had a plot of 600 m² sampled. Four samples were taken at monthly intervals. The insects collected were separated and identified in orders, with the assistance of the stereomicroscope. 3135 insects were collected, belonging to eight orders; 2363 individuals in the SPD and 772 in conventional tillage. In SPD orders were sampled: Orthoptera (1270), Hymenoptera (480), Diptera (344), Coleoptera (240), Hemiptera (12), Dermaptera (11), Lepidoptera (05), and Blattodea (01). In PCS: Coleoptera (282), Orthoptera (225), Hymenoptera (162), Diptera (73), Dermaptera (19), Hemiptera (08), Lepidoptera (03). The abundance was higher in the SPD, representing 75.37% of the collected individuals, while the PCS showed 24.63%. The most abundant orders in the SPD were Orthoptera, (53.74%) and Hymenoptera (20.31%). But in the PCS, the orders that had greater abundance were Coleoptera (36.52%) and Orthoptera (29.14%). The NTS showed greater abundance of insects due to the deposition of plant material on the ground surface serving of food to the same. Additionally, the system maintains the favorable environmental conditions and do not exert eradication cultural practices which are required in conventional tillage.

Keywords entomofauna; abundance; maize

40 Susceptibility of the Neotropical brown stink bug to specific and non-specific insecticides

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The control of the brown stink bug *Euschistus heros* rely heavily on the use of insecticides. Despite the fact that these insects can also be targeted by unintended insecticide exposures, almost nothing is known about their susceptibility to these non-specific insecticides. Thus, this study was conducted aiming to estimate susceptibility of a laboratory strain of *E. heros* to lambda-cyhalothrin and thiamethoxam (insecticides that target *E. heros*) and the chlorantraniliprole and spinosad (insecticide used to control lepidopteran pests in soybean fields). Seven concentrations of commercial formulations of each insecticide were used. The insects were exposed to dried insecticide residues that coated the inner walls of 250 mL glass-vials. In the control treatment, the insects were exposed to vials treated with distilled water. Ten adult insects were placed in each vial and at least 10 vials were used for each insecticide concentration. Mortality was assessed after 48h of exposure and submitted to Probit analysis to estimate the lethal concentrations (LC). For the two non-specific insecticides, chlorantraniliprole cause a maximum mortality of 13.6% at a higher concentration used (equivalent of 10-folds the field rate recommendation for controlling lepidopteran pests), preventing the estimation of a concentration-mortality curve. The LC50 (97.2 mg of a.i/L) and LC95 (1,377.0 mg of a.i/L) of spinosad to *E. heros* corresponded, respectively, to 0.7- and 9.2-folds of the field rate recommendation to lepidopteran pests. For the two specific insecticides, the LC95 values for thiamethoxam (175.0 mg of a.i/L) and for lambda-cyhalothrin (10.3 mg of a.i/L) corresponded, respectively, to 1.2- and 0.14-fold of field rate recommendation to *E. heros*. Thus, the laboratory strain showed high susceptibility to a pyrethroid insecticide, lambda-cyhalothrin and extremely low susceptibility to the diamide insecticide chlorantraniliprole.

Keywords *Euschistus heros*; concentration response bioassay; soybean

41 Toxicity of *Duponchelia fovealis* (Lepidoptera: Crambidae) larvae to different insecticides

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The exotic pest of strawberry, *Duponchelia fovealis* (Lepidoptera: Crambidae) was recently found in Brazil, causing significant losses to this crop. Regarding its recent introduction in Brazil there are lack of information about insecticides toward its control. This study evaluated the mortality of second instar larvae of *D. fovealis* subjected to topical treatment with different commercial insecticides already available for other pests. The larvae were topic directly sprayed using a Potter's tower with the insecticides (dosage): acetamiprid (0.08 g a.i/L), cyromazine (0.1125 g a.i/L), methoxyfenozide (0.12 g a.i/L), thiamethoxam + lambda-cyhalothrin (0.10575 + 0.0795 g a.i/L), milbemectin (0.02 g a.i/L), chlorantraniliprole (0.0368 g a.i/L), lambda-cyhalothrin (0.04 g a.i/L), deltamethrin (0.0125 g a.i/L), thiamethoxam (0.75 g a.i/L), fenpropathrin (0,195 g a.i/L), alpha-cypermethrin (0.01 g a.i/L), chlorfenapyr (0.24 g a.i/L), indoxacarb (0.048 g a.i/L) and lambda-cyhalothrin + chlorantraniliprole (0.025 + 0.05 g a.i/L). Based on mortality of second instar larvae, the insecticides chlorfenapyr, indoxacarb and lambda-cyhalothrin + chlorantraniliprole were assayed to calculate the dose-mortality curves. Among the three insecticides, the indoxacarb was the most toxic to larvae, while chlorfenapyr exhibited the highest slope. The insecticides indoxacarb, chlorfenapyr and lambda-cyhalothrin + chlorantraniliprole caused levels of mortality from 70.9 to 100% to second instar larvae of *D. fovealis*, which can be considered promising insecticides to control this pest, once properly recorded in Ministry of Agriculture, Livestock and Supply (MAPA).

Keywords Exotic strawberry larvae; chemical control; susceptibility

42 Documenting visitation rates by insects to flowering *Eucalyptus calycogona* in Monarto, Adelaide, Australia

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Eucalypts are an important floral resource for a wide range of native fauna and also introduced honeybees *Apis mellifera*. Monarto is situated approximately 60 kilometres east of Adelaide and consists of patches of disconnected remnant vegetation and re-vegetated areas. The project became the largest re-vegetation project conducted in the state; up to 2000 hectares of cleared land was revegetated, around 600,000 plants across 250 different species, including local species and eucalypts from around Australia. The data collected can be used to compare the 1970s plantings' potential as a source of nectar with that of remnant vegetation, or even to compare it to more recently re-vegetated areas in the region. The assessments of the frequency of visits by introduced honeybees can be compared to that of other visitors. One of the animals introduced into Australia since the arrival of Europeans was the honeybee *Apis mellifera*. The Australian flora has co-evolved with their native pollinators, and this makes them vulnerable to changes in pollinator visitors. Given that honeyeaters rely on nectar as they do, honeybees taking this resource, up to 50% or more in some bird-pollinated plants. By documenting the visitation rates for each of the pollinators deemed to be present at the Monarto revegetation site, the pollinators are competing or coexisting on *E. calycogona*. The fieldwork has been conducted in half-day segments cumulatively resulting visitation rates representative of the whole day. The samples were groups of 100 open flowers from *E. calycogona*, from two branches per tree. Thus, a total of 10 branches have been analysed. Prior to conducting the experiment, an initial setup has been required whereby trees and branches with sufficient open flowers have been identified and marked with fluorescent field tape. The visitation rates of insects have been calculated by time taken for individual insects to visit five flowers.

Keywords Pollination; Visitation; Honeybees

43 Susceptibility of africanized honey bee *Apis mellifera* to pesticides commonly sprayed on melon fields in Brazil

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The africanized honey bee *Apis mellifera* is considered an important pollinator of melon fields. However, exposure to pesticides used in the management of this crop can affect the survival of these bees, reducing their ecological services. Thus, this study was conducted aiming to evaluate the susceptibility of *A. mellifera* to pesticides commonly sprayed on melon fields in Brazil. Concentration-mortality bioassays were performed on forage bees of six colonies maintained in the apiary of Federal University of Viçosa - UFV. Commercial formulations of three insecticides (deltamethrin, lambda-cyhalothrin and imidacloprid) and one commercial formulation containing the fungicides chlorothalonil and thiophanate-methyl were tested. Increasing concentrations of pesticides were prepared in honey syrup solution (50%). The bees were collected, anesthetized in CO₂ and then transferred to plastic pots of 500 mL. After one hour of starvation, the bees were subjected to feed on pesticides solutions for 5 h. After the exposure time, the bees fed uncontaminated syrup solution. Mortality was evaluated 24 h after the pesticide exposure and were used to estimate the lethal concentrations (LC₅₀). The highest *A. mellifera* susceptibility was observed to lambda-cyhalothrin (LC₅₀ = 0.00063 g/mL), while the smallest was observed to deltamethrin (LC₅₀ = 0.70 g/ml). Surprisingly, the fungicide solution exhibited similar and moderate toxicity (LC₅₀ = 0.0015 g/mL) than the insecticide imidacloprid (LC₅₀ = 0.0024 g/mL). Further investigations at field levels are necessary to evaluate whether such pesticides reduce the pollinator services provided by *A. mellifera*.

Keywords honey bee; pollinator; mortality

44 Yield losses in the vegetative stage of transgenic and conventional corn by attack of insects

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The transgenic corn, which expresses the toxin the bacteria *Bacillus thuringiensis* (Bt) represent more than 80% of brazilian crops. So far, the concern with this technology focused on resistance management. Thereby, there are few studies that quantify the losses caused by insects in the vegetative stage of transgenic and non-transgenic corn. The insect attack in this stage can result a death of plants and consequently reduce the yield. The goal of this study were to determine the yield losses of transgenic corn and conventional corn caused by insects and identify arthropods responsible for these losses. The study was carried out in experimental field of Cajuri-MG. The transgenic corn used was simple hybrid DKB 390 YG and conventional was the isolate DKB 390. These two hibrids were grown under no-tillage system with liming and fertilization. The experimental design was completely randomized with eight repetitions. The mortality of plants and the factors responsible for this death were evaluated one time for week. The total losses in Bt corn were 35.21 ± 15.9 kg ha⁻¹ and in no-Bt corn were 73.48 ± 20.82 kg ha⁻¹. The insects responsible for the losses were *Elasmopalpus lignosellus*, *Spodoptera frugiperda*, Termites and *Gryllus spp* and bedbugs. The group of insects that cause major losses were bedbugs in transgenic corn, causing losses of 20.1 ± 14.67 kg ha⁻¹, and termites in the conventional corn causing losses of 29.57 ± 16.02 kg ha⁻¹. Therefore, the yield losses are higher in non-transgenic corn than in conventional corn. Bedbugs are responsible for major losses in transgenic corn and termites in conventional corn.

Keywords *Bacillus thuringiensis*; *Spodoptera frugiperda*; Maize

45 Protein content in glands and brain of European and Africanized honeybees

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Honeybees have four major glands in their head and thorax that perform key functions in the colony. This study aims to evaluate how different the Africanized (AHB) and European (EHB) honeybees *Apis mellifera* can be by comparing the total protein content, by Bradford method, in the salivary thoracic (ST), salivary cephalic (SC), mandibular (Man), and hypopharyngeal (Hypo) glands and brain of adults honeybees. The study with EHB was carried out in Sheffield, UK, and the study in AHB was carried at ESALQ/USP, Piracicaba, São Paulo, Brazil. Each sample consisted of a pool of 10 glands (salivary thoracic; salivary cephalic; mandibular; hypopharyngeal) and brains of the same aged cohort. The samples were collected from three different hives with factorial arrangement consisting of 2 levels of races (European and Africanized) and 7 levels of age (zero; five; 10; 15; 20; 25, and 30 days). ANOVA and F-test were applied ($p < 0.05$). The total protein content in both bee races had peaks in the nurse phase (05-15 days) for ST, Man, Hypo, and Brain while the forager phase (15-30 days) had peaks for SC and the brain (only in EHB). The total amount of protein content per structure was bigger in EHB for SC, Hypo, and brain, but surprisingly the salivary thoracic and mandibular glands had significantly more protein in AHB than EHB. Despite the difference between the races studied they share some similarities related with the development of glands and brain protein content pattern. We would expect the total protein content in the structures studied to be higher in EHB because the bees are larger than in AHB, but this was not observed with the glands that are not attached to the brain (ST and Man) showing that the bee size may be key to the physiological difference between these races.

Keywords Bee physiology; *Apis mellifera*; Polyethism

46 Locomotory responses of Neotropical brown stink bugs *Euschistus heros* under sublethal exposure to imidacloprid

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The Neotropical stink bug *Euschistus heros* is a major pest in Brazilian soybean fields. Its control is achieved mainly by applications of neonicotinoid insecticide imidacloprid. Increases on the density of naturally occurring populations of *E. heros* registered over last years in Brazil has been related, allegedly, to increases on the reproductive output induced by sublethal exposure to imidacloprid. In this study, we carried out a survey of behavioural (locomotory) responses of immature (4th and 5th instars) and adult (both males and females) of *E. heros* to imidacloprid sublethal exposure. The insects were subjected to walking trials on surfaces fully-treated and partially-treated with sublethal doses of the insecticide. The parameters recorded for the fully-treated arenas were walked distance, velocity, time spent walking, and number of stops in the arena. For the half-treated arenas, only the proportion of time spent in the untreated side of the arena. On untreated surfaces, there were no significant differences ($P > 0.05$) for all the studied parameters between the different instars. On fully treated surfaces, there are statistically significant ($P = 0.03$) interactions between instar type and treatment ($P < 0.001$). The sublethal exposure to imidacloprid increased significantly ($P < 0.001$) the walked distance, time and velocity for the male adults and walking time and velocity for the 4th instar. No significant differences were registered for the 5th instar and female adults. For the half-treated arenas trial, the results indicated significant differences for all the instars except the 4th instar. While the 5th instar, the male and female adults have decreased the time spent in the treated half arenas, the 4th instar spent an equal amount of time in the two halves. Our findings suggest that the increased activity of males subsequent to imidacloprid sublethal exposure might induce an enhanced mating search behavior that could be linked to the recent out-breaks of *E. heros* in Brazilian soybean fields.

Keywords sublethal exposure; stink bug; Locomotory responses

47 Performance of *Ricoseius loxocheles* on different food sources

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Phytoseiidae mites can feed, besides their prey, on a variety of food sources such as fungi and pollen. *Ricoseius loxocheles* (Acari: Phytoseiidae) is a mite species easily found in the Zona da Mata Mineira and it is able to feed on coffee leaf rust *Hemileia vastatrix*. Its food habits has been studied and it seems that *R. loxocheles* is specialist to feed on the fungi, suggesting that this species may be considered a control agent of this plant disease. Then, this study aimed to study the performance of *R. loxocheles* on different food sources. We used as food sources: coffee leaf rust (*H. vastatrix*), clover leaf rust (*Puccinia oxalidis*), cattail pollen (*Typha sp.*) and bee pollen. The results showed that various types of food sources can be used by the phytoseiid mite without compromising its survival and reproduction. Thus, *R. loxocheles* was able to use the coffee rust and clover rust, as well as cattail pollen to improve their reproductive success. Survival and oviposition of the phytoseiid were similar when fed on the food sources listed above. However, only the bee pollen was not favorable for the phytoseiid, causing higher mortality of the mite. Therefore, we can concluded that *R. loxocheles* is able to explore many resources for its diet besides coffee leaf rust. Thus, it is suggested that further studies are necessary to determine the function of this phytoseiid on coffee system.

Keywords Leaf Rust; Phytoseiid; Survival

48 Toxicity of aqueous tobacco extract (*Nicotiana tabacum* L.) to *Helicoverpa armigera*

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Helicoverpa armigera (Hübner, 1805) (Lepidoptera: Noctuidae) is a highly polyphagous agricultural pest. Its occurrence in Brazil was reported for the first time in 2013, in the states of Mato Grosso, Goiás and Bahia, where this pest has caused crop losses and environmental and socioeconomic damage. The use of synthetic chemical insecticides to control lepidopteran has caused negative impacts on human health and the environment. Tobacco extract (*Nicotiana tabacum* L.), can be an alternative for the control of *H. armigera*, because its insecticidal properties. The objective of this study was to evaluate the susceptibility of *H. armigera* to aqueous tobacco extract and estimate its LC50 and LC90. Sixty caterpillars at first instar were used for each treatment. The aqueous extract of tobacco was prepared at a concentration of 10% (w / v) for susceptibility evaluation. As control, distilled water was applied. The LC50 and LC90 of the aqueous tobacco extract were estimated. Caterpillars at first instar of *H. armigera* are susceptible to aqueous extract of tobacco. LC50 and LC90 were 2.1 and 4.7%, respectively. Thus, it was concluded that the aqueous tobacco extract was effective on the control of *H. armigera* larvae at first instar.

Keywords Solanaceae; botanical insecticide; plant pest management

49 Impact of pesticides on survival, hypofaryngeal glands and antennal morphology on in vitro-reared honey bee workers

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The worldwide disappearance of honey bee (*Apis mellifera*) populations has become a main concern between beekeepers, researchers and governmental agencies. The decline of the honey bee has been attributed to a combination of factors including poor nutrition, pesticides, pathogens, parasites, and destruction of habitats. Pesticides are of particular concern due to the frequency and abundance of pesticides residues in nectar, pollen, and wax. Here we examine the effects of relevant field-level concentrations of pesticides on larval survival, hypofaryngeal gland cells and antennae. Using larval in vitro rearing technique, we examined the effects of 3 acaricides (amitraz, coumaphos and fluvalinate), 2 insecticides (chlorpyrifos and imidacloprid), 1 fungicide (chlorothalonil) and 1 herbicide (glyphosate) at the concentrations found in pollen. Each pesticide was integrated into the larval diet throughout larval development. Three colonies of *A. mellifera* were used in this study. Our data showed that, except glyphosate and imidacloprid, all pesticides affected honey bee survival (Log-Rank = 400,36; df = 8; p < 0,001). All pesticides reduced hypofaryngeal cell size of recently emerged adults, except fluvalinate, amitraz and chlorpyrifos (F = 16,07; df = 54; p < 0,001). Except glyphosate, all pesticides reduced hypofaryngeal cell nucleus size (F = 13,12; df = 54; p < 0,001). Newly emerged bees exposed to coumaphos, fluvalinate, imidacloprid, chlorpyrifos and chlorothalonil had deformations on antennae. Our findings are important for the understanding the risk of pesticide exposure during immature post-embryonic development on the impairment of honey bee survival, development and morphology.

Keywords Pesticides; honeybees; sublethal effects

50 Fungicide action used in tomato crops against *Trichogramma pretiosum* Riley (Hymenoptera: Trichogrammatidae)

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The aim of this study was to evaluate the possible alterations of biological characteristics of *Trichogramma pretiosum* (Riley, 1879) (Hymenoptera: Trichogrammatidae), subjected to parasitism of *Anagasta kuehniella* (Zeller, 1879) (Lepidoptera: Pyralidae) eggs treated with fungicides registered for tomato crops in selectivity tests using the methodology recommended by IOBC/WPRS for selectivity studies. Twenty nine fungicides were evaluated in experiments that were carried out at NUDEMAFI. Cards containing 20 eggs of *T. pretiosum* were immersed in a fungicide solution and subjected to parasitism by 24 hours. The fungicides effect on the biological characteristics of parasitism was observed after the incubation period and after the emergence of the adults. It was concluded that the fungicide Supera® (Copper Hydroxide 537.4g/L), Nativo® (Tebuconazole 200g/L + Trifloxystrobin 100g/L), Censor® (Fenamidone 500g/L) Manzate 800® (Mancozeb 800g/Kg), Captan SC® (Captan 480g/L), Amistar WG 500® (Azoxystrobin 500g/Kg) Frowncide 500 SC® (Fluazinam 500g/L) Fegatex® (Benzalkonium chloride 100g/L) Redshield 750® (Cuprous oxide 860g/Kg) Proplant® (Hydrochloride Propamocarb 722g/L), Isatalonil 500 SC® (Chlorothalonil 750g/Kg) Recop® (Copper oxychloride 840g/Kg), Bion® 500 WG (Acibenzolar-S-Methyl 500g/Kg) and Curzate BR® (Mancozeb + Cymoxanil 80g/Kg 640g/Kg) showed the best results for the parasitoid selectivity *T. pretiosum*.

Keywords Biological control; Phytosanitary products; Selectivity

51 Biological characteristics of *Helicoverpa armigera* (Lepidoptera: Noctuidae) on artificial diets

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The *Helicoverpa armigera* (Hübner, 1805) (Lepidoptera: Noctuidae) is a polyphagous pest already registered in more than a hundred species in several families. The first occurrence of these insect records on the American continent was in Brazil in 2013 in the states of Mato Grosso, Goiás and Bahia, associate mainly with cotton and soybean crops, and then being also related in others crops. The presence of this pest in Brazil has resulted in larger agricultural losses, impacting the economy and society, being necessary an effective plan of integrated pest management. In view of the need to obtain more information about the biological characteristics of *H. armigera*, the aim of this study was to determine the biological aspects of the insect on three artificial diets. One hundred larvae were individualized in flat-bottom glass tubes (2.5 x 8.5 cm) with three different kind of artificial diet: Greene et al. (1976) modified and suggested by Giolo et al. 2006 and Garcia et al. 2006 for *Helicoverpa zea* (Diet 1); suggested diet Parra (2001) for *Anticarsia gemmatalis* (Diet 2) and suggested diet by Parra (2001) for *Diatraea saccharalis* (Diet 3) and after the adults emergence, they were kept in Polyvinyl chloride (PVC) cage and fed with honey. The evaluation was daily done and kept in a climatic chamber (25°C, 70% RU and photoperiod of 14 h). The following biological characteristics were observed: viability (%) and duration of larvae phase, pre-pupal and pupal; duration (days) of adults and larva-adult; sexual ratio and pupa weight (mg). In the analysis of variance ($p < 0.05$) the pupal weight variable was the only one significant difference between treatments and Tukey the test Diet 1 proportioned higher pupal weight (386.7 mg) and the most satisfactory for *H. armigera* rearing in laboratory conditions.

Keywords Biology; Insect rearing; insecta

52 Attraction of parasitoids by *Ocimum basilicum* and *Tagetes erecta* in organic sweet pepper crop

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Habitat diversification helps to attract parasitoids, subsequently plants can provide prey and alternative hosts, pollen, nectar, shelter, favorable microclimate, among other benefits, necessary for insect development and may encourage the pest control. The goal of this study was to evaluate two plants, basil (*Ocimum basilicum*, Lamiaceae) and yellow marigold (*Tagetes erecta*, Asteraceae), as attractive plants the Hymenoptera parasitoids. The experiment was conducted from 08.26.2013 to 11.30.2013, in Lavras, MG. Three treatments were evaluated: (1) four marginal beds with basil and sweet pepper along the central beds; (2) four marginal beds with marigold and pepper along the central beds; and, (3) pepper in the central beds. Each treatment was placed in four beds with 18 pepper plants and four marginal beds with 18 attractive plants (basil or marigold). Weekly samples were collected, with two traps adapted Moericke within the crop of each treatment, it placed 15 cm below the average height of the top of sweet pepper plants. The data for parasitoids were subjected to faunistic analysis (richness, abundance and H' diversity index) and compared statistically by analysis of variance. Was observed greater species richness in T1 (42) followed by T2 (36) and T3 (34). Diversity found in T1 and T2 (2.89 and 2.90) was lower than in T3 (3.32), due to the abundance of individuals of certain genus. Also, was found greater abundance of individuals, when there was presence of attractive plants in pepper bed edges, treatments 1 and 2 were 153 and 145 individuals respectively and the T3 only 56. In the data subjected to analysis of variance ($p < 0.0001$), there was significant difference between treatments, with an average genus/sample was 10.36, 10.93 and 4 for treatments with basil, with yellow marigold and sweet pepper, respectively. Thus, the attractive plants shelter parasitoids that may regulate the occurrence of important pests in the sweet pepper production.

Keywords Habitat diversification; parasitoid; attractive plants

53 Assessing the effects of Bt corn on abundance of predator insects

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The commercialization of Bt corn is allowed in Brazil since 2007. In 2012, the acreage of Bt corn represented 66% of the total area of maize in the country. Bt corn plants produce toxins with greater specificity for Lepidoptera pests. Thus, these plants exhibit high efficiency in the control of *Spodoptera frugiperda*, *Helicoverpa zea* e *Diatraea saccharalis* caterpillars. Consequently, they reduce the need of insecticide applications. However, there are few studies concerned with the effects of Bt toxins on predator insects. Thus, we carried out evaluations in order to quantify the abundance of predator insects occurring in conventional and in Bt corn grown in the experimental area of UFV. The treatments (conventional and Bt corn) consisted of 7 plots (200 m²). Only the conventional corn received applications of insecticides. The evaluations were carried out for five weeks, an evaluation per week, throughout the reproductive cycle of culture. Coleoptera (Anthicidae and Coccinellidae), Hemiptera (Miridae and *Orius* sp.) and Dermaptera were quantified by tapping tray samples. We only found difference between conventional and Bt corn for Dermaptera abundance (Student's t-test, $p < 0.05$). The average abundance of Dermaptera for Bt corn was 11.00 while that for the conventional corn was 5.71 insects. Thus, abundance for Coleoptera (Anthicidae and Coccinellidae), Hemiptera (Miridae and *Orius* sp.) were similar in conventional and Bt corn. Besides that, the application of insecticides may have reduced the abundance of Dermaptera in conventional corn.

Keywords IPM; transgenic plants; beneficial insects

54 Effects of rainfall and temperature on populations of *Liriomyza huidobrensis*

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One of the most important agents of natural control of insects is the climatic elements. They can directly affect the oviposition, development, reproduction and, indirectly the quality of the host plant or the action of natural enemies. The leafminer *Liriomyza huidobrensis* is an important agricultural pest in many plant families, especially Solanaceae. In this sense, this pest is an interesting model to study the effects of climatic elements on insect populations. Therefore, the aim of this study was to investigate the influence of rainfall and temperature on populations of *L. huidobrensis* during the seasons. The experiments were carried out in commercial tomato crops in the region of Viçosa, MG. The evaluations were conducted in 12 crops for two years. In each crop were assessed 24 plants, each plant as a repetition. The characteristics assessed were the percentage of leaves mined from *L. huidobrensis*, air temperature and the intensity of rainfall. The data of mined leaves percentages; air temperature and intensity of rainfall were subjected to multiple regression analysis at $P < 0.05$. Summer was the season with the highest percentage of mined leaves (24.13%), while the winter (0.69%) and spring (1.37%) had the lowest percentage of mined leaves. The air temperature and the amount of rainfall had a significant effect on the percentage of mined leaves. The temperature had a positively affected and, when it was above 22 ° C, we observed an increase in the percentage of mined leaves. In the other hand, the rainfall had a negative effect. So, when the rainfall intensity was greater than 2 mm.day⁻¹ a reduction in the percentage of mined leaves occurred. Therefore, the temperature and intensity of rainfall affect the percentage of leaf mined by *L. huidobrensis*.

Keywords climatic elements; tomato leaf miner; pest management

55 Insecticide activity of castor oil against *Spodoptera eridania* (Lepidoptera: Noctuidae)

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Vegetable oils represent an alternative to insect control, since they are natural products of plant origin, and biodegradables. In this way, the aim of this study was to evaluate the insecticidal activity of castor oil, *Ricinus communis* (Euphobiaceae), against *Spodoptera eridania* larvae (Lepidoptera: Noctuidae). For the bioassay were used tomato leaflets from cultivar Santa Clara as food. The suspensions were prepared 0.0; 2.5; 5.0; 7.5 e 10.0% (v/v) of castor oil using distilled water as solvent adding neutral liquid detergent (1% v/v) and Tween® 80 (0.05% v/v). The leaflets and the larvae were treated with spraying in a Potter tower calibrated to 15 psi in Petri dishes. The assessment was conducted until 72 hours after spraying. We used a completely randomized design, with 10 larvae of 2nd instar per repetition and 5 repetitions, in a total of 50 individuals per treatment. The mortality of *S. eridania* was affected by castor oil concentration, being increased with increasing concentrations and adjusting the nonlinear exponential model ($F=196.6397$; $p<0.001$; $R^2=95.16\%$). The lethal concentration for a median population (LC50) was 2.37% with 95% confidence intervals of 1.39 and 3.78%. Thus, it appears that castor oil is a promising tool for the management of *S. eridania*. However, studies about the performance of the product in semi-field and field conditions are needed to validate a statement to farmers.

Keywords alternative methods; insecticide plants; phytosanitary management

56 Pathogenicity of isolates of the genus *Beauveria* obtained in productive soils of IFNMG Campus Januária the larvae *Galleria mellonella*

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The entomopathogenic fungi in Brazil are still very little explored. The use of these entomopathogens has great potential for biological control because it is effective in controlling both the initial and adulthood of insects as well as being low cost without harming the environment. For being naturally sensitive to environmental conditions such as temperature and UV radiation, working with isolates obtained in the area of intended use it becomes a viable strategy. This study aimed to verify the potential of isolates of genus *Beauveria* found in IFNMG-Campus Januária soils on larvae *Galleria mellonella*. The LCB1 and LCB2 isolates were evaluated in suspensions 4,81x10⁷ and 5,31x10⁷ conidia per mL, respectively. These were applied on larvae of *G. mellonella* of eighth instar obtained from creation of the entomology laboratory of IFNMG in five replicates per treatment. After 48 hours exposure to isolates there was 90% mortality of the larvae, mycelial growth being observed in 83.4% of the larvae after 96 hours of exposure to isolated LCB1, while in LCB2 68.75% of exposed larvae showed mycelial growth. The ANOVA was significant only for mycelial growth variable. As noted, the isolates of genus *Beauveria* obtained in soils productive of IFNMG Campus Januária, are promising and may represent a good control of pest regional agricultural option.

Keywords Biological control; entomopathogenic fungi; biological potential

57 Hormesis by Trichogrammatidae (Hymenoptera) submitted to the herbicide glyphosate

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Pests should be controlled with low impact methods. The herbicide glyphosate was evaluated on 10 Trichogrammatidae (Hymenoptera) species. A female of each Trichogrammatidae species was individually placed per test tube (no-choice) with a card containing approximately 45 *Anagasta kuehniella* Zeller, 1879 (Lepidoptera: Pyralidae) eggs. Parasitism was allowed for 48 h when the cards were sprayed with the herbicide glyphosate (Roundup Original DI) (13.94 L.ha⁻¹) along with the control (distilled water). The aim of this study was to evaluate the compatibility of the herbicide glyphosate, recommended for several crops, to 10 Trichogrammatidae species. The emergence of *Textit* *T. acacioi* females was lower but that of *T. atopovilia*, *T. demoraesi*, and *T. pretiosum* higher with the glyphosate. This herbicide also increased the emergence of *T. brasiliensis*, *T. demoraesi*, *T. galloi*, and *T. soaresi* males and decreased those of *T. atopovilia* and *T. pretiosum*. The sex ratio of *T. galloi* was lower and that of *T. brunii*, *T. brasiliensis*, *T. demoraesi*, and *T. soaresi* higher with glyphosate. This herbicide was harmless to all Trichogrammatidae species females based on the International Organization for Biological Control (IOBC) classification. The possible hormesis effect of glyphosate on Trichogrammatidae species and on the bacterium *Wolbachia* sp. (Rickettsiales: Rickettsiaceae) was also discussed.

Keywords Biological control; Herbicide; Trichogramma

58 Speed of action of insecticides to the control of *Ascia monuste*

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The *Ascia monuste* (Lepidoptera: Pieridae) is an important pest of plants of the Brassicaceae family. Chemical control is the main method adopted to control this pest and, therefore, the correct choice of the insecticide to be used is essential. Based on this fact, it is recommended the use of insecticides that show fast speed action to avoid that the pests reach the economic threshold. Thus, the objective of the study was to determine the speed action of four insecticides to the control of *Ascia monuste*. The bioassays were conducted in the Integrated Pest Management laboratory at Universidade Federal de Viçosa. The treatments were the insecticides cartap, chlorantraniliprole, chlorfenapyr, deltamethrin and the control. The bioassays were performed in a completely randomized design with sixty replicates. Discs of cabbage leaves were immersed in an insecticide solution (recommended dose + 0.1% spreader-sticker) and the control (0.1% spreader-sticker), and the discs were allowed to dry in the shade. Afterwards, each disc was placed in a plastic pot (250 mL) which were added ten larvae (second instar) of *Ascia monuste*. We assessed the mortalities of insects until the death of last individual in all insecticides treatments. The bioassays results were submitted to survival analysis, in which survival curves are obtained using Kaplan-Meyer estimators for each treatment. There were statistically significant differences among the survival curves of the treatments to *Ascia monuste* (Log-rank test, $X^2 = 460,75$, $gl = 4$, $p < 0.0001$). The insecticides cartap and deltamethrin caused mortality to all larvae of *Ascia monuste* in less than one hour. The insecticides chlorfenapyr and chlorantraniliprole caused mortality to all the larvae by up to 9 and 30 hours, respectively. Thus, the studied insecticides can be categorized in three groups, according to the speed of action to the control of *Ascia monuste*: fast, intermediate and slow control.

Keywords Time-mortality curve; Brassicaceae; Great Southern White

59 Effects of plants extracts at different developmental stages of the predator *Podisusnigrispinus* (Dallas) (Heteroptera: Pentatomidae)

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Resistance, pest resurgence, and negative effects on natural enemies are consequences of the indiscriminate use of organo-synthetic insecticides. Interest in substances from plants which have toxic and deterrent properties is increasing, but there are few reports on the effects of natural extracts on *Podisusnigrispinus* (Dallas) (Heteroptera: Pentatomidae), an important biological control agent in Brazil. In this study, the toxicity of aqueous extracts of *Anonasquamosa* (Anonaceae), *Azadirachtaindica* (Meliaceae), *Corymbiacitriodora* (Myrtaceae), *Cymbopogonwinterianus* (Poaceae), *Lip-piasidooides* (Verbenaceae), *Menthaarvensis* (Lamiaceae), *Ricinuscommunis* (Euphorbiaceae), and *Sapindussaponaria* (Sapindaceae) was evaluated on developmental stages (eggs, fifth instar, and adults) of the generalist predator *P. nigrispinus*. Eggs of *P. nigrispinus* were dipped in extract concentrations of 1, 3, 5, 7, or 10% and the nymphs and adults of this predator received 1 μ L of each extract by topical application on the dorsal area. The extracts affected nymph hatching and the extracts of *A. indica* (flowers), *A. squamosa*, and *R. communis* were the most toxic. Extracts of *R. communis* were toxic to fifth instar nymphs at the concentrations of 5, 7, and 10% while *S. saponaria*, *A.indica* (flowers), and *L. sidoides* caused higher mortality rates in adults. These extracts affected the life cycle of the predator *P. nigrispinus* and may be effective in controlling other pests.

Keywords Natural enemies; Pentatomidae; Botanical Insecticides

60 Population growth of *Polyphagotarsonemus latus* on non-crop plants and chili pepper plants

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Broad mite, *Polyphagotarsonemus latus* (Acari: Tarsonemidae), is distinguished for being a polyphagous and a cosmopolitan pest. It is found attacking different crops of global importance including chili pepper (*Capsicum frutescens*). Among broad mite hosts are also found non-crop plants. The objective of this study was to evaluate the potential of *P. latus* to develop on chili pepper and on non-crop plants surrounding chili pepper cultivation, and determine which non-crop plants have potential to provide food resources to broad mite. The experiment was carried out under laboratory conditions. Besides chili pepper plants, five non-crop plants of common occurrence in chili pepper crops were tested: *Vernonia polysphaera*, *Ageratum conyzoides*, *Triumfetta bartramia*, *Conyza bonaeriensis* and *Bidens pilosa*. Leaf discs of each plant species were put in Petri dishes and infested with 10 adult females. Significant differences were observed in the instantaneous rate of population growth (r_i) among plant species. Higher population growth was found on *C. frutescens*, followed by *T. bartramia* and *A. conyzoides*. Thus, possibly these non-crop plant species promote survival and development of broad mites in the field and can act either as a sink or source of this pest. Future fieldwork should investigate this hypothesis

Keywords Broad mite; *Capsicum frutescens*; instantaneous rate of increase

61 Evaluation of different types of traps used for catching insects with forest quarantine potential for Brazil in a customs station

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The dissemination of forest quarantine pests, increased trade, can have serious economic, environmental and social consequences. Member countries of the International Convention of Plant Protection (IPPC) and the signatories of the Sanitary and Phytosanitary Agreement (SPS) of the WTO should consider in their public policy mechanisms to reduce the risk of introduction, establishment of pest and its impacts. Three types of traps: "funnel trap", impact, both with synthetic attractive, and light activated daily at four sites with imported goods, many containing wood packaging in a Customs Station Interior (EADI), were tested in order to provide strategies early detection of forest quarantine pests. The collections were weekly from August 2011 to February 2012. A total of 42,886 specimens of 18 orders was captured. The light trap collected the largest amount of insects, 42,023. The "Funnel-trap" and the impact of insects collected 693 and 143, respectively. The month of December was 22% of the insects collected and the winter months the smallest percentage: 5.4% in August and 7.7% in September. The percentages of collected individuals was lower in the months of spring and summer with 17.1% in October, 13.7% in November, 16.0% in January and 17.6% in February. Diptera was the order with the largest number of individuals collected, 57.4%, followed by Hymenoptera, 11.2%, Coleoptera, 8.4%, Hemiptera, and Lepidoptera 8.2%, 7.8%, totaling 93% of specimens caught. All orders are these forest quarantine pests established by Instruction No. 41 of 2008 of the MAPA.

Keywords early detection; exclusion; monitoring

62 Selectivity of insecticides used against *Tuta absoluta* on *Macrolophus basicornis* in residual exposure

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The aim of this study was to evaluate the residual effect of 5 insecticides, recommended to control of *Tuta absoluta* Meyrick, 1917 (Lepidoptera: Gelechiidae) in the tomato crop on the predator *Macrolophus basicornis* (Hemiptera: Miridae) in inert surface. The used insecticides (g a.i. L-1) were teflubenzuron (0.0375), chlorantraniliprole (0.0368), chlorfenapyr (0.12), abamectin (0.018), and cartap hydrochloride (1.25). The insecticides were sprayed in its highest recommended doses through a Potter precision tower in Petri dishes, and one hour after the spraying 10 third instar nymphs of *M. basicornis* were released in each Petri dish, in a total of 60 nymphs divided in 6 Petri dishes per treatment. Eggs of *Anagasta kuehniella* (Lepidoptera: Pyralidae) were offered ad libitum to the nymphs. To evaluate the mortality caused by the insecticides, we considered each nymph as one repetition, and we used Weibull distribution to make survival curves, aiming the formation of similar groups. The insecticides were ranked according to their mortality in the classification proposed by the IOBC. Regarding the survival curves, abamectin was fitted in group 1, with a LD50 of 2.1 days. Cartap hydrochloride showed a LD50 of 6 days, and was fitted in group 2. Teflubenzuron, chlorantraniliprole and chlorfenapyr were in the same curve as the control, and they were fitted in the group 3, with a LD50 of 17 days. The insecticide abamectin caused the death of all the nymphs, so was classified in the category 4 (mortality above 99%), considered harmful to *M. basicornis* nymphs. Cartap hydrochloride was classified in category 2 (mortality between 30% and 79%), considered slightly harmful. The mortalities caused by teflubenzuron, chlorantraniliprole and chlorfenapyr were lower than 30%, so they were classified in category 1, considered harmless to this predator.

Keywords early detection; exclusion; monitoring Tomato pinworm; Predatory Heteroptera; Integrated Pest Management

63 Biological activity of the ethanol extract of *Mansoa alliacea* (Bignoniaceae) on *Anticarsia gemmatalis* (Noctuidae)

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The soybean Caterpillar *Anticarsia gemmatalis* is the main agricultural pest related to soybeans, causing considerable damage to this crop. An alternative to control this insect is the bioprospecting of phytochemical compounds extracted from Brazilian native plant species that would have biological effective activity against this pest. The objective of this study was to evaluate the biological activity of ethanol extract of *Mansoa alliacea* on *A. gemmatalis*. For the bioassay, we used 100 g of leaves *M. alliacea* to extract 4.86 g of crude extract using 1.5 L of ethanol as a solvent in a Soxhlet type extractor, and then it was concentrated on a rotary evaporator at 40 ° C. Bioassays were performed with 30 third instar caterpillars by concentration of ethanolic extract (1; 2.5; 5; 10; 15 mg / ml) and 30 caterpillars for the control. Each insect was individually placed in a 50 ml-flask, together with a cotton moistened and 1 g of artificial diet with diluted extracts that were available as food source for seven days. The parameters evaluated were mortality; weight and morphometric characteristics from the pupa; the beginning of the pupal stage and adult; consumption of diet and weight of larvae after seven days of bioassay. The experiment environment was conditioned at 27 ± 1 ° C and relative humidity of 80 ± 5%. All the teste was randomized. Data were analyzed by analysis of variance (ANOVA) followed by Tukey test (P <0.05). In trials with ethanol extract we observed 36.6% mortality of caterpillars in higher concentrations. There were no significant differences in weight and morphometric aspects of pupae. The ethanol extract of *M. alliacea* presented insecticide and deterrent activity against *A. gemmatalis*.

Keywords *Mansoa alliacea*; *Anticarsia gemmatalis*; noctuídeo

64 Constraints to larvae entrance in the stalks as a sugarcane resistance mechanism against sugarcane stalk borer.

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The sugarcane borer *Diatraea saccharalis* (Lepidoptera: Crambidae) is one of the major pests in sugarcane crops in Brazil. Neonate larvae of such insects are able to feed on the leaves and leaf-sheaths for nearly 10 days before enter into the stalks, causing not only yield losses but also reducing the quality of sugar and alcohol. Sugarcane genotypes that constraint the ability of these insects of entering the stalks is of great importance in sugarcane resistance breeding programs. Here, we recorded the time need for *D. saccharalis* larvae to enter into the stalks of six (SP891115, SP803280, SP813250, RB867515, RB928064 and RB835486) sugarcane cultivars. The experiment was carried out in completely randomized design with 20 replicates per treatment. Four plants of each genotype were infested with five 9-day-old larvae, totaling 20 larvae per genotype. The larvae entrance in the stalks was assessed at 24, 48, 72 and 96h after infestation and the entrance time were compared by the Holmm-Sidak test. Larvae that did not enter the stalk up to 96h were considered as censored data. Significant differences were observed for the larvae entrance time between the genotypes SP89115 ($46.0 \pm 7.1h$) and SP803280 (80.5 ± 6.5) ($P = 0.0347$). Such differences might probably be due to the hind hardness, wax content in the stalk surface or fiber content. Further investigation addressing such traits among these cultivars will contribute to confirm whether the larva entrance time is a robust tool to be used in sugarcane screening programs.

Keywords IPM, Plant resistance, sugarcane breeding

65 Effect of vegetables oils at *Planococcus citri*

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The crop coffee is an important agricultural activity in Brazil. However, faces problems that interfere with the production, for example the phytosanitary problems. The species *Planococcus citri*, known as mealybug, is the master pest to crop, may cause losses to production. The absence of recommended products encourages the search for management methods, especially to minimize the use of synthetic chemical insecticides unsuitable as a means of immediate control of the pest. This study was carried out to assess the efficiency of vegetables oils as alternative method of *P. citri* control. It was evaluated in the laboratory vegetables oils of *Glycine max*, *Zea mays* and *Brassica napus* that were applied at a 3% concentration (m/v) in arenas containing coffee leaf disc with ten second instar nymphs. The application of vegetable oils caused mortality of mealybug, and the *G. max* oil showed the highest mortality 75.8%, while the *Z. mays* oil and *B. napus* showed, respectively, 66.2% and 64.9% mortality. Thus it was concluded that the use of the vegetables oils may be an alternative on phytosanitary control of *P. citri*, minimizing the intensive and inappropriate use of synthetic chemical insecticides and contributing with Integrated Programs Management.

Keywords IPM; mealybug; botanical insecticides

66 **Biology and Capacity Predatory of *Delphastus pusillus* (Coleoptera: Coccinellidae) on *Aleurocanthus woglumi* (Hemiptera: Aleyrodidae)**

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Among the natural enemies, predators are considered an important defense of plants against insect pests. In the group of predators there are the ladybugs (Coleoptera: Coccinellidae), most of which are predatory. Adult *Delphastus pusillus* are small in size 1.3 to 1.5 mm long and black coloring. Adult individuals of *D.pusillus* were collected with brush assistance and placed in test tubes and transferred to the Bioecology Laboratory Insects (LABIN). The places where the collections of these adults were in citrus cultivation farms in the municipality of Capitão Poço. There was the longevity of adults and the predatory ability of all urges of *D.pusillus*. The experimental design was completely randomized with fifteen repetitions with 15 plates with an adult each. Longevity in days Ladybird differs between treatments, which increased with the provision of *A. woglumi* eggs, being (46.6 ± 1.99 days). There were differences in predation between the phases of development of blackfly, and predation of eggs higher in 86.72% to adult ladybird, for nymphs II and III nymphs (urge), respectively in the adult predator phase 26.50% for pupae also offered there were differences in the consumption capacity in adult of *D.pusillus* was higher respectively with 37.16%. Biology and predatory capacity revealed potential *D.pusillus* in fly-black-of-citrus, enabling its creation in the laboratory and possibly for future programs enabling the use of this natural enemy to control pests in a greenhouse or even in field.

Keywords biology; predation; ladybug

67 Toxicity of new amides to *Ascia monuste*

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The demand for new insecticides molecules in pest control is increasing due to the development of resistant insects populations to the currently products. Natural molecules extracted from plants are good models to the synthesis of new insecticides. An example of these natural molecules is the piperine; compound extracted from plants of the family Piperaceae. *Ascia monuste* (Lepidoptera: Pieridae) is an important brassica pest in America. Thus, the aim of this study was to assessed the toxicity of piperine amide analogues to larvae of *Ascia monuste*. Second-instar larvae of *A. monuste* were used in the assays. The bioassays were carried out by topical application. The dose used was 30 mg/g body mass of *A. monuste*. The experimental design was completely randomized with six replicates per treatment. The treatments were the three synthesized amides (amides 1, 3 and 6) and acetone as experimental control. The mortalities were counted 48 hours after the topical application. The insects that lost their motor coordination or did not move when touched by a brush were considered dead. Mortality data were subjected to analysis of variance (ANOVA) and the averages of each treatment were compared by Tukey test ($p < 0.05$). The amide 3 caused the higher mortality to *A. monuste* ($> 80\%$). The amides 1 and 6 caused mortality similar to the experimental control ($< 10\%$). Therefore, the amide 3 is promising to be used as an insecticide due to its high toxicity to *Ascia monuste*.

Keywords Great southern white butterfly; New insecticides; Mortality

68 Adaptation of technique for rearing of the coffee berry borer *Hypothenemus hampei*

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The study of rearing techniques for coffee berry borer, *Hypothenemus hampei* (Coleoptera: Curculionidae: Scolytinae), one of the most important obstacle to coffee culture, it is necessary to facilitate the execution and comparison of researches data. Thus, the objective of this study was to evaluate rearing techniques for the coffee berry borer, using different coffees, as well as forms of asepsis and the storage. The number of offspring produced was evaluated using arabica coffee in beans, arabica coffee in parchment and robusta coffee in beans. For the asepsis of these coffees was used a commercial product based on P2O5 (PCB-P2O5, 30 mL/20 L water), Sodium Hypochlorite (NaClO 5% v v-1) and distilled water (control), these separated in two batches after the asepsis process, one used immediately and the other stored at -20 °C for 60 days for further use. Among the coffee types used as a food source in the control (without asepsis), the robusta coffee in beans was the best for the rearing of the coffee berry borer, producing 464.2 insects. For the arabica coffee in beans and in parchment, using asepsis with NaClO and PCB-P2O5, respectively, these did not affect the development of the coffee berry borer and increased the number of individuals produced. When used for the rearing of the coffee berry borer, robusta coffee in beans and performed the asepsis with PCB-P2O5, produced 535.6 insects. The coffee storage in freezer at -20 °C for 60 days can in some cases reduce the number of offsprings of the coffee berry borer, but it is important for insect maintenance during the off-season. The best rearing technique for the coffee berry borer is in robust coffee in beans, using the asepsis with PCB-P2O5, which increases the number of insects beyond being the cheapest one.

Keywords *Coffea Arabica*; *Coffea canephora*; Asepsis

69 Nicosulfuron influence of ten species of trichogrammatid (Hymenoptera: Trichogrammatidae) in tests without choice

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Among the biological control agents, one that stands out is the parasitoid of lepidopteran eggs, *Trichogramma* spp. (Hymenoptera: Trichogrammatidae). This genus has been used and studied because of their control efficiency, easiness of reproduction and wide geographical distribution. The importance of genus combined with these features highlights the need to understand and study the interaction between pesticides and agents of this group. This research was developed in the Insectarium GWG Moraes ICA / UFMG. The objective was to evaluate the toxicity of Nicosulfuron herbicide on oviposition, female emergency and sex ratio of the biological control agent *Trichogramma* spp., in tests without the possibility of choice. The statistical delimitation was the factorial scheme 2x10 with 10 repetitions. Between these, the treatments were nine species of the *Trichogramma* genus and one of the *Trichogrammatoidea* genus on the repellence of Nicosulfuron herbicide in 1.50 L / ha and the control with distilled water. Cards with approximately 45 eggs of *Anagasta kuehniella* (Lepidoptera: Pyralidae) were sprayed with the treatments and inserted into microtubes with a female *Trichogrammatidae* for parasitism. There were evaluated percentages of parasitized eggs, number of emerged eggs and sex ratio. The data were submitted to the ANOVA variance analyses and to the Scott-Knott test; both $P < 0,05$. Regarding the control, Nicosulfuron negatively affected the parasitism of five species, *T. annulata* of the genus *Trichogrammatoidea* and *T. acacioi*, *T. benneti*, *T. demoraesi* and *T. pretiosum*. The treatment with Nicosulfuron, compared to the control, affected more the females' species of *T. annulata*, *T. atopovirilia*, *T. benneti*, *T. pretiosum* and *T. soaresi*. *T. acacioi* and *T. demoraesi* presented lower sexual ratio.

Keywords *Trichogramma*, herbicide, biological control

70 Index of *Liriomyza trifolii* (Diptera: Agromyzidae) captured in color adhesive

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The objective of this study was to evaluate the efficiency of commercial traps Bio Trap Cards Adhesive Biotrap of yellow and blue in the capture of *Liriomyza trifolii*, verifying the preference of this insect. This study was conducted at the Federal University of Espírito Santo, in the Center for Scientific and Technological Development in Plant Health Management (NUDEMAFI) in greenhouses. Assays were performed with anti-screen cages afídica (1 x 0.5 x 0.5 m) where the insects were released at dusk on tomato plants. The sticky traps were placed equidistant so to stay at 25 cm from the plant where the insects were released. The models were colored yellow and other colored blue. In each cage was placed a choice for each color and each representing a repetition cage. Assessments were performed 48 h after being collected and counted the number of insects caught. Most samples had captured insects. Since the yellow traps had a higher capturing rate compared to trap blue staining.

Keywords Behavior; attractiveness; insects

71 Potential use of four different insecticides to control *Acanthoscelides obtectus* (Coleoptera: Bruchidae) in Brazil

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The bean weevil, *Acanthoscelides obtectus* (Coleoptera: Bruchidae) is one of the main pests of the stored beans *Phaseolus vulgaris*. The control of such insects, when accomplished, is achieved mainly through few available chemical products such as phosphine. The intensive use of these available chemical compounds can lead to selection of resistant populations, hazards to human health and environmental contamination, which can compromise the control efficacy of these products. Thus, protecting grains with alternative chemical control options are urgently needed. In this study, we surveyed the responses of a Brazilian population of *A. obtectus* to insecticides of different chemical classes: deltamethrin (pyrethroids), thiametoxam (neonicotinoids), spinosad (spinosyns) and indoxacarb (oxadiazines). Such compounds are potential candidate insecticides in the control of stored product pests in Brazil as they all meet the stored products pest control criteria: high insecticidal activity, long residual activity, and low mammalian toxicity. The insects were subjected in 20 ml vials to concentration-mortality bioassays. After 24 hours exposure the lethal concentrations LC50 and LC95 of each insecticide were determined. The results showed that the four insecticides effectively controlled *A. obtectus*. Deltamethrin (LC50 = 0.3 and LC95 = 2.5 mg a.i/g) and thiametoxam (LC50 = 1.2 and LC95 = 7.8 mg a.i/g) were the most efficient insecticides. Although spinosad and indoxacarb had efficiently controlled *A. obtectus*, they presented higher LC50 (Spinosad: 3.2 mg a.i/g. Indoxacarb: 12.0 mg a.i/g) and LC95 (Spinosad: 19.8 mg a.i/g. Indoxacarb: 43.7 mg a.i/g) values. Therefore, the present study showed that the four compounds tested could be good tools to consider in bean weevil management strategies. Further investigations are needed to assess the impact of these insecticides on other stored product pests.

Keywords insecticides; bean weevil; bioassays

72 *Zinia* (*Zinnia elegans* - Asteraceae) potential to attract natural enemies and organic systems diversification

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Habitat diversification and heterogeneous landscape designing are requirements of the conservative biological control, which contribute to conservation of natural enemies and reduction of insect pest populations. The objective of the study was to evaluate zinia (*Zinnia elegans* – Asteraceae) potential as an attractive crop to natural enemies, aiming organic systems diversification. The experiment was conducted in experimental field in Embrapa Agrobiologia, in Seropédica – RJ, from November 2011 to April 2013. Attractive plants were arranged in a completely randomized block design, in plots 4x4 meters ($N = 4$ replicates). Natural enemies sampling was made by the tapping method to displace insects from the plant into a plastic bag and insect net. Data analysis was performed by calculating faunal indices: Richness, Constant and Frequency Index. Natural enemies present in zinia were spiders (20%), predator insects (63%) and parasitoids (16%). Spiders have not been identified yet. The richness of predators and parasitoids (Insecta) was 10 and 12 families, respectively. Almost the predators, family Coccinellidae was the most common (38%), distributed in 62% of the carried out samples, classified as constant. The families Chrysopidae, Reduviidae and Syrphidae were also representative during the bloom. The most common family of parasitoid was Braconidae (48%), followed by Chalcididae (14%), both classified as fortuitous, due to their presence in less than 25% of the carried out samples. Throughout the experiment was observed the presence of lepidopterans from the family HesperIIDae, whose caterpillars were common in Fabaceae plants and also the development of the fungus *Alternaria* sp. Thus, although it is attractive to natural enemies the use of zinia in organic systems diversification should be better evaluated, mainly due to its association with Fabaceae plants.

Keywords conservative biological control; predators; parasitoids

73 Commercial yeast extract (*Saccharomyces cerevisiae*) as an alternative food attractant for monitoring fruit flies (Diptera: Tephritidae)

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The fruit flies are one of the major pest problems for fruit crops considering that the direct damage is caused to the final product – the fruit – and its quarentenary implications concerning the in natura fruit exportation. The fruit fly population monitoring is an important tool to characterize qualitatively and quantitatively the tephritids in an area. The efficiency of monitoring depends on the trap used, the place where it is installed, and mostly on the quality of the attractants. The present study aimed to evaluate a commercial yeast extract *Saccharomyces cerevisiae* as an alternative food attractant for monitoring fruit flies. The experiment was performed in the Germplasm Bank of mango located at Embrapa Cassava and Fruits, Cruz das Almas, BA. The experiment followed a completely randomized design with 5 treatments repeated 7 times making a total of 35 traps. The treatments evaluated were: T1–water; T2–water+sugar; T3–5% of yeast extract+5% of borax; T4–yeast extract+5% of sugar+5% of borax; e T5–5% of hydrolyzed protein. The experiment was conducted for four weeks with insect collecting and food attractant replacement done every week. We collected 224 specimens of fruit flies (128 females and 96 males). The genus *Anastrepha*, with 126 females and 96 males, represented by the species *A.obliqua*, *A. pickeli*, *A. montai*, *A. sororcula*, *A. fraterculus*, *A. zenilidae*, *A. amita* and *A. barnesi* (first occurrence in the state of Bahia), contributed with 99% of the total collected. The species *Ceratitis capitata* contributed with only two females. Statistical difference was observed for the treatment T3 (5% of yeast extract + 5% of sugar + 5% of borax) compared to the others. However, the treatments T4 (yeast extract + 5% of sugar + 5% of borax) and T5 (5% of hydrolyzed protein) did not show significant differences. The alternative food attractant based on a commercial yeast extract *Saccharomyces cerevisiae* is effective for using in a fruit fly population monitoring. Additional studies are recommended for evaluating the economic viability of the product.

Keywords Atractiveness; Mc Phail trap; Hydrolyzed protein

74 Spatial distribution of phytophagous mites on soybean

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There is a great concern about the so-called agricultural commodities such as soybean, an oilseed of high economic value which in Brazil occupies an area of about 27 million hectares, accounting for a quarter of the global area cultivated. Among the threats to the high productivity of the crop is the incidence of pests which may occur from germination to harvest. The objective of this study was to analyze the spatial distribution of phytophagous mites on soybean in Santa Maria - RS. The study was carried out in the cropping season 2010/11, with two evaluations, in an area of 8.47 ha, sampling grid of 50 x 50 m and 33 sampling points. At each point was accounted the total number of mites sampled randomly in three upper third and three middle third leaves, with the aid of portable magnifying glasses. The data of mite total density were subjected to geostatistical analysis and then subjected to ordinary Kriging procedure in order to characterize the modeling of thematic maps. The degree of spatial dependence for the mites was aggregated. The sampling grid was effective for the methodology used with the software GS + 7.0. The spatial distribution of mites occurred in aggregate form and the sampling grid used in the evaluations of 01/02 and 17/03 were adequate. The results allow us to characterize that the geostatistic can be used in the recognition of the spatial distribution of mite.

Keywords geostatistics; IPM; agriculture of precision

75 Effects of two soybean resistance strains on the mid gut morphology of *Anticarsia gemmatalis* larvae

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Anticarsia gemmatalis is one of the main soybean pests in Brazil and the production of resistance plant strains with diverse phytochemical profiles have become an effective technique for biological control and reduction of insecticide applications. In this work is described the effects of two soybean strains; IAC17 and IAC24 (with known herbivore resistance features) on the mid gut of *A. gemmatalis* larvae. Two groups of five larvae in second stage were put over leaves of the resistance soybean strains and one group of five larvae over artificial diet to feed for eight days. Time in which forth to fifth stage larvae was reached. Histological procedures and posterior image analysis were performed. A higher concentration of flavonoids Diadzin and Rutina caused different effects on the mid gut epithelium but not on the peritrophic membrane or the muscular wall. A variation on flavonoid concentration between the two resistance strains produced an dilatation of the goblet cells cavities in both cases, but a discontinuous deformation of columnar cells by a bigger deformation of goblet cells and apparently production of regenerative cells due to IAC17 strain ingestion which contains a higher Diadzin concentration. Otherwise, an epithelium detachment from the muscular wall and a high production of cytoplasmatic vacuoles in columnar cells where produced by ingestion of IAC 24 strain which contains a higher Rutina concentration. Goblet cells deformation and vacuoles formation were not described before as effect of Rutina in high concentrations, but from Diadzin. Thus, new studies with different flavonoid concentrations are necessary.

Keywords Flavonoids; Cells; Vacuoles

76 Oviposition preference of leaf-miner fly *Liriomyza huidobrensis* on different hosts

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The leaf-miner *Liriomyza huidobrensis* (Diptera: Agromyzidae) is a polyphagous pest that is gaining worldwide importance over the past years. This is due the considerable losses in crop production of several families of plant, such as solanaceae, cucurbitaceae and fabaceae. The life cycle of this pest goes through the stages of egg, larvae, pupa and adult. The oviposition of *L. huidobrensis* is endophytic. After the eggs hatch, the larvae feed on the mesophyll. In this regard, *L. huidobrensis* can cause direct damage, reducing photosynthetic plant area and indirect damages, facilitating the entrance of pathogenic microorganisms. However, there are few studies on the oviposition preference of *L. huidobrensis* on different hosts of this pest. Thus, the aim of this study was to evaluate the oviposition preference of *L. huidobrensis* in tomato, potatoes, beans and melons plants. This work was conducted at Universidade Federal de Viçosa, MG. The treatments were plant of tomatoes, potatoes, beans and melons. The experimental design was a randomized block with six replications. Each block was formed by a wooden cage (72x120x72 cm) covered with organza with a plant of each species. The plants remained for 48 hours with 100 adults unsexed of leaf-miner per plant. All data were subjected to analysis of variance and treatment average were compared by Tukey test at $P < 0.05$. The highest oviposition rate of *L. huidobrensis* occurred in tomato (220.67 ± 19.88) and the lowest in melon plants (11.77 ± 2.90). This highest oviposition on tomato crop possibly can be explained by the morphological and chemical characteristics such as the thickness of the epidermis and compounds that promote this pest. Therefore, the tomato is the preferred host at oviposition of *Liriomyza huidobrensis*.

Keywords Animal behavior; pest management and reproduction

77 Fumigant effect of essential oil of *Croton pulegiodorus* in the management of *Callosobruchus maculatus*

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Essential oils and the constituent components are being very studied when its insecticidal activity to the warehouse pest control. The objective of this study was to evaluate the fumigant effect of essential oils *Croton pulegiodorus* on adult *Callosobruchus maculatus* instored *Vigna unguiculata*. The experiment was composed of fumigation chambers formed glass containers, bomboniere type of 1L capacity, which contained 20 g of cowpea and 10 adult *C. maculatus* with known age. The concentrations used were 0, 0.1, 0.4, 1.4, 3 and 3.5 $\mu\text{L} / \text{L}$ of air, which has been estimated by preliminary tests in four replicates. The essential oil of *C. pulegiodorus* was impregnated with automatic pipetter, on filter paper strips (2x5 cm) fixed on the lower surface of the cover containers. To avoid direct contact of the insects with the oils used was a porous material (tulle), between the container and the lid. The fumigation chambers were reared under $25 \pm 2^\circ \text{C}$ and $70 \pm 10\% \text{RH}$. After 48 hours numbers of dead and alive insects were counted. The data were submitted to Probit analysis through the SAS Institute programs (2012). The results demonstrated that the essential oil from *C. pulegiodorus* presented fumigant effect and was promising for the management of *C. maculatus* in cowpea, with high toxicity since the lethal concentrations were relatively low (LC50 and LC90 of 1.29 and 7.04 $\mu\text{L} / \text{L}$ of air, respectively).

Keywords Botanical insecticides; Stored bean; Coleoptera

78 Effect of the intake of honey contaminated with phytosanitary products by *Trichogramma pretiosum* (Hymenoptera: Trichogrammatidae)

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Releases of *Trichogrammaspp.* for the control of pest insects can be benefited by the presence of nectar in the field; however, it can be contaminated by the application of pesticides. Therefore, the objective of this study was to evaluate the toxicity of pesticides used in cotton culture on *T. pretiosum*, when fed contaminated honey. Newly emerged adults were fed a honey solution containing (μL): teflubenzuron (2.5), thiodicarb (11.1), chlorfenapyr (75), flupyradifurone (30) and methomyl (100). The control treatment consisted of honey diluted in acetone. After 24 hours of exposure of adults to the products, the mortality of adult females was evaluated and, for those that survived, *Anagasta kuehniella*(Zeller) (Lepidoptera: Pyralidae) egg cards were offered for a period of 24 hours of exposure to parasitism. The females were then kept in the same tubes with the objective of evaluating their daily survival and the cards with eggs were placed into new tubes, kept in a climate-controlled chamber for the development of parasitoids. The effects on the survival of females, emergency and parasitism capacity were evaluated. Chlorfenapyr, flupyradifurone and methomyl were the most toxic compounds to the adult parasitoids, with median lethal time (LT50) of 1 day. For the control treatment, 10 days were necessary to reduce its population by half. The pesticides teflubenzuron and thiodicarb did not reduce the percentage of emergency of *T. pretiosum*, and were classified as selective; unlike the parasitism capacity, both products reduced the number of parasitized eggs, and were classified as slightly harmful. Chlorfenapyr, flupyradifurone and methomyl need to be evaluated in greenhouse and/or field conditions, since they affected important biological parameters of *T. pretiosum* in laboratory studies.

Keywords Chemical control; Natural enemy; Nectar

79 Development evaluation of pupae *Tenebriomolitor* (coleoptera) at different temperatures

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Characterize the reproduction of beetles is of great economic and environmental importance in agricultural areas. Global losses in crops and stored products caused by the attack of insect pests in post-harvest are significant. The animal flour or Tenebrio is the name given to the larvae of *Tenebriomolitor* a beetle *Tenebrio* genre, typical family representative tenebrionídeos, black or dark brown color. The larvae of this beetle is used in many experiments as hosts for insects multiplication of bacteria and nematodes. They are also used in the diet of birds and fishing bait. The experiment aimed to the evaluation of the development of pupae to adulthood under the influence at different temperatures. The pupae used in the experiment were from larvae reared in the laboratory with artificial diet (wheat bran and soy germ). Were used 10 Petri dishes containing five pupae evaluated for each temperature. Five replications were performed at temperatures of 15, 20, 25, 30, 35 and 40 ° C in a BOD. The plates were covered with filter paper and moistened with distilled water. Observations of plates were held for a period of seven days. After experimentation, we found that there were significant differences in change of pupation adult between the temperatures of 25, 30 and 35 ° C. All pupae submitted between 25 and 35 ° C completed their metamorphosis cycle. In temperature of 40 ° C of 50 pupae submitted, only two pupae stage changed on the first day. At temperatures of 15 and 20 ° C pupae they have not developed. From these data, one can establish an ideal range between 25 to 35 ° C for the treatment and creating mealworms in captivity.

Keywords Tenebrio; larva; variation.

80 Cicadellidae (Hemiptera) diversity in three species of forage in Itaguaçu, Espírito Santo

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Located in the mountainous region of Espírito Santo State, southeastern Brazil, the municipality of Itaguaçu has a geographical area of approximately 531 km² and a population of nearly 15,000 inhabitants. The economy is mainly based on agriculture and very little in industry, therefore there is a large number of properties targeted for cultivation or breeding of dairy cattle and beef. The climate is sub-tropical humid, with an average annual temperature of 23.5°C and the average annual rainfall is about 1,066 mm, generally concentrated between November and March. The leafhoppers of the family Cicadellidae feed on plant tissues, and may pose a risk to plantations by their ability to transmit pathogens to plants, causing a chain of damage culminating in livestock productivity. Thereby, it is important to conduct surveys about the leafhopper fauna, for controlling of harmful species and maintaining the provender quality for livestock. In the present study, we analyze four dairy farms using *Brachiaria brizantha*, *B. mutica*, and *Panicum maximum* (Poales: Poaceae) as fodder and located in different points of the municipality. The leafhoppers were collected using a capture entomological net. To calculate the alpha diversity, Shannon-Wiener index was used, and to estimate similarity between the forage studied, Jaccard Index was used. A total of 233 individuals were collected in *B. brizantha*, representing nine species of Cicadellidae (diversity of $H = 1.426$). In *B. mutica* were collected 407 individuals of nine species ($H = 0.7208$) and in *P. maximum*, 51 individuals of six species ($H = 1.397$). Among the common species, stand out *Hortensia similis* (Cicadellinae) and *Balclutha* spp, (Deltocephalinae) with 365 and 155 individuals, respectively. The application of Jaccard index revealed that the composition of Cicadellidae fauna obtained in *B. brizantha* and *P. maximum* is more similar to each other than in relation to *B. mutica*.

Keywords Auchenorrhyncha; leafhoppers; Brazil

81 Faunal analysis of ant (Hymenoptera: Formicidae) in colored cotton

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The cotton crop, *Gossypium hirsutum* L., is one of the most traditional crops in Brazil, it can be used in production of oil, protein and fiber. In response to greater ecological concern from society, the colored cotton have been standing out because dispense the use of dyes for dyeing. The cotton crop has a high number of pests that cause drop in production, in the other hand, the crop has a high number of natural enemies that control the pests. The ants prey mainly Lepidoptera and Coleoptera pests. Population survey studies are necessary for the implementation of Integrated Pest Management programs (IPM). Thus, in this study was make a population survey of soil ants in colored cotton, *Gossypium hirsutum* L. latifolium herbaceous, aiming study their population through faunal analysis. The experimental area was located at UNESP Jaboticabal, Brazil, and consists in five blocks of 160mtotalizing 8000m² performed once every two weeks and covered two seasons, first March to June 2012 and second November 2012 to June 2013. The faunal indices of dominance, abundance, frequency and constancy of the species, the Shannon-Wiener index and evenness index were analyzed by ANAFAU software. In this study were captured 6706 specimens of ant, belonging to 16 genera and six subfamilies. The species *Solenopsis* sp., *Dorymyrmex* sp., *Pheidole oxyops*, *Atta sexdens rubropilosa*, *Brachymyrmex* sp. e *Camponotus melanoticus* stood out as predominant, these only *Atta sexdens rubropilosa* is damaging to the crop. The Shannon-Wiener index was 2,3352 and the evenness index was 0,7795.

Keywords cotton crop; population survey; natural enemies

82 **Effect of entomopathogenic fungus *Beauveria bassiana* in control of *Bemisia tuberculata* on cassava cultivation**

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The cultivation of cassava *Manihot esculenta* Crantz is a major source of food, being part of the alimentation of more than 1 billion people in 105 countries and is cultivated worldwide. The whitefly *Bemisia tuberculata* is one of the major pests causing direct and indirect damage. Currently there is no registered chemical product to control it, producers use pesticides inappropriately with low efficiency, selecting resistant individuals and decreasing the population of natural enemies. The objective of this study was to evaluate the population fluctuation of whitefly and the efficiency of the bio pesticide Ballvéria - isolated IBCB 66 *Beauveria bassiana*. The experiment was conducted in an experimental area of 960 m², evaluating two cassava cultivars (Crioula and Fécula Branca) in the 2013/2014 crop, with spacing of 1x1 meters. The evaluation of the experiment was done through weekly observations, quantifying adults and whitefly nymphs in the middle third and upper third of the plants that was six months old and with 21 leaves / developed plant. Were made 3 applications of Ballvéria bio-insecticide, with an interval of 30 days each from April/2014. The data were analyzed using Scot-Knott test at 5% probability. During the months of data collection was quantified more nymphs than adults in both the cultivars and it was observed that nymphs and adults had a higher preference for Crioula . After three applications of the fungus *B. bassiana* there was a reduction of 57.20 and 74.05% of the population of *B nymphs. tuberculata* per plant, to cultivate Crioula and Fécula Branca, respectively. Cultivar Crioula was more productive compared to Fécula Branca.

Keywords Biologic Control; Whitefly; *Manihot esculenta*

83 Factors affecting syrup consumption by *Melipona bicolor* (Apidae; Meliponini)

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The stingless bees, Meliponini, are found in Subtropical and Neotropical regions of the world, with 33 genera exclusively from Neotropical region. These bees store nectar and pollen in pots made of wax. In times of scarcity of food it is necessary to provide supplementary food to the colonies, being water and sugar syrup a common supply provided by beekeepers. It is believed that the syrup collection, especially from individual feeders, is related to empty or opened food pots available inside the nest and there is a preference for syrups with higher concentrations of sugar. Thus, the aim of this work was to evaluate the amount of food collected by *Melipona bicolor* and its relation with the number of available pots inside the colony. The experiment was conducted in the central Apiary of the Federal University of Viçosa, in the period from 15 to 21 of November of 2014 with three colonies of *Melipona bicolor*. Sucrose solution was used at concentrations of 30% and 60%, which was supplied twice a day in the amount of 30 ml from each concentration per colony. All food pots were counted and classified before and after the provision of syrup. It was observed that a large part of the supplied syrup was stored in empty pots. Total consumption of syrup was positively correlated with the number of empty pots for *M. bicolor* ($p < 0.05$). Regarding the difference of consumption between the two syrup concentrations, the collection of the 60% concentration syrup was significantly higher by t test ($p < 0.05$), both in the morning and in the afternoon. Based on these results it can be concluded that syrup collection is directly related to the availability of empty pots, that there is a preference for higher concentrated syrup and that the consumption in the morning period is higher than in the afternoon.

Keywords Meliponini; Food; Syrup

84 *Azadirachta indica* extract, Meliaceae L., used for controlling *Amerrhinus ynca* *in vitro*

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Amerrhinus ynca (Coleoptera, Curculionidae), pest of the coconut leaf rachis, is commonly controlled by insecticides for inhibiting cholinesterase, benzofuranyl methylcarbamate, by spraying and direct applications on the canals built by the larva in the rachis². Plant extracts are commonly used in pest control, for example the "Neem", *Azadirachta indica*, Meliaceae, which has secondary metabolites with biological activity. Azadirachtin is the most important for entomology, by physiological disorders that alter the development of insect pests, mainly due to the action of feeding repellency, inhibiting its development. Thus, they used methanol extracts of neem fruit in order to inhibit the development of larvae *Amerrhinus ynca* under laboratory conditions. Was selected 12 larvae, collected in the field, in the same instar. These were maintained in artificial culture medium, coconut mesocarp processed in petri dishes. For biological activity of extracts were used 8 larvae kept in artificial medium with 10% of the methanol extract of neem and fruit. As control were used 4 kept only on artificial media. The larvae were kept at a temperature of 25 ± 1 ° C, humidity of $70\% \pm 5\%$. The culture medium was replaced every 4 days. The insects were evaluated until its inactivity or death. The methanol extract of neem fruit was effective in reducing the activity and larval death in about 60 days. Larvae kept in nutritional means, without the extract, developed into adulthood. These results are similar to those detected in other weevils, yet unpublished for *Amerrhinus ynca*. The activity of *A. ynca* "in vitro" was interrupted by methanol extract of neem fruit. The application of these extracts under field conditions are being developed.

Keywords biological activity; coconut; extract of neem

85 Plant architecture and the intensity of herbivory and trichome density in *Bauhinia brevipes* (fabaceae)

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The plant architecture is determined by the composition and persistence of vegetative and reproductive organs and can affect the plant-insect interactions according to Lawton. The objective of this study was to analyze and compare the architecture of *Bauhinia brevipes* (Fabaceae), herbivory and the density of leaf trichomes, in the dry season (May to August 2014) and rainy season (January to April 2015). Were marked 30 plants, at random, to analyze the structural characteristics and of which 15 were collected insects of the branches, with plastic bag, for identification. To quantify the density of trichomes were collected 5 leaf samples of other 15 plants selected at random. The data were analyzed according to Kruskal-Wallis one-way analysis of variance and Spearman's correlation by Program Bioestat 5.0. Plant height ranged from 88.21 ± 40.40 cm at the dry season to 94.23 ± 41.65 cm ($p < 0.05$) in the rainy season. The diameter of the trunk during the dry period was 0.57 ± 0.36 cm and increased to 0.93 ± 0.55 cm during the rainy season. The number of branches was 8.86 ± 5.44 in the dry season and went to 16.38 ± 12.67 in the rainy season, and the young leaves per plant ranged from 0.21 ± 1.05 in the dry season to 1.54 ± 3.35 in the rainy season and the old leaves increases from 5.58 ± 7.66 to 14.57 ± 14.05 in the rainy season. Plant height was correlated with the number of branches ($r = 0.72$) and chewing insects with damaged older leaves ($r = 0.77$). The glandular trichomes naviculate ($487.26 \pm 157.06\text{mm}^2$) were more abundant in the rainy season, but no correlation was found with damaged or intact leaves. Arthropods most often found in the dry season were Coccoidea (56.18%), followed by Tapinoma (15.62%), Cicadellidae (15.62%) and Araneae (12.5%), which was also more frequent in rainy season (37.5%). We concluded that some species of scale insects are commonly found in *B. brevipes*; and there was an increase in the structures of the plant between dry rainy seasons.

Keywords Plant architecture; herbivory; trichomes

86 Effect of Atrazine on 10 Trichogrammatidae (Hymenoptera) species in no-choice test

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Selective pesticides that do not affect non-target organisms are important in the biological control of pests. The aim of this study was to evaluate the effect of herbicide atrazine, recommended for corn crop, on 10 Trichogrammatidae (Hymenoptera) species. A female of each *Trichogramma* spp. was individually placed per test tube (no-choice) with a card containing approximately 45 *Anagasta kuehniella* Zeller, 1879 (Lepidoptera: Pyralidae) eggs. Parasitism by these natural enemies was allowed for 48 h and the cards were sprayed with the herbicide atrazine at 8.07 L.ha⁻¹ (Gesaprim500 Ciba Geisy), along with the control (distilled water). Atrazine reduced in 73.8% *Trichogramma bruni* Nagaraja, 1983, females emergence, but increased in 20.8% *Trichogramma pretiosum* Riley, 1879; 7.3% *Trichogramma demoraesi* Nagaraja, 1983; 7.4% *Trichogramma galloi* Zucchi, 1988, and 5.3% *Trichogramma soaresi* Nagaraja, 1983. Conversely, this herbicide increased the *T. bruni* males emergence and decreased those *T. pretiosum*. In addition, atrazine reduced the in 66.7% *T. bruni*, 17.5% *Trichogramma atopovilia* Oatman and Platner, 1983, and 15.0% *Trichogramma bennetti* Nagaraja and Nagarkatti, 1973, sex ratio and increased in 13.8% *T. demoraesi* and 13.6% *T. soaresi*. The herbicide was slightly harmful to *T. bennetti* and *T. bruni*, but was harmless to the other Trichogrammatidae species based on the International Organisation for Biological Control (IOBC) classification.

Keywords biological control; *Trichogramma*; egg parasitoid

87 Population dynamics of caterpillars in two central pivots of the good success farm

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The center pivot irrigation is a device that allows the water distribution uniform and controlled manner, where various technological and methodological improvements were introduced in the equipment to meet the new demands of irrigated agriculture. However, some pest advantage irrigated crops for their development. Caterpillars are the main defoliating soybean as velvetbean caterpillar, soybean looper caterpillar, armyworm caterpillar and tobacco budworm caterpillar. The Good Success Farm, Buritis property, whose geographical coordinates are 16° 51'21" S and 49° 58'25" W, with an average altitude of 569 m. The Farm it has two central pivot, the pivot 1 with an area of 58 ha and pivot 2 with an area of 18 ha. The soybeans were planted on November 3, 2014 and harvested on 21 February 2015. In order to verify the population fluctuation of caterpillars in central pivot, it was developed this project in the 2014/2015 crop. For the sampling of pests two methods were used, according to Quintela (2001) and Correa-Ferreira (2012). The caterpillars complex and all the pests of the order Lepidoptera, which occurred in the pivot were soybean looper and armyworm caterpillar. The juveniles (caterpillars) soybean looper showed a different fluctuation in the pivot 1 (large) in relation to the pivot 2 (Small). The population of lower caterpillars (< 1.5 cm) had greater on the pivot 2 than in the pivot 1, For the population of larger caterpillars (> 1.5 cm) had higher in the pivot 1 than in the pivot 2. The armyworm population, It had a smaller that soybean looper, but the larger caterpillars (> 1.5 cm) were found more on the pivot 1. The pivot 2 whose, the population was less than 0.5 insects per point in just two samples.

Keywords Insect pests; irrigation; population density

88 Does sodium chloride enhance the insecticidal activity of imidacloprid against *Euschistus heros*?

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The brown stink bug *Euschistus heros* causes serious damages to soybean production in Brazil. Its control is achieved mainly by the use of insecticides. For several years, lack of new molecules has led farmers to use insecticides with similar modes of action against *E. heros* within a single season, which might have favored the selection of resistant populations. In the past, it was demonstrated that the addition of sodium chloride (NaCl) enhanced the insecticidal activity of some compounds, but it has not been tested for modern insecticides. Here, we evaluated whether *E. heros* would prefer or avoid the presence of NaCl in a choice experiment. We treated fresh bean pods with four compounds (only distilled water; imidacloprid solution; water and NaCl [0.5%]; imidacloprid and NaCl [0.5%]) and offered it to *E. heros* in an arena (50x50x10cm). The pods were put in each arena side (one treatment for each side). We used five replicates (arenas) with 20 textitE. heros males and evaluated the percentage of insects that were in each treatment over several times (1; 2; 3; 4; 5; 6; 24; 48h after the insects release). In the first five hours, higher numbers of insects (repeated measurements ANOVA, $P < 0.05$) were in the beans treated with imidacloprid + NaCl. After that, there were no significant differences among the treatments. Thus, the addition of NaCl might enhance the insecticidal activity of imidacloprid solutions and help to keep the efficacy of such *E. heros* control method for longer periods.

Keywords Sodium chloride; Neonicotinoid; Pentatomidae

89 Pirate bugs as potential predators of soybean looper *Chrysodeixis includens*

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Biological control is a natural phenomenon to control pests. This control may occur due predators. The predatory pirate bugs (Hemiptera: Anthocoridae) are generalists and have great importance in the pest control by preying upon eggs and larvae of pests such as the *Chrysodeixis includens* a major soybean pest. These insects have the potential to prey on *Chrysodeixis includens*. But this potential is still little studied. Thus, the aim of this study was to determine the potential predation of three species of pirate bugs on soybean looper caterpillars. This work was carried out in the Laboratory of Integrated Pest Management at UFV. Three species of predatory pirate bugs were used: *Blaptostethus pallescens*, *Amphiareus constrictus* and *Orius tristicolor*. The experiment consisted of three treatments beyond the control; the experimental design was completely randomized with 20 repetitions. Each repetition consisted of a Petri dish containing 10 caterpillars *C. includens* of the second stage, an adult pirate bug and a soybean leaf as food for the caterpillars. For the control was established only by caterpillars of soybean looper. The numbers of consumed caterpillars were quantified after 24 hours. The data were submitted to analysis of variance and means were compared by Tukey test at 5% probability. There were differences between the three species regarding the consumption of caterpillars. *B. pallescens* showed the greatest potential for causing predation of 29% mortality, *O. tristicolor* and *A. constrictus* of 22% and 4% mortality respectively. *B. pallescens* consumed a greater amount of food due to the higher body size. Therefore, the specie *B. pallescens* has greater potential for predation of second stage larvae than the other two species, demonstrating potential for biological control of this pest.

Keywords natural enemies; biological control; predatory capacity

90 Sublethal exposure and toxicity to pesticides on *Trichogramma pretiosum* (Hymenoptera: Trichogrammatidae)

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Parasitoids of the genus *Trichogramma* represent an alternative for the control of pest-insects in cotton, but it is necessary to use selective pesticides in crop management. However, the objective was to evaluate the effects of the pesticides: (ia L-1 g) teflubenzuron (0.01875), thiodicarb (0.5), chlorfenapyr (0.9), flupiradifurone (120) and methomyl (1.075) on *T. pretiosum* (Hymenoptera: Trichogrammatidae) in their immature stages. *Anagasta kuehniella* eggs (Lepidoptera: Pyralidae) were offered to females of *T. pretiosum* for a period of 24 h and subsequently treated with insecticides via Potter tower, containing the parasitoid in immature stages. The effects were measured in the F1 generation emergency. To evaluate the effects of the products on the emerged parasitoids from the F1 generation were individualized 20 females in glass tubes and offered up paper cards with eggs of the alternative host for a period of 24 hours exposure to the parasite. Then, the cards with the eggs were placed in new tubes for the development of insects. The effects were measured on emergence of F2 generation and the parasitism capacity. The teflubenzuron pesticides, thiodicarb and flupiradifurone didn't reduce the percentage of emergence of *T. pretiosum*, when applied to these parasitoids in the various stages of its development, and were classified as selective. Methomyl already decreased this biological parameter and was categorized as slightly prejudicial. All the compounds reduced the number of parasitized eggs per female of the F1 generation. The percentage of emergency parasitoids of the F2 generation was reduced only by chlorfenapyr in its phases of egg-larva and pupa, and was classified as slightly harmful. The teflubenzuron products, thiodicarb and flupiradifurone were slightly harmful to *T. Pretiosum*, enabling the compatibility of these in integrated pest management programs in cotton.

Keywords Parasitoid; Chemical control; selectivity

91 *Spodoptera frugiperda* Multiple Nucleopolyhedrovirus bioinsecticide formulation and maintenance of virulence after eight years of storage

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A bioinsecticide to be commercially practicable should be effective in controlling the target pest, need to have a long storage period without lost its efficacy and require a low cost to manufacturing. These characteristics will result in a commercial bioinsecticide that would be competitive with similar products. A *Spodoptera frugiperda* Multiple Nucleopolyhedrovirus (SfMNPV) is effective to infect the fall armyworm, *Spodoptera frugiperda*, but it is not produced commercially yet. Thus, the aim of this work was evaluate mortality of *S. frugiperda* larvae after exposure to a SfMNPV based bioinsecticide that was stored up to eight years at room temperature. The bioinsecticide formulation was obtained by a homogenate of *S. frugiperda* larvae dead by a SfMNPV isolate and the inert ingredient, zeolite. The bioinsecticide was inoculated on 4-squared leaves fragments of maize immersed in viral suspensions 4-million or 4-billion occlusion bodies (OB)/mL plus surfactant. In control treatment leaves fragments was immersed in distilled water plus surfactant. One leaf fragment and one 6-days-old larvae was enclosure inside a 50 mL polyethylene cup for 48 hours. After that larvae was transferred to another cup with artificial diet. Larval mortality was accessed daily up to pupal stage. Mortality data were subjected to ANOVA and means compared by Tukey test ($\alpha=0.05$). The SfMNPV virulence was high after one year of storage, achieving 76 and 97% of larval mortality at viral suspensions of 4-million and 4-billion OB/mL. After eight years, the SfMNPV virulence decreased to 37 and 76% of larval mortality in the lower and higher concentration, respectively. Our findings suggest that zeolite is a suitable inert ingredient to formulate the bioinsecticide. Furthermore, SfMNPV would be lethal to fall armyworm, *S. frugiperda* larvae at least one year after manufacture and storage at room environment.

Keywords *Spodoptera frugiperda*; microbial control; entomopathogenic virus

92 Entomopathogenic nematode behavior at different distances from corn plants treated with elicitors

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Diabrotica speciosa is a polyphagous beetle that damages both the foliage and roots of agricultural crops, particularly corn plants. Entomopathogenic nematode applications for biocontrol of *D. speciosa* have been successful; recruiting more nematodes through application of elicitors to stimulate plant defenses may enhance efficacy of entomopathogenic nematode biocontrol. The objective of this work was to evaluate the effect of horizontal distance on the recruitment of the entomopathogenic nematode *Heterorhabditis amazonensis* in corn plants and the use of elicitors to enhance recruitment. Nematodes were inoculated (1500 IJs) into the soil at distances of 30 and 60 cm from potted untreated corn plants and corn plants treated with foliar application of methyl jasmonate and methyl salicylate. Methyl salicylate treated plants recruited significantly (around 30%) more nematodes at both distances. Methyl jasmonate treatment did not significantly increase nematode recruitment. These results suggest that methyl salicylate could be considered an option for enhancing control of subterranean pests such as *D. speciosa* by recruiting nematodes at distance through integration with push-pull strategies.

Keywords elicitors; *Heterorhabditis*; *Diabrotica speciosa*

93 Effect of host plant on biology and life parameters of *Tetranychus neocaledonicus* (Tetranychidae: Trombidiformes)

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Erythrina velutina Willd. (Fabaceae) is a tree species used for shading (in some cultures), urban afforestation and restoration of degraded areas, and efficient in restoration of riparian forests. Among the pests that affect the development of *E. velutina* is the phytophagous mite *Tetranychus neocaledonicus*. This research aims to evaluate the biological parameters of *T. neocaledonicus* in *E. velutina*. Thirty adult females were transferred from the host units to the rearing unit that consisted of a leaf of *E. velutina* with the abaxial surface facing upwards and placed on a polyurethane sponge that was previously saturated with water within an acrylic box. The deposited eggs were observed every 12 hours to determine the viability and duration of the egg stage. After that each mite continued to be observed every 12 hours to determine the duration of larval stages, protonymph, and deutonymph. The egg to adult period lasted on average 12.8 ± 0.7 days. In that period the longest phase was the eggs incubation which was 5.1 ± 0.4 days. The larval phase took approximately 2.5 ± 0.4 days and the protonymph and deutonymph periods were 2.2 ± 0.2 and 2.9 ± 0.3 days, respectively. The average longevity of the adults males was 22.0 ± 0.2 days and females 25.5 ± 8.3 days, with the period of pre-oviposition, oviposition, and post-oviposition 1.2 ± 0.2 , 23.4 ± 7.3 , and 0.9 ± 1.0 , respectively, for females. The daily average quantity of eggs was 4.8 ± 0.5 per female with a total average of 12.2 ± 5.7 eggs per female. All of the non-fertilised eggs developed males. The results obtained in this research are the first record about biological aspects of the mite *T. neocaledonicus* in *E. velutina* and can be used as a base for future investigations to determine a strategy of control of these mites.

Keywords Mulungu; Tetranychidae; Forest pest insect

94 Use of *Aristolochia trilobata* essential oil and its major compounds for control the *Acromyrmex balzani*

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Leaf-cutting ants of *Acromyrmex* genus are common insects in the neotropics region. They are important pests because of its wide distribution, high abundance and the economic damage they cause to agriculture. The organosynthetic insecticides are the most widely used control method, which although effective, can result in environmental contamination and in fragmentation of colonies. The use of essential oils from plants have been considered a viable alternative to conventional insecticides. Thus, this study aimed to evaluate the ant activity of the essential oil from *Aristolochia trilobata* and its major compounds on leaf-cutting ants *Acromyrmex balzani*. The compounds were identified by GC-MS-FID. To determine the lethal concentrations (LC50 and LC90) was held fumigation bioassays. Each experimental unit consisted of a sealed glass jar with filter paper moistened with distilled water at the bottom and seven workers. The treatments were applied with the aid of a microsyringe on a filter paper of 1 cm² which was suspended and fixed by a line at the cover bottom. It was identified twenty five components in essential oil, and four were considerate majoritarian (sulcatyl acetate, p-cymene, linalool and limonene). Linalool (LC50 = 2.40 μ L L⁻¹) and sulcatyl acetate (LC50 = 2.18 μ L L⁻¹) were more efficient than essential oil (LC50 = 3.76 μ L L⁻¹), whereas p-cymene (LC50 = 4.96 μ L L⁻¹) and limonene (LC50 = 5.72 μ L L⁻¹) was less toxic than essential oil. The linalool and p-cymene acted faster than sulcatyl acetate, limonene and *A. trilobata* essential oil. *A. trilobata* essential oil and its major components show rapid and high fumigation toxicity to the leaf-cutting ant *A. balzani*. Further studies are needed to elucidate the effects of these components in natural environments.

Keywords Ant activity; cipó de mil homens; biopesticide

95 Potential use of lambda-cyhalothrin and thiamethoxam in control of Brazilian populations of *Sitophilus zeamais*

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The maize weevil *Sitophilus zeamais* is a major pest of stored grain in Brazil and the main method of its control is the use of pyrethroid insecticides. However, the indiscriminate use of these compounds has resulted in selection of resistant populations, increasing the pressure and the need to test new control alternatives. Thus, this study aimed to investigate the potential use of lambda-cyhalothrin (pyrethroids) and thiamethoxam (neonicotinoids) insecticides in control of Brazilian populations of *S. zeamais*. In order to evaluate the toxicity (LD50) of these two chemicals, concentration-response bioassays were performed with 15 populations of *S. zeamais* collected from several locations in Brazil. At least 6 different concentrations were tested in a completely randomized experimental design with five repetitions. Each repetition consisted of 20 insects exposed to a grain mass (approximately 20 g) treated with 0.50 mL of water diluted insecticide solution and contained in 20 ml vials. Mortality was assessed after an exposure period of 24 hours and the data were analyzed using the model PROBIT to determine the LD50. The results showed small differences between populations for the two insecticides. For lambda-cyhalothrin, the LD50 dose varied from 0.28 (Teresina) to 5.43 mg a.i./kg of grains (Juiz de Fora). The highest level of resistance was recorded for the population of Juiz de Fora with a resistance ratio of 7.6 (compared to Sete Lagoas, which is the standard population of susceptibility to pyrethroids). For thiamethoxam, the LD50 ranged from 0.02 (Canarana) to 1.25 mg a.i./kg of grains (Juiz de Fora). Our results demonstrate that the control of *Sitophilus zeamais* in Brazil using lambda-cyhalothrin may not be effective in some cases as at least one population had a moderate level of tolerance. Regarding thiamethoxam, its efficacy in controlling this pest made of it good tool to consider in maize weevil management strategies.

Keywords Stored grain; insecticide resistance; maize weevil

96 *Biology of Spodoptera frugiperda* in sweet corn treated with phosphite

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The fall armyworm is a serious pest of corn, infesting the crop from emergence until the harvest. The salt of phosphorous acid (H₃PO₃ – phosphite) has shown deleterious action against many phytophagous arthropods. Hence, this study aimed at studying the action of phosphite supplied sweet corn on the biology of *S. frugiperda*. Plants of sweet corn were grown in 5L capacity plastic containers and kept until V8 stage when they were infested with five neonate caterpillars each. 48 hours after the infestation (HAI), the plants were sprayed with a solution of potassium phosphite 00-40-20 (Phytogard® Potássio, Stoller do Brasil LTDA, Campinas-SP) at the following concentrations: control, 2, 4 and 6 L per ha. A precision CO₂ sprayer regulated to a pressure of 30 KPA was used and after spraying the plants were kept within a greenhouse. The treatments were designed in a complete randomized block with five replications and 5x the number of plants, once the evaluations performed were destructive. The evaluations took place at 3, 7, 11, 17 and 24 DAI, when the whorl of 20 plants was opened and the number of live and dead caterpillars counted. After that, they were kept into 70% alcohol solution for future measurements of body length and head capsule width. In the last evaluation, at 24 DAI, the larvae were also weighted and kept until they turned into a pupa which were weighted and sexed. Data were used in descriptive analysis and submitted to one-way ANOVA. The only significant difference found among treatments was for the head capsule width at the 3 DAI: the larvae coming from plants exposed to the concentration of 4L of phosphite per ha had the largest value (2.97 mm±0.14) and the remaining treatments did not differ among them. The pupal viability were 85,71%, 88,24%, 88,89%, and 100% for 6L, 4L, control and 2L of phosphite per ha. Also, the treatments with phosphite altered the proportion of male:females, increasing the proportion of male to female when compared to control.

Keywords Foliar spray; pest management; phosphorus

97 Coleoborers associated to three distinct ecosystems in Seropédica / RJ

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Individuals of the Coleoptera order, which include the Coleoborers, are responsible for damages on healthy plant tissues and, more severely, on plants under stressful conditions. Nevertheless, Coleoborers also contribute to nutrient cycling and are considered essential for the ecosystem's equilibrium. In this context, the objective of this study was to analyze the occurrence of entomofauna of Coleoborers in three distinct ecosystems. The weekly sampling was carried out in Seropédica/RJ in 5 ha of forest fragment (FF), in 0.25 ha of agroforestry system (AFS) and in 0.33 ha area with organic coffee production (OC). Four impact traps (semi-funnel model) were installed in each environment and then baited by using ethanol. The study is in progress with 25 samplings already performed out of a total of 54 samplings that will be completed on 11/18/2015. The collected insects were stored in 70% ethanol and individuals belonging to Scolytinae, Anobiidae, Platypodinae, Bostrichidae and Cerambycidae groups were identified at the family level, whilst the remaining individuals were counted as "others". 10,002 individuals were identified as Coleoptera order, from which 73% were Scolytinae appearing as the most representative group within the samples in the three ecosystems. From this percentage, 34% occurred in the area of OC, 37% in AFS and 29% in FF. The AFS comprised a higher number of individuals of all taxa compared to the other two environments, except considering the Anobiidae family which showed 36% of the individuals to be found in FF, 33% in AF and 31% in OC. Regarding the total number of Platypodinae, 31% was registered in OC and 69% in AFS, with no occurrence in FF, whilst 36% of individuals of Bostrichidae was registered in OC, 42% AFS and 22% in FF. For the group "others", we observed that 30% occurred in OC, 36% AFS and 34% in FF. We suggest that the constant interventions in vegetation of AFS may explain the higher registered number of insects in this environment.

Keywords Coleoptera; Agroforestry system; Decomposers

98 Growth of symbiotic fungus in the initial colonies of *Atta sexdens* (Hymenoptera: Formicidae)

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Leaf-cutting ants of genera *Atta* and *Acromyrmex* use fresh leaves as a substrate for their symbiotic fungi. They represent important pests of agricultural and forestry sectors. The objective of this study was to evaluate the growth rate of the fungus *Leucoagaricus gongylophorus* in the initial colonies of *Atta sexdens*. Moreover, evaluate the foliar consumption of *Morus* sp. Five colonies of *A. sexdens* maintained in laboratory ($\pm 24^\circ \text{C}$ and 70% RH) for five months after nuptial flight were selected and transferred, each, to one glass terrarium (20x20x2 cm). Silicon hoses (2.5 cm diameter) connects laterally to the terrarium, with two plastic pots (500 ml) and pierced lids, in which one pot represents the foraging arena and the other simulates the trash chamber. The colonies were supplied with young leaves of *Morus* sp. every 48 hours. The fungal growth was accompanied weekly for 10 weeks by drawing manually its area on vegetal paper. The drawings were scanned and the area was measured using the software ImageJ. The Bartlett test was used to verify the homogeneity of variance, the analysis of variance (ANOVA), for comparison of means, and Tukey's test at 5% significance level. The forage was different between the nests ($F = 5.8667$, $p = 0.0007$) and the average weekly consumption per nest was 1.142 g dry weight leaves *Morus* sp. However, there was no significant difference in the growth rate of the fungus *Leucoagaricus gongylophorus* between nests ($F = 1.7219$, $p = 0.1642$). The average weekly growth was 16.721 cm³, about 2.4 cm³ per day.

Keywords leaf-cutting ants; foraging; *Leucoagaricus gongylophorus*

99 Effect of cotton seeds treatment with thiamethoxam on *Chrysoperla externa* (Neuroptera, Chrysopidae)

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The chemical treatment of seeds has been used in the control of arthropod pests in several crops. Among the main insecticides applied on treatment of cotton seeds, there is the thiamethoxam, belonging to the chemical group of neonicotinoids. However, its effect on beneficial organisms is not well known, once it may be translocated to the pollen and nectar of plants, which are generally used as a food source for pollinators and natural enemies. In this context, the objective of this study was to evaluate the effects of the treatment of cotton seeds with thiamethoxam on biological characteristics of *Chrysoperla externa* (Hagen). The cotton seeds were sown 2 cm deep in plastic recipients containing 100 ml of commercial formulation of substrate mixture from the base of vermiculite and organic matter (Plantmax®), soil and manure in the same proportion, then germinated in a greenhouse. The plants were used in the bioassay when they reached v2 stage of development. Two treatments were used: non treated seeds, and seeds treated with thiamethoxam. For each treatment, 50 larvae of *C. externa* newly-hatched (1-2 hours old) subdivided into 10 parcels of 5 larvae each, in which they were individually placed in cages containing a cotton plant. The larvae were fed with eggs of *Ephesia kuehniella* ad libitum (Zeller, 1879) (Lep.: Pyralidae), being the extrafloral nectar of the plant itself used as a source of water. The length of larval and pupal period, as well as larval survival were evaluated. Among the variables analyzed, there was a statistical difference for the larval period, which was higher for the larvae fed on cotton extrafloral nectar of plants treated with thiamethoxam ($p = 0.017$).

Keywords Chemical products; treatment of seeds; selectivity

100 Selective action of botanical extracts on 3rd and 4th instar of *Eriopis connexa* (Coleoptera:Coccinellidae)

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The use of plants with insecticidal properties is a very old practice on the agriculture. Until the discovery of organosintetic insecticides in the first half of the last century, botanical insecticides were widely used to control insects. Botanical insecticides are generally less harmful to beneficial insects, but usually it is depends on the taxon, development stage, and concentration. This study aimed to evaluate the selectivity of garlic, lemongrass, pepper and tobacco extracts, separately or mixed, all at 8% concentration, on third and fourth instar of *Eriopis connexa* under laboratory conditions, with acclimatized environment ($25 \pm 1^\circ \text{C}$, $70 \pm 10\% \text{RH}$, and photoperiod of 12 hours). The experiment was conducted with five replicates, each with 10 individuals. Eggs of *E. connexa* were took from the stock colony kept in the laboratory, and after the hatching, larvae were individually placed in glass vials of 20 mL, fed on Mediterranean flour moth eggs, and monitored until the desired instar. Then, larvae were removed from vials and the topical application of treatments was sprayed on them in 1L-plastic pots. The spraying was performed with aid of a manual sprayer. After application, larvae submitted to the treatments were observed each 24-h interval to obtain data referring to their mortality (lethal effect). Besides the comparison between the treatments performed by the Tukey contrast at 5%, a statistical measurement known as Odds Ratio was used. All botanical extracts, separately or mixed, showed no lethal effect to larvae of 3rd and 4th instar of *E. connexa* in laboratory.

Keywords botanical insecticides, selectivity, ladybeetle

101 Population dynamic of *Liriomyza huidobrensis* during the year

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The leaf miner *Liriomyza huidobrensis* (Diptera: Agromyzidae) is an important pest worldwide. It's responsible for economic losses in several crops such as tomato, potato and beans. The life cycle of *Liriomyza huidobrensis* begins when the female pierces the leaves surface with its ovipositor to depositing eggs in the mesophyll. After the eggs hatching, the larvae feed of leaves parenchyma causing reduction in photosynthetic area and, reduction in productivity consequently. Thus, the first step to develop pest management programs for *Liriomyza huidobrensis* is to understand how is the intensity of attack from this pest. Therefore, the aim of this study was evaluate the *Liriomyza huidobrensis* intensity of attack in tomato crops during the years seasons. The study was conducted at Universidade Federal de Viçosa, MG, Brazil. All evaluations were carried out on commercial tomato crops for three years. In each crop, 24 plants were evaluated randomly and, each plant was considered one repetition. The variable observed were number of mines caused by *Liriomyza huidobrensis* per leaf. The data of number of mines per leaf in function of the seasons were subjected to analysis of variance and compared by Tukey test at 5% of probability. Summer was the season with the greatest number of mines per leaf (10.18). On the other hand, winter and spring, had the smallest numbers of mines per leaves (approximately 1). The increase in the number of mines in summer probably is due to the temperature increases in this season. Therefore, the intensity of attack caused by *Liriomyza huidobrensis* is larger in summer and decline in spring and winter.

Keywords pest management; population dynamic and tomato leaf miner

102 **Effect of *Mentha piperita* extract on immune system of leaf-cutting ants (Formicidae: Attini)**

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The existence of a complex defense system in leaf-cutting ants has hindered further development on strategies to control these pest insects. The humoral immune system involves extracellular molecules present in the hemolymph, responsible for the cascade reaction of the phenol oxidase and the melanin production. The cellular defenses are mediated by hemocytes and include the reaction of encapsulation. This study aimed to evaluate the effects of a hexanic extract of *Mentha piperita* in the defense system of some leaf-cutting ants species. We evaluated the immune defense of workers of *Acromyrmex subterraneus subterraneus*, *A. subterraneus molestans*, *A. niger* and *A. rugosus rugosus* using the encapsulation rate of a micro nylon filament inserted at their thoraxes. The number of hemocytes in the hemolymph was collected with a microcapillary, transferred to the Newbauer chamber and examined under a light microscope. The effects of that extract when applied as a sublethal dose were also analyzed. The extract was diluted in acetone at a concentration of 5 mg/ml and applied topically to the ants, using a Hamilton micro syringe. The average encapsulation rate and the hemocytes number on different species were compared using ANOVA; the parameters were considered significant when $p < 0.05$. It was found that the extract decreased the encapsulation rate on workers of *A. subterraneus molestans* and *A. rugosus rugosus* and decreased the number of hemocytes on workers of *A. subterraneus subterraneus*, *A. niger* and *A. subterraneus molestans*. The suppression of the immune system exposes these individuals, and consequently the colony to situations of risks because they become more susceptible to potential pathogens. At this time of low immunity, control can be facilitated and can be done with lower doses of insecticides or other products. Studies on the application feasibility of immune defense suppression in the field and interaction with other control strategies can be made in the future.

Keywords controle biológico; extrato botânico; *Acromyrmex* spp.

103 Use of entomopathogenic nematodes (NEPs) in insect control (Coleoptera) agricultural pests

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The NEPs belong to *Heterorhabditis* and *Steinernema* genres and they are considered obligate parasites of insects. These nematodes genres have symbiotic association with pathogenic bacteria. These bacteria cause illness and death to the host insect. NEPs are used to control insect pests. The experiment aimed to test the effectiveness of NEPs in adult beetles *Palembus dermestoides*. It was used 15 petri dishes lined with filter paper. To each plate was added five adult beetles. It was added a 200 juvenile J3 solution (Phase couple of infecting nematode) 5 ml. The gender entomopathogenic nematode used was isolated LPP40 *Heterorhabditis*, an isolated mangrove Gargaú, Rio de Janeiro. Plates were stored in an oven for seven days. The average oven temperature was 30 ° C. The creation of the host insect, beetles, was in the laboratory with artificial diet. After seven days plates were observed presenting bodies. The corpses were opened to verify the hermaphrodite stage of the nematode. Were also used, White traps. These traps consist of Petri dishes of 9 cm diameter, with a PVC ring (2.5 cm diameter x 8 mm height) and, on this, a piece of filter paper 2.0 x 8.0 cm . The filter paper is shaped so that their edges are in contact with distilled water in the plate and, on this, a corpse. After five days were analyzed for J3 emergency confirmation on the board of the water. No significant *Palembus* infection of adults with application of J3 nematodes. Further tests will be conducted in the larval stage and pupa of the same species of beetle. The adulthood has little direct contact with the ground. Entomopathogenic nematodes are more efficient in displacement in moist soil.

Keywords Nematode; *Palembus*; virulence

104 Selective activity of botanical extracts on pupa and adult of *Eriopis connexa* (Coleoptera: Coccinellidae)

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The botanical extracts are commonly used in organic agriculture in order to control pests with low environment impacts, but some of them have showed lethal or secondary effects to some biological phases of aphidophagous lady-beetles, as extract of neem (*Azadirachta indica*). This study aimed to evaluate the effect of four botanical extracts: garlic (*Allium sativum*), lemongrass (*Cymbopogon nardus*), pepper (*Capsicum frutescens*) and tobacco (*Nicotiana tabacum*), separately and mixing, all at a concentration of 8%, and water as a control, sprayed on pupa and adult of *Eriopis connexa* (Coleoptera: Coccinellidae) in laboratory conditions (25±1° C, 70 ± 10% RH, and 12 hours of photophase). The experiment was conducted in complete randomized design with five replicates (10 individuals per replicate). Eggs of *E. connexa* were removed from stock colony kept in the laboratory, and after the hatching, the larvae were individually placed in glass vials of 20 mL, and feed on larvae of *Drosophila melanogaster* (Diptera: Drosophilidae) and eggs of *Anagasta kuehniella* (Lepidoptera: Pyralidae) ad libitum, and monitored until to obtain the desired biological phase (pupae and adults). The individuals of *E. connexa* were removed, placed in a 1L-plastic container where the topical application of the treatments was sprayed on them, with the aid of a manual sprayer. After application, the treated pupae were observed every 24 hours until the adult emergency, and the treated adults were observed for 24 hours, in order to obtain data referring to their mortality (lethal effect). Apart the comparison between the treatments performed by the Tukey contrast at 5%, it was used the statistical measurement known as Odds Ratio, which indicates the number of times that the probability of success of a treatment is greater than another. The topical application of all botanical extracts, separately or mixing, did not showed lethal effect on *E. connexa* pupae and adults in controlled laboratory conditions.

Keywords Botanical extracts; selectivity; natural enemies

105 Diversity and similarity of Auchenorrhyncha (Hemiptera) faunal components in São José do Calçado, Espírito Santo

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Positioned in southeastern Brazil, state of Espírito Santo covers an area of 46,077.519 square kilometers. One of the municipalities in the southern Espírito Santo, São José do Calçado was founded in 1855 and is located 213 km from the state capital, Vitória. It has an average of 11,000 inhabitants, tropical climate, altitude of 320 meters above sea level, a unique geography, with rivers, waterfalls, mountains and valleys, and economy based on family and livestock farming. The suborder Auchenorrhyncha is a group of hemipterous insects distributed throughout the world. All members of this group are phytophagous and many are vectors of viral and fungal diseases of plants. The agricultural damage caused by these insects are extremely relevant. Based on specimens collected with a heavy-duty sweep entomological net in four different properties of São José do Calçado (P1, P2, P3, and P4) we carried out an inventory of the auchenorrhynchous species. Collected specimens were stocked in dry entomological blankets with data such as type of grass of collected points, culture, type of management and topography. Taxonomic identification was based on external and internal morphological characters, the results were submitted to a database created to make possible to analyze statistically and environmentally (Shannon-Wiener diversity index; Morisita similarity index). The collections resulted in getting 17 species. The most representative genera were *Ferrariana*, *Plesiommata*, *Hortensia*, *Balclutha* (Cicadellidae), *Notozulia* (Cercopidae), and *Bladina* (Nogodinidae). The total diversity of Auchenorrhyncha was 1.744. In P1 the diversity was 1.41 (ranged from 0.706 to 1.749), in P2, 1.357 (0.571 to 1.609), in P3, 1.870 (1.157 to 1.479), and in P4, 0.804 (0.332 to 1.233). Degrees of diversity of each property are low, except in P3, where diversity is medium. As the similarity between the properties, P2 and P4 (similarity of over 90%) and P1 and P3 (close similarity to 60%) were pooled.

Keywords Auchenorrhyncha; leafhoppers; Brazil

106 Selectivity of commercial insecticides to the predator *Orius tristicolor*

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The efficiency of agricultural pest management is affected by use of non-selective insecticides. This practice eliminates the natural biological control and cause instability in agricultural ecosystems. In this context, the predator pirate bug *Orius tristicolor* (Hemiptera: Anthocoridae) is an important natural enemy in several crops. Thus, the aim of this study was to determine the selectivity of commercial insecticides in favor of *O. tristicolor*. The study was conducted in the laboratory of Integrated Pest Management at Universidade Federal de Viçosa. Completely randomized design with six replicates was used. The insecticides applied were: Chlorpyrifos, Chlorantraniliprole, Bifentrin, Chlorfenapyr and Cartap. And their respective doses were: 6,25; 5,0; 5,0 mL/L and 2,5g/L. The control was composed of water and spreader sticker. For assembly of bioassays, kale leaf disks were treated, dried and subsequently were transferred to the Petri dish. Each replicate consisted of a Petri dish containing 10 insects and a treated kale disk. The mortality was assessed 48 hours after the assembly of the experiment. Data were subjected to analysis of variance and means were compared by Tukey test at 5% probability. The insecticides Chlorpyrifos, Bifenthrin, Chlorfenapyr and Cartap caused 100% mortality. On the other hand, Chlorantraniliprole caused less than 20% mortality and thus was selective in favor of the predator. Thereby, this insecticide can be used without causing mortality to individuals of this species and contribute to the success of biological control performed by *O. tristicolor* and to efficiency of Integrated Pest Management programs. Therefore, the Chlorantraniliprole insecticide is selective to the predator *Orius tristicolor* and can be used in IPM programs in crops where this product is registered.

Keywords Chemical Control; Natural enemy and Integrated Pest Management

**107 Parasitism of *Trichogramma pretiosum* on
different ages and densities of eggs of
*Helicoverpa armigera***

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The introduction of caterpillar *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae) and subsequent distribution in almost all of Brazil have entailed considerable losses to crops attacked. Major injuries are defoliation and the onslaught of reproductive structures by caterpillars. Because of this highly destructive power, it requires an efficient control. Considering the recent occurrence in the country, the control has been hampered due to lack of management practices adapted to our agricultural reality beyond the diversity of cultures, climate and multiple cycles of possible crops a year. Thus, the control with biological and chemical insecticides has been used as an emergency and the search for effective control alternatives for integrated pest management are necessary. The use of biological control with parasitoids of eggs has been an alternative to control this pest in other countries with occurrence report. Thus, this study evaluated the acceptance of pest eggs in different ages (0-12, 24-36, 48-60 h) by the parasitoid *Trichogramma pretiosum* Riley (Hymenoptera: Trichogrammatidae) and parasitism on eggs densities of 15, 20, 25 and 30 per female parasitoid employing a Brazilian commercial line. *H. armigera* eggs with up to 36 h provided higher parasitism. Regarding the density of eggs available, the parasitoid responded with higher percentage of parasitism in the density of 20 eggs. In both bioassays, the emergency was over one parasitoid per parasitized egg and the sex ratio has remained around 80% of females. These results can help in programming gaps between parasitoid releases to control the pest.

Keywords Biological control, Integrated Pest Management, Caterpillar *armigera*

108 Incidence of *Spodoptera frugiperda* in both hybrid and variety corn plants as a consequence of nitrogen dosing

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Corn *Zea mays* is a widespread culture in the world and has great economic importance to Brazil. Although high yield potential, the state of Espírito Santo has limitations on the production resulted from unbalanced fertilization and pest attack. Nitrogen (N) is the most required element by the corn, its inadequate supply can provide high susceptibility to pest attack and diseases. The main crop pest is the caterpillar cartridge *Spodoptera frugiperda*, causing great losses in the production. The objective of the experiment was to evaluate the attack of the plague through the scale of damage with notes ranging from 0 (no damage) to 9 (major damage) in two genetic materials in function of different dosages of N. The test was conducted at the Institute Federal Espírito Santo - Santa Teresa campus, in the design of randomized blocks and treatments arranged in split portion with 4 repetitions. The portions refer to two genetic materials: hybrid (AG-1051) and variety (Capixaba Incaper 203), and the subportions to five doses of N: 0, 60, 120, 180, 240 kg N.ha⁻¹, adopting the urea as a source of N. was held fortnightly 4 fertilization in coverage, the first 15 days after emergence (DAE). The evaluation was done after 60 DAE, evaluating 15 random plants in each subplot. There was a statistical correlation between the doses of N and genetic materials. The hybrid showed less attack compared to variety in all tested doses. In the hybrid the damage was decreasing as the dose was increased, due to the high efficiency uptake of genetic material by N, increasing the resistance of the plants. The variety showed less damage in the absence of nitrogen fertilizer due to the hardiness and the uniformity genetic material, which favored lower assimilation of nutrients by plants. It concludes that the dose of 240 kg N.ha⁻¹ provided less pest attack on the hybrid, and the dose of 0 kg of N.ha⁻¹ less attack on variety.

Keywords pest; corn genetic resource; nitrogen assimilation

109 Toxicity of the essential oil *Chenopodium ambrosioides* to *Sitophilus zeamais*

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The control of stored grain insects is characterized most often by the use of synthetic insecticides. However, these compounds may be harmful to human health by its manipulation or even consumption of contaminated food. The continued use of such compounds can also select resistant populations of insect pests. Therefore, other control measures are necessary in order to minimize such problems. This study aimed to evaluate the toxicity of the essential oil of *Chenopodium ambrosioides* L., in order to control *Sitophilus zeamais* (Coleoptera: Curculionidae). The essential oil was extracted by hydrodistillation. The tests were performed in a room temperature of 25 ± 1 ° C and $70 \pm 10\%$ of relative humidity. Ten adults (age 0-24 hours) of *S. zeamais* were placed in containers (11x11x3 cm). A ribbon filter paper (2x5 cm) soaked with essential oil dose was placed inside of each container. The concentrations were 8.3; 11.1; 25.0; 33.3; 47.2; 69.4 and 100 μL of the oil per litre of air. The number of dead insects was counted after 72 hours of exposure. Lethal concentrations and mortality curves were estimated by Probit regression. The LC50 and LC90 oil was 21.3 and 45.2 μL L⁻¹ air, respectively, to *S. zeamais*. The essential oil of *C. ambrosioides* presents toxicity to *S. zeamais* and can be used in the control of this insect pest.

Keywords stored grains; weevil of corn; fumigation

110 Rating pest in corn crops for grain and corn silage

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Maize can be bred for industrial use in various foods such as grain or animal feed in the form of silage. Corn for silage has the characteristic of high concentration of dry matter and their harvest is made before the full development of the grain. Both varieties of corn are grown in the Palmeiras de Goiás region in irrigated area and another without irrigation. This study aimed to quantify and discriminate against insects pests and natural enemies in irrigated corn for the production of grains and other corn crop in rainfed for silage. These two types of productions are common in the region, especially during the off-season, held during the months from February to July. The work was conducted simultaneously in both areas with 10 sampling points georeferenced by farming and 5 plants per point. Visual observations were made with the spreadsheet fill. The analysis revealed a higher infestation of insect pests in irrigated corn, despite the controls being made strictly. Insect had higher rates of population in dryland compared to irrigated area, one of the reasons is because corn has been harvested early for silage training. Another important factor for the highest concentration of insect pests in irrigated corn is determined by weather conditions possibly set by irrigation in the area and the intermittent cultivation in the pivot.

Keywords Irrigation; Maize; Sampling

**111 Hymenoptera parasitoid fauna (Insecta) in
an area of cultivation of cacao at cabruca
system, in the north of state of Espírito
Santo, Brazil**

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Brazil is the sixth largest producer of cocoa, *Theobroma cacao* L, and the state of Espírito Santo (ES) is the third largest producer within the country, being the city of Linhares the main producer of the state. Cabruca is an agroforestry system where cocoa grows along with native trees from the Atlantic Forest, allowing the preservation of the forest and the animals that inhabit this type of ecosystem. The parasitoids (Hymenoptera) play an important role as a controller of pests whereas the maintenance of the forest microclimate favors and supply these insects with alternative food resources, contributing to their stay in cultivation. This study aimed to survey the hymenoptera parasitoids that occur in an area of cocoa-cabruca from Linhares, ES. Ten yellow Moericke traps (39cm x 29cm x 6cm) were installed at the ground level, separated 30m from each other, and remained active for seven days with weekly collections from September / 2009 to March / 2010. The specimens were preserved in 70% alcohol, sorted and identified in superfamily and family level. 527 specimens have been captured 527, belonging to eight superfamilies: Ceraphronoidea, Chalcidoidea, Chrysidoidea, Cynipoidea, Diapriidea, Evanioidea, Ichneumonoidea, and Platygastroidea. 17 families were collected; the most frequent were [Platygastridae (42.7%), Diapriidae (25.2%) and Ceraphronidae (10.2%)]. The remaining families represented less than 5% of the specimens (Agaonidae, Aphelinidae, Encyrtidae, Eucharitidae, Eulophidae, Eupelmidae, Mymaridae, Trichogrammatidae, Evaniidae, Figitidae, Bethyidae, Ichneumonidae, Chrysididae, and Braconidae). The most abundant families should be better investigated in the future, as they can be used for biological control programs of pests associated with cocoa.

Keywords Cocoa, pest, control

112 *Otocrania* sp. (Phasmatodea) leaf preference in captivity

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Herbivorous insects exhibit a variability in food plant preferences. Our study aimed to identify the leaf preference of the species *Otocrania* sp. in captivity. Two couples of the species were collected by hand in the Caatinga vegetation of the municipality of Contendas do Sincorá, Bahia state, and maintained in the lab in a glass box (0.5 m depth, 0.5 m width, 0.8 m height), covered with mosquito net. During the first four days in captivity, the animals ate leaves from plant species of their natural habitat. On the fifth day, leaves of four plant species: *Malus gala*, *Psidium guajava*, *Morus nigra* e *Rosa* sp., were offered as food to the insects. We measured leaf area of the species before and after 48 hours of exposition to herbivory. After eight days of experiment, the animals consumed 13.6 % of the leaves of *Rosa* sp., 6.8 % of *M. gala*, 6 % of *P. guajava* and no leaves of *M. nigra*. Diverse *Otocrania* species are monophagous as result of physiological adaptations to host plant chemistry. However, in our study, the species showed a polyphagous behavior. More studies are necessary to determinate how the captivity affect the feeding behavior of *Otocrania* species, but ours results shows the species to do not feed in chemical defended plants as *M. nigra*.

Keywords herbivory, phasmids, stick bug, captivity behavior, Caatinga

113 Preference bait-odor by bees Euglossini in the Parque Estadual Mata das Flores, Castelo- Espirito Santo

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The Euglossini bees are important pollinators in the neotropical region, and the aim of this study was to evaluate the attractiveness of bait-odor in the collection of these bees in the Parque Estadual Mata das Flores, located in Castelo (ES). Passive type traps made from plastic bottles were used. Each trap was tied 1.5 meters from the ground, distant 5 meters from each other, placed in the field from 09:00 AM to 01:00 PM and each one was soaked with a different essence - eucalyptol, vanilla, benzyl acetate or eugenol. The collects were performed (Authorization ICMBIO / SISBIO Process number 19404-1 of 27/04/2009) in the months of September, October and December 2014, January, March and May 2015. The captured bees were transported to the Zoology Laboratory - CCA/UFES, prepared for the collection, and identified with the relevant literature. Were collected 124 individuals divided into two genus, *Euglossa* Latreille (n = 66 - Eug) and *Eulaema* Lepeletier (n = 58 - Eul). The eucalyptol essence was the most attractive to 62.90% of the bees (EUG n = 63 and Eul n = 15), followed by benzyl acetate with 16.13% (EUG n = 2 and Eul n = 18), eugenol with 14.51% (Eug n = 1 and Eul n = 17) and vanilla with 6.45% (Eug n = 0 and Eul n = 8). To *Euglossa* the eucalyptol essence was the most attractive 95.45% (n = 63), benzyl acetate 3.03% (n = 2), eugenol 1.51% (n = 1), and vanilla attracted no bee genus. Benzyl acetate was the most attractive essence to *Eulaema* with 31.03% (n = 18), followed by eugenol 29.31% (n = 17), eucalyptol 25.86% (n = 15) and vanilla 13.79% (n = 8). The Euglossini fauna sampled contributed to indicate the Park as an important refuge of fauna in the region because the bees from this tribe present ecological requirements that put them as bioindicators of quality of the sampled environment.

Keywords Benzyl acetate, Orchids, Bioindicators

114 Trophic association of frugivorous flies in *Citrus* spp. (Rutaceae) in the municipality of Camamu, South of Bahia, Brazil

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One of the most important pest of the Brazilian horticulture is the fruit fly (Tephritidae), and also some Lonchaeidae species, which are usually recognized as important commercial pests. This study aimed to determine the diversity and interspecific co-occurrence of frugivore dipterans in order to contribute to the understanding of ecological relationships between fruit fly species. The investigation was performed by gathering orange fruits *Citrus* spp. in diversified orchard, as well as by using McPhail traps in comercial orchard of acerola (*Malpighia emarginata*) in the municipality of Camamu, BA, Brazil (13°58'S; 39°08'W). In the fruiting period, fruits from cup and soil were collected, individualized in pots and covered with TNT. They were maintained in natural environment to provide development of the insects, then, the specimens were identified according the specific methodology. Taking into account 40 sampled fruits, the infestation resulted in 16 puparium per fruit, with 458 emerging specimens of *Ceratitis capitata*, 12 of *Neosilba glaberrima* and 15 of *N. zadolicha*, with four interactions between *C. capitata* and *N. zadolicha*; three between *C. capitata* and *N. glaberrima*; two between *C. capitata*, *N. glaberrima* and *N. zadolicha*. In addition, we also observed that in two of the interactions between *C. capitata* and *N. zadolicha* Stratiomyidae specimens were present. *Anastrepha fraterculus*, *A. obliqua* and *C. capitata* were collected in traps exhibiting the highest MAD index (0.46) in 2014 October. No parasitoid has been observed but co-occurrence was found between Tephritidae and Lonchaeidae in the same fruit.

Keywords Fruit fly, *Ceratitis capitata*, *Neosilba* sp.

115 Ant fauna from the botanical garden of Federal University of Juiz de Fora, Juiz de Fora, MG, Brazil

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Krambeck's forest is a tropical urban environmental reserve located in the city of Juiz de Fora, Minas Gerais State, with an area of 291.9 hectares of continuous Atlantic Forest, connected to other remaining fragments of socioenvironmental importance, being one of the most threatened biomes in the world, and its current area is no more than 12% of the original size, composed mostly of fragments with variable length, usually small. One of those fragments, called Sítio Malícia, was acquired by Federal University of Juiz de Fora for the deployment of the Botanical Garden. Considering that Krambeck's Forest represented over the years an important regional wildlife refuge, researchers have been working to know its biodiversity, with this work being the first to survey the ants fauna in the Botanical Garden of Federal University of Juiz de Fora before it is open to the public. To do that, samples were collected monthly in twelve months, using pitfall traps installed in three tracks inside the forest. The ants collected were screened at the Arthropod Laboratory of the Department of Zoology of Federal University of Juiz de Fora and identified to genera using dichotomous keys. A total of 4232 ants were collected, belonging to the genera *Acromirmex*, *Atta*, *Camponotus*, *Cephalotes*, *Nylanderia*, *Pachycondila* and *Solenopsis*, with genus *Solenopsis* the most abundant, followed by *Pachycondila*. The less abundant was *Cephalotes*, with only seven specimens collected. *Pachycondila* and *Camponotus* were present in both dry and wet seasons, while *Cephalotes* was only present in wet season.

Keywords Ants, Atlantic foret, Krambeck's forest

116 Aquatic insects as water quality indicators in Parque Estadual Mata da Pimenteira – PE

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Continental water ecosystems represent a valuable natural resource. However, anthropogenic changes, common in these environments, can result in the loss of biological diversity and change the structure of the communities present. Aquatic insects are organisms that play a central role in nutrient dynamics, the transformation of substances and energy flow in aquatic ecosystems. Many representative insects are studied as possible biological indicators of water quality, the reason is because they are sensitive to different variations in environmental conditions, which potentially makes them important tools for preserving the quality of water resources. This study aimed to evaluate the water quality of a temporary lake at Parque Estadual Mata da Pimenteira, Serra Talhada – PE, using aquatic insects as bioindicators. Bimonthly, sampling of aquatic insects was collected from July 2014 to May 2015, at three collection points. The insects were collected along with aquatic weeds, using manual collection for the large macrophytes = MGP (three replicates/collection point) and an aquatic insect net for small macrophytes l = MPP (two replicates/collection point). The ‘Biological Monitoring Working Party’ index was applied and adapted to show the quality of water. The insects were distributed in 10 families: Anisoptera (4.44%), Noteridae (4.44%), Tabanidae (48.89%), Melyridae (2.22%), Hydrophilidae (13.33%), Corixidae (2.22%) and Brentidae (2.22%), for MGP, and Carabidae (13.33%), Gryllotalpidae (2.22%) and Haliplidae (6.67%) to MPP. With the BMWP index the temporary lake water, which had been considered regular quality, was classified as contaminated. Being a State Park, which supposes a minimum of human intervention, the result of these studies gives rise to concern and demonstrate the importance of biomonitoring studies in order to contribute as tools for the preservation of the area.

Keywords Aquatic insects, bioindicators, BMWP

117 Aspects of biology and ecology of *Platyphora* (Coleoptera: Chrysomelidae: Chrysomelinae) in Rio de Janeiro, Brazil

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Chrysomelidae is one of the largest and most diverse beetle families. Adults and larvae are essentially phytophagous and show a high degree of specialization towards their host plants at genus and species level. *Platyphora* comprises about 500 species in South America, which feed mainly on Solanaceae, Convolvulaceae and Asteraceae. Most species are viviparous and larvae can present cicloalexia, a defensive behavior of gregarious circular formation at rest. Maternal care has been described in four species until now. Beetles are often aposematic and show chemical defenses due to the sequestration of host plants toxins. Despite the genus diversity and conspicuity, the biology and the ecology of the group are still poorly known, and most studies focus on the chemical ecology and their potential use as biological control. This project aims to study aspects of the biology and ecology of *Platyphora* at Serra dos Órgãos National Park, where nothing was known on its existing species. Data were obtained from field and laboratory observations, the entomological collection of the Laboratório de Ecologia de Insetos/UFRJ and literature. A total of 19 species of *Platyphora* were recorded in the park. The group exhibited a seasonal pattern, with higher abundance in the hot rainy season, not being recorded from May to August, during the drier and colder months. Temperature and precipitation seem to strongly influence the temporal dynamics of these insects, as well as the availability of their host plants. Solanaceae was the most common host plant family, followed by Convolvulaceae. No observed species presented maternal care, but other behavioral defenses were recorded, such as cicloalexia and use of trichomes from *Solanum* leaves by larvae. Parasitoids were not found, although some species present unprotected eggs and larvae without any apparent behavioral defense. The chemical defense of *Platyphora* may be effective against enemy attack, but this requires further investigation.

Keywords Atlantic Forest, seasonality, defense

118 External activity of *Caenohalictus incertus* (Apidae, Halictini) in autumn and winter in southern region of Brazil

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Knowledge of abiotic factors and external activity is scarce for bees. We aimed to get information about temperature, relative humidity, light intensity and wind thresholds to textit *Caenohalictus incertus*. The study was conducted in fall and winter 2013/ 2014 in Joinville, in dense low land rain forest, CFa Koeppen climate. The observation occurred at a concentration of nests along a sheltered wall of massive clay bricks. In autumn and winter 2013, there were four days of weekly observations and in autumn and winter 2014, one day (total of 100 days of observations). Observations were made at a distance of 1-2 m from the entrance of the nests, being annotated the output and the input of bees and, every hour, the temperature (°C), relative humidity (%), wind (m/s) and light intensity (lux) (x1000). A thermohydrometer and a digital lightmeter ICEL anaus (HT-208 and LD-51) and a mini weather station Kestrel 3500 were used. In the fall (2013/2014), there were a total of 384 records (10 active nests). Times thresholds were at 7:40 and 16:30. Regarding the temperature, the thresholds were 18 and 31,1°C. In relation to the relative humidity, the thresholds were 40 and 90%. Regarding the luminous intensity, the thresholds were, under construction, 001 and 011 lux and, outside the building, 021 and 1078 lux. In relation to the wind, the thresholds were 0 and 0.2 m/s. In winter (2013/2014), there were a total of 18 records (6 active nests). Times thresholds were at 9:00 and at 15:30. Regarding the temperature, the thresholds were 17.1 and 31,1°C. In relation to the relative humidity, the thresholds were 57 and 80%. Regarding the luminous intensity, the thresholds were 003 and 010 lux under construction and 022 and 291 lux outside the building. In relation to the wind, the thresholds were 0 and 0.9 m/ s. The movement showed decrease, as autumn advanced, with complete interruption before the end of this season, and restart of the movement in late winter.

Keywords external movement, abiotic factors, Halictinae

119 The influence of water velocity and habitat structure for insect community and characteristics

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Aquatic insects present several adaptations to survive in lotic environments and the success of different taxa in these environments depends on their adaptations to the environmental characteristics. This work aims to evaluate the relationships among number of different insect families, their adaptations, water velocity and habitat structure, as the presence or absence of bryophytes. The study was conducted in Paquequer river located in Serra do Mar in July 2014. For 20 rocks (10 "naked" and 10 with bryophytes), through which the water passed with different velocities, we manually scraped an area of 20 x 20 cm, using a net which was positioned at the end of the waterfall. For each family found the adaptations for fixing to the substrate was identified. An ANCOVA was conducted to relate the richness of insect families to the habitats and water velocity. "prominent claws" was the adaptation found more frequently in the assemblage, so we conducted a Chi-square to test if the frequency of this adaptation was homogeneous in relation to the others. A regression analysis was performed to assess the existence of a linear relationship between the relative frequency of this adaptation and the water velocity. A total of 743 individuals in 20 families were recorded being Baetidae (Ephemeroptera) the most abundant one (46.3%). We found that the habitats with bryophytes shelter a larger number of families than of "naked rocks" habitat, regardless of the water velocity. This pattern supports the hypothesis that more heterogeneous habitats are richer compared to more homogeneous ones. The presence of "prominent claws" was significantly higher than other adaptations, but its relative frequency in taxa was not correlated with the current, in both habitat types. In conclusion, the presence of bryophytes seems to be more important than the water velocity in the determination of the number of different families and relative importance of some adaptations.

Keywords Aquatic insects, community, adaptations

120 Nesting site selection by social wasps in the urban fragment of Atlantic Rainforest

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The survival of species of social wasps depends on its success in establishing new colonies, in tropical areas the selection of nesting sites along with the varied architecture of the nests are mainly influenced by two types of selection pressure: abiotic conditions and predation. In this sense, understanding the communities living anthropogenic environments is of utmost importance because the knowledge gained of species and their nesting sites can ensure the maintenance of their environmental services. Therefore, the objective of this study is to know the structure and complexity of the network of interaction between social wasps that nesting in vegetation. The work was performed in the Botanical Garden of the Federal University of Juiz de Fora, located in the urban area of Juiz de Fora, southeast of Minas Gerais. The area of expressive richness, diversity and heterogeneity floristic of arboreal vegetation with endangered species and predominance of pioneer plants in addition to the considerable presence of exotic species. Active search for nests of social wasps were held monthly for five consecutive days between February 2011 to February 2014, to meet the connectivity was assembled an adjacency matrix with 169 colonies. The network of interactions comprised 20 species of wasps and 35 plants, of which 24 species were exotic and 11 native. the plants *Dracaena fragrans*, *Dracaena fragrans* 'Victoria', *Coccothrinax barbadensis*, *Sabal maritima* and *Monstera deliciosa* were the most used for nesting wasps, with 81 nests registered, these data reveal an attraction to exotic plants for their nesting colonies. The study site has abundance of these plant species which provide support suitable for nesting because of their broad leaves and long lasting. The results suggest that the differences in the complexity of the environment directly influence the structure of the network of interactions between social wasps and their nesting substrates.

Keywords colonies, landscape ecology, social insects, nest architecture

121 Frequency of nocturnal insects captured by light traps at Ituiutaba-MG

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¹Faculdade de Ciências Integradas do Pontal, Universidade Federal de Uberlândia Nocturnal insects have a high sensitive visual system and this ability is important to fly, avoid obstacles, find food, mates and resources but artificial lights can attract the insects letting them disoriented. Local fauna surveys are important in determining species diversity and the life cycle. This study aimed to survey the nocturnal insect fauna from the campus area of Universidade Federal de Uberlândia in Ituiutaba –MG. The campus is covered with grass and is located in the southern area of the city nearby a semideciduous forest. The insects were collected monthly using a light trap in two different sites on campus from June to December 2014, stored in alcohol and identified in the laboratory. Climatic data were provided by Inmet, Brasilia-DF. Data were statistically analyzed in frequency and Spearman correlation by Bioestat 5.0. 518 insects were collected, distributed in 10 orders and 48 different families. The most common orders were Hymenoptera (30.74%), followed by Trichoptera (16.13%), Diptera (14.80%), Coleoptera (14.42 %), Hemiptera (10.06 %) and Lepidoptera (7.97 %). Trichoptera was correlated with temperature ($r = 0.78$), due to the increase in temperature may reflect the patterns of life cycle and reproduction season. There was a peak of abundance in all orders in the rainy season. The transition from the dry to the rainy period was important to the most insect families.

Keywords Biodiversity, entomofauna, light trap

122 Survey Lepidoptera (Insecta) of RPPN Fazenda Macedônia, eastern Minas Gerais

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The order Lepidoptera, represented by butterflies and moths, occurs on all continents except Antarctica. A peculiar aspect of the biology of this group are the eating habits of adults, which are very different from those immature. Caterpillars are generally herbivorous and adults can be nectar or fruit eaters. The Atlantic Forest has one of the richest fauna of Lepidoptera in the world, which are often used in the environmental assessment. Considering the role of these insects in the perceived level of impact ecosystems, this work aimed to survey Lepidoptera in protected area of the Vale do Aço - MG, RPPN Fazenda Macedônia. The study area is located on the right bank of Rio Doce, eastern Minas Gerais, where 50% are eucalyptus plantations and the remaining native vegetation is characterized as semi-deciduous forest, and represents an important fragment of Atlantic Forest in Minas Gerais. Samples were collected from March to December 2012, with Van Someren-Rydon traps and active search using entomological nets. However, there are few studies in the state of Minas Gerais. 140 specimens were collected and distributed in six families, and the area of greatest number of species collected was the edge of the eucalyptus, which is the region most open fronts and contact between the forest and eucalypt plantation. Fragmentation represents severe risks to biodiversity, and sampling of Lepidoptera can provide consistent data for conducting environmental diagnostics. These findings coupled with data from this group in other forest remnants are important to base studies on conservation of landscapes as well as contribute to the knowledge of the lepidopteran fauna of the state of Minas Gerais.

Keywords Faunistic, Inventory, Atlantic Forest

123 Wealth gathering and analysis of the class Insecta in Serra da Jiboia, in Bahia's South Reconcavo

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The region known as Serra da Jiboia, located at the South Reconcavo of Bahia, gathers the area of five cities: Elisio Medrado, Santa Teresinha, Castro Alves, Varzedo and São Miguel das Matas. With the extension of approximately 44,000 hectares, it is an important transition area between the Atlantic Forest and the Caatinga. The present work has as aim, with bases on the project "Protected Area of Serra da Jiboia: a strategy for conservation in the extreme north of the Central Corridor of Atlantic Forest", identify, classify and characterize the Insecta classes of Serra da Jiboia, with the purpose of know and scale the insects wealth present in the region, to a later use of these data in the final report regarding the creation proposal of a protected area in Serra da Jiboia. This is about a work which uses pitfall-traps, with different kinds of baits (sardine, banana, oatmeal and molasses) disposed in specific areas of the region, which were divided in five points. In each of these, two collects were made within a gap of 48 hours. Later, the collected material is screened, separated and identified. Until the present moment, three of five collects were already made, with the works of identification and separation of the material made in laboratory. The realized screening separates the insects in orders of the class Insecta. Eleven of fifteen of these classes were found. It is possible to conclude that even with the works in progress, the natural wealth present in Serra da Jiboia is considerably great, and of a significant importance to the conservation of the region's biodiversity. The main goal of the work is to utilize these data to the final report of the project, which seeks the installation of protected area in the place.

Keywords Serra da Jiboia, Insecta, Conservação

124 Pollen preferences of Meliponinae in urban environment

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Meliponinae account for near 300 species in Brazil. Our investigation included *Melipona quadrifasciata quadrifasciata*, *Scaptotrigona bipunctata* and *Tetragonisca angustula*, three species of Meliponinae from Southern Brazil. As a natural product, the honey could present alterations on the composition as a result of the availability of flowers in their environment. Our work aimed at comparing the pollen diet of the three species aforementioned in their urban environments. The evaluation was carried out at Erechim, Rio Grande do Sul State, and Guatambu, Santa Catarina State, Brazil. The pollen was collected monthly from workers and from recent reserves on each hive, between February and April, 2015. The workers of *M. q. quadrifasciata* gathered pollen from five species, reaching a distance of 290 and 145 m on average, at Erechim and Guatambu, respectively. The more abundant pollen species were *Eucalyptus grandis* and *Solanum mauritianum*. Workers of *S. bipunctata* gathered pollen from 15 species within an average distance of 183 and 97 m, at Erechim and Guatambu, respectively; *E. grandis*, *Raphanus raphanistrum* and *Bidens pilosa* were the more abundant pollen species. In turn, *T. angustula* obtained pollen from 16 species with a distance of 91 and 70 m on average, at Erechim and Guatambu, respectively; the predominant pollen were *Foeniculum vulgare*, *Syagrus romanzoffiana* and *Trema micrantha*. The results indicate that *T. angustula* presented a more diversified use of pollen resources and short average foraging distance. Moreover, that last bee species presented a higher proportion of pollen from herbaceous and shrub plants species. Such pollen spectra can favor the adaptation of *T. angustula* to urban environments. On the other hand, *M. q. quadrifasciata* showed more dependence of tree species with massive flowering, which tends to be a more scarce resource at urban areas.

Keywords stingless bees, resource sharing, urban meliponiculture

125 The effect of geomorphology on beetle fauna in veredas

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Veredas occur predominantly in wetlands composed of sandstone with drained surface, forming the headwaters of rivers, which can be areas of temporary refuge during the dry season in Cerrado. The formation occurs in flatlands or slightly wavy surfaces and is divided into four geomorphological zones: recharging, characterized by savanna vegetation; exudation, with the presence of hydrophilic grasses; wetland, characterized by the presence of buriti; and the canal zone, where the water flows into vereda. The extent and design of each geomorphological area are linked to land geomorphology, which promotes a diversity of habitats and species. Understanding how the beetles community is structured on different features is very important for the conservation of this fragile ecosystem. This study evaluated the response of beetles community to geomorphological zones in veredas. The field work was conducted in two veredas: Vereda P1 and Vereda P2, first forms a stream and second forms a lake, both located at São Gonçalo do Abaeté, Minas Gerais. Samples were conducted between May 2010 and March 2012 using pitfall traps in transects with 20 m (recharge and exudation zones) for three days. A total of 383 individuals beetles were sampled, distributed in five families and 25 morphospecies. The beetles richness varies according to the geomorphological zones in interaction with season ($F(6,32) = 2.31$; $p=0.05$), and the beetle abundance varies between veredas in interaction with season ($F(6,32) = 5.074$; $p=0.04$). We observed that the richness and abundance of beetles seems to suffer influence of the wet season. The exudation zone in beginning of wet season is more richness than recharge zone in Vereda P1 (form stream). In Vereda P2 (lake) doesn't exist richness differences between zones. These results suggest that the geomorphology of the veredas can influence the process of beetle colonization.

Keywords Cerrado, brazilian wetlands, Coleoptera

126 Abundance and altitudinal distribution of Chrysomelidae (Coleoptera) at Parque Nacional da Serra dos Órgãos, Brazil

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Chrysomelidae is one of the most diverse families of Coleoptera, with over 35,000 described species, almost all being phytophagous. Despite their relevance, only a few works describe the spatial distribution of chrysomelids along environmental gradients, especially on mountains. Studies along altitudinal gradients provide important database to evaluate how the distribution of organisms respond to environmental changes. The aim of this study is to describe the relative abundance of Chrysomelidae within Coleoptera and of its subfamilies along an altitudinal gradient at Parque Nacional da Serra dos Órgãos, State of Rio de Janeiro, Brazil. The study began in December 2014 and insects are being sampled with Malaise traps at 15 sites along a gradient ranging from 100 m to 2150 m a.s.l., at intervals of 100 to 200 m altitude. Two traps were placed at each site, distant about 50 m from each other, and bottles are changed monthly. In the laboratory, sampled insects are sorted, the beetles are counted and the chrysomelids, separated and identified at subfamily level. A total of 3,723 individuals of Chrysomelidae were sampled so far, accounting for ca. 40% of all beetles above 1950 m and less than 30% below this altitude, which shows the importance of the group within Coleoptera, particularly at higher altitudes. Galerucinae is the most abundant subfamily, representing 82% of the total abundance of Chrysomelidae, followed by Eumolpinae with 14%. Less abundant subfamilies are: Cassidinae (1.9%), Criocerinae (1.2%), Cryptocephalinae (0.7%), Bruchinae (0.2%), Chrysomelinae (0.03%) and Lamprosomatinae (0.03%). Preliminary results indicate that Galerucinae is abundant throughout the mountain, while Eumolpinae concentrated about 87% of its abundance in the upper half of the mountain.

Keywords Galerucinae, Atlantic rain forest, malaise traps

127 Seasonal Variation in the Composition of Stratiomyidae in Estação Ecológica Estadual de Guaxindiba, São Francisco de Itabapoana, RJ, Brazil

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Stratiomyidae is a Family of Diptera Order, with about 370 genera and 2.800 species in the world; the wing venation is characteristic for the family, the anterior veins are strong, and the discal cell is small and usually situated in the anterior half of the wing. This cosmopolitan family is an important pollinator and decomposer of organic matter. The Estação Ecológica Estadual de Guaxindiba (EEEG), located in São Francisco de Itabapoana, north region of the state of Rio de Janeiro, Brazil, is a last remnant of the ecosystem Floresta de Tabuleiro in the southeast region in the biome of Floresta Estacional Semidecidual de Mata Atlântica. The climate is warm and humid, without pronounced winter, with influence of marine and rainy season in summer. The objective was to analyze the seasonal effect, temperature and precipitation in the population of Stratiomyidae during one year. Between March 2013 and April 2014, samplings were made every two months, in five distinct tracks, using five Malaise traps, one for each track. The Malaise's contents were collected and preserved in alcohol 70%, later mounted on entomological pins, identified and deposited in the Museu Nacional collection. A total of 492 individuals in ten genera and 12 species were identified, the most abundant genera was *Sargus* with 92% of the total. The only species that occurred in all months was *Sargus thoracicus*. May to September are considered dry months, but those were the months where the greatest abundance of individuals was observed 73%, into nine species. From October 2013 to April 2014 are rainy months, occurred 27% individuals in seven species, but those were the months where the greatest diversity. According to previous literature, humid and warm months are described to be the months of more abundance for Stratiomyidae. The family usually does swarms, which would explain the high rate of individuals during dry season, whereas previous and subsequent months have lower rates.

Keywords Seasonality, Diptera, Diversity

128 **Flesh flies (Diptera: Sarcophagidae) of a inundated forest of lower amazon**

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The Amazon region contains different vegetation types, and *varzea* (periodically inundated) forest is the second most predominant type after *terra firme* (upland) forest. Many animal and plant species are restricted to inundated forests, but few studies treat the insect communities of *varzea* forests, especially concerning flies. The family Sarcophagidae (flesh flies) comprises 3.094 species worldwide, with few records from the Brazilian Amazon, a species-rich environment. The objective of this study was to evaluate the composition and abundance of flesh flies in a *varzea* flood forest in the Amazon. This study was carried out in a river floodplain forest along the Marapanim River, at Calafate Village, municipality of Magalhães Barata, state of Para, northern Brazil. Flies were collected in traps made of plastic bottles baited with rotting beef lung. A total of 77 flesh flies, distributed in five genera and 11 species, were collected. The most abundant species were *Oxysarcodexia amorosa* (42,8%), *Peckia (Peckia) chrysostoma* (23,4%), and *Peckiamyia abnormalis* (9,1%). The species *Hallina egregia* is a new record for the Brazil, since it was previously known only from Panama and Trinidad and Tobago. The new species of *Peckia (Peckia)* collected seems to be restricted to *várzea* forest since it belongs to the *hillifera* group that contains species usually associated with estuarine, mangrove, or regularly flooded coastal habitats.

Keywords Community, Oestroidea, Varzea Forest

129 Caiman nests are not favorable sites for ant colonies, in central-western Amazonia

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Amazon basin harbors the greatest diversity of crocodylian species. Adult caimans, are top predators, but during the early stages of life cycle may be easy prey for many vertebrates and invertebrates. Caimans build nests gathering leaves, branches and mud, which may function as good nesting sites for ants. In this work, we evaluated if caiman nests (*Melanosuchus niger* and *Caiman crocodilus*) harbor more ant species richness and abundance. The ants were sampled in three field campaigns at RDS Piagaçu-Purus: September and December 2013 and October 2014. In each campaign were sampled 6, 8 and 8 caiman nests, respectively. The ants were collected using six pitfalls established around the nests and six pitfalls in adjacent areas, following a paired sample design. The number of ant species and abundance were compared by t-tests. Overall, there were sampled 19 species and 442 individuals around the nests and 16 species and 556 ants in the areas adjacent to the caiman nests. The number of species and the abundance of ants around the nests and in the adjacent areas were similar ($t = 0.747$, $p = 0.231$ $t = -0.86$, $p = 0.80$, respectively). Despite the higher amount of resources and decaying material, our results suggest that ground-dwelling ants do not preferably forage or establish colonies in caiman nests. Possibly the plant material gathered to create the caiman nests may be a better nesting site only for ant litter-dwelling species, such as *Basiceros*, *Strumigenys* or *Octostruma*, which were poorly sampled in this study.

Keywords Formicidae, Amazon, flooded forests

130 Altitudinal distribution and sex ratio of two Cantharidae (Coleoptera) species in Parque Nacional da Serra dos Órgãos

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The family Cantharidae (Coleoptera) is characterized by soft-bodied beetles, generally with aposematic color, found mainly in tropical regions. Despite presenting more than 5100 species and about 140 genera, there is little knowledge about their ecology, behavior and distribution, due to the insufficient taxonomic background. The objective of this work was to study the range of altitudinal distribution and the sex ratio of *Macromalthinus brasiliensis* and *Malthoichthyurus sp.*, species with no ecological data available in the literature. Samples were collected using Malaise traps, distributed in 15 sites along a gradient between 100 and 2150 m above sea level, in Parque Nacional da Serra dos Órgãos (PARNASO), state of Rio de Janeiro. Two traps, about 50 m apart, were assembled at each site, having their bottles exchanged monthly since December 2014, with altitude ranges from 100 to 200 m. All individuals collected were counted and sexed. On the samples so far analyzed, 799 specimens (414 males, 385 females) of *Macromalthinus brasiliensis* were distributed between 350 m and 1250 m altitude. *Malthoichthyurus sp.* had 468 specimens (249 males, 219 females) collected between altitudes of 700 m and 850 m. The species present different distribution amplitudes, but had peaks of abundance at the same altitude (700 m), and also a close sex ratio of 1: 1. These results detail the altitudinal distribution of the two species, as well as their sex ratio, what could contribute to a better understanding of their ecology, behavior and geographical distribution, providing basic data for further studies. The description of new information about *Malthoichthyurus sp.* is particularly important, since the genus has only three described species in Brazil; besides, their great abundance in this study is in contrast with the almost absence of species in this genus in museum collections.

Keywords ecology, montane forest, Atlantic Forest

131 Spatial distribution and sex ratio of *Pelecinus polyturator* (hymenoptera: pelecinidae) at serra dos órgãos national park

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Pelecinus polyturator (Hymenoptera: Pelecinidae) is an endoparasitoid wasp of dung beetles and June beetles (Coleoptera: Scarabaidae and Melolonthidae), whose females have a long abdomen, possibly adapted to access host larvae living underground. They have wide distribution from the southeastern portion of Canada to southern Argentina. *P. polyturator* has a higher frequency of females in the north of their distribution, it is speculated that this species has "geographic parthenogenesis". Females of North America would reproduce by thelytoky (females developing from unfertilized eggs), since the males would be restricted to few regions. However, in the south of distribution, it is believed that arrhenotoky (males developing from unfertilized eggs) prevail because the proportion of males increases. Although it has a wide distribution in Brazil, the published literature is scarce, being based on specific observations analysis. This study aims to describe the temporal and altitudinal variation of the species and its sex ratio in the Serra dos Órgãos National Park, Rio de Janeiro, Brazil. The collections are being made monthly since November 2014 with 30 malaise traps arranged in 15 different altitudes from 100 m up to 2150 m. *Pelecinus polyturator* occurred from about 150 m to 1650 m, being more abundant at 1050 m. The abundance also varied in time with the peak recorded in January. Preliminary results support arrhenotokous reproduction of this wasp in our region, indicate that the sex ratio varies in time and that the species has a protandric pattern - males emerge before the females. The protandry can also be one of the factors leading to differences in sex ratio among different regions in individual samples. It is important to follow the population throughout its breeding season for more realistic estimate of sex ratio and temporal abundance of both sexes, making it possible to understand the process behind the local pattern and to compare different regions.

Keywords *Pelecinus*, spatial, distribution

132 Which is the safest place for caterpillars in vegetation?

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Environmental factors such as climatic conditions, resource availability and the presence of natural enemies can change species behavior, distribution and abundance. Caterpillars are susceptible to predation and parasitism; however, these interactions could be affected by vegetation structure and the foraging place used. The aim of this study was to test the predation risk suffered by caterpillars exposed in different places in the vegetation. This study was conducted at a Cerrado region located in Fazenda de Lavrinha (15°28'28" S e 42°48'29" W), Mato Verde, Northern of Minas Gerais. Ten transects of 50m were delimited, where 5 trees were selected in each one at 10m of distance among, which represented the sampling points. One artificial Caterpillar was fixed in each point at three different places: soil, trunk and leaf. In total, 150 green artificial Caterpillars, with 4cm of length and 4mm of diameter were evaluated. Caterpillars were inspected after 48 hours of exposition. We observed that higher predation was conducted by invertebrates of Hymenoptera, specifically ants and wasps. Predation brands by birds and sucking insects were also observed. The place that Caterpillars was fixed did not affected predation risk suffered by them ($p>0.05$). In tropical forests, the predation exerted by hymenopterans has higher effect on Lepidoptera's populations. It looks like the risk of a Caterpillar be attacked depends on the structure of vegetation in which occurs. Studies conducted in forestry vegetation have showed that there is more predation in Caterpillars located at 2-4m above the ground. Probably, the fact of Cerrado's vegetation be naturally open may influenced the result that we observed, once the perception of prey could be the same in different places. The pressure exerted by natural enemies on Caterpillars could act as selective pressures that determine the evolution and adaptation of defenses by the prey.

Keywords artificial Caterpillars, Campo Rupestre, predation risk

133 Frugivorous butterflies occurring in areas with different human impacts in the Jamari National Forest, State of Rondônia

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Arthropods are increasingly being used to assess the diversity and species composition of different habitats or phytophysiology, responding to different disturbance or management regimes. Butterflies inventories are useful in studies of diversity and conservation, due this group to act as good and fast indicator of environmental parameters and continuity of ecosystems and landscapes. Thus, this study aimed to inventory the fauna of Lepidoptera from Jamari National Forest. Have been done seasonal surveys of butterflies occurring in three zones with different characteristics in Jamari National Forest, in which, the zone 1 comprises the rain forest without anthropic impact, the zone 2 comprises the secondary capoeirão and anthropic areas and the zone 3 comprises the rain forest with anthropic areas. Sampling was done in August 2014 (dry season) and March 2015 (rain season), using baited traps with fermented banana and active capture with hand net. There were sampled 572 specimens, being 418 specimens sampled in dry season and 154 specimens sampled in rain season. From the total, 448 specimens were identified in specific level, distributed in 57 species. The more abundant species were: *Nessaea obrinus* (39 specimens), *Zaretis itys* (37 specimens), *Morpho helenor* (36 specimens) and *Archaeoprepona licomedes* (32 specimens). Nine species exclusively were found in the zone 1, thirteen species found in the zone 2 and five species found in the zone 3.

Keywords Frugivorous butterflies; Amazon; Anthropic impact

134 Eucalyptus forest interference in population fluctuation of lesser cornstalk borer in Bt maize and conventional

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The lesser cornstalk borer is a major pest of maize during germination and the first 30 days of implantation of the culture. Their food in the corn stem cause irreversible damage called dead heart, where the caterpillar penetrates inside the stem and feeds the conducting vessels of the plant and leaf buds of corn. This project has been verified the fluctuation of the borer caterpillar population in a 10 ha area with hideaway with conventional maize PR 1150 Priorizi seeds and two areas of transgenic corn LG 6304 VTPro, being a 10 ha area next to a wood of Eucalyptus with six years of planting and the second area with 10 hectares of transgenic corn of the same cultivar, without interfering edges. The project was carried out at Fazenda Bom Sucesso, Gleba Three Brothers, located in Palmeiras de Goiás - GO during the months from March to June 2015. The methodology used to sample the caterpillars and natural enemies was to Cruz et al (2008), where they were visually evaluated and photographically pests at 15 sampling points in each of the systems (refuge side of the transgenic and transgenic Eucalyptus without interference). In transgenic corn side of the eucalyptus were found, 30 days after sowing (04.16.15), averaging 0.7 Crawler borer by sample point, while in corn refuge were found only 0.2 Crawler borer per sample point and transgenic maize without interference were viewed only average 0.1 borer caterpillars only the first evaluation, where corn was starting germination. In the remainder of the cycle there was no presence of the borer caterpillar. The results showed that Eucalyptus may be a protected area for the lesser cornstalk borer, that survives in other plants for their survival and when the culture preferably as maize is planted in an area close to kill it leaves the protection area and attacks the culture.

Keywords Lepidoptera; Samling; Eucalypus

135 The Reflectance of red corolla flowers of *Tropaeolum majus* Explaining Bees' preference

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Tropaeolum majus is a species widely used as a medicinal and ornamental plant; due to its durability, melliferousness and natural dye, it is considered an unconventional vegetable and has a great importance for the commercial beekeeping. Bibliographic analysis of data indicates that despite the knowledge of agronomic and pharmacological characteristics, researches on plant-insect interactions are scarce. This research aims at studying the preference of pollinating insects by different colors of *T. corolla. majus* with the intention to contribute to a better understanding of the species biology. The experiment was conducted in the Federal University of Grande Dourados' garden. Pollinating insects were evaluated in 21 weeks during blooming period. The experimental design was completely randomized and the means were compared to Tukey at 5%. To determine the reflectance, fresh flowers of *T. majus* with yellow coloring, red, orange and yellow with reddish nectar guides, to make the reflectance measurements. The reflectance measurements were made directly on the flowers using the portable spectrophotometer (USB 4000 - Ocean Optics) with detector Toshiba TCD1304AP Linear CCD array, tungsten lamp / halogen as radiation source and wavelength of 350nm to 800nm. The petal temperature was assessed with digital infrared thermometer Incoterm at 9:00 a.m and 1:00 p.m. Bees identified visiting all the flowers were *Apis mellifera L.* and *Trigona spinipes*. By evaluating the visitation average of insects, a preference for red flower in all weeks of flowering was clearly observed, especially between the fifth and the eighth week. More bees visited the red flowers due to an increased temperature (Average±28.7) in these flowers and a larger reflectance (observed in vivo that the red plant is the one that absorbs more light within the Electromagnetic spectrum in the visible region).

Keywords Capuchin, Pollinators, color corolla

136 Sexual selection and speciation in a new genus of fireflies (Coleoptera: Lampyridae)

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Sexual selection can drive allopatric populations to speciation due to mutual reproductive isolation. In lineages under promiscuous mating systems, female cryptic choice can enhance diversification rates of male genitalia, sometimes leading to "lock-and-key" (LAK) mechanisms, including nuptial hooks. This reciprocal isolation hampers gene flow and therefore facilitates local adaptation, especially in species occurring in heterogeneous habitats such as mountains. Somatic features are thought to evolve much slower than sexual ones, thus being relatively similar in sibling lineages. Because they share much of their phenotypes due to common ancestry, these lineages can feature strong niche overlaps, and competitive exclusion may shape their spatial-temporal distribution. We analyzed if the phenotype and distributions of four new species in a new genus of fireflies (Coleoptera: Lampyridae) can be explained by independent sexual selection in allopatry and competitive exclusion. We monthly sampled the species with flight interceptor traps, in the Serra do Mar and the Serra da Mantiqueira mountain ranges, for a full year. Despite the edeagal similarity, both males and females show species-specific morphology of the terminalia, working together as a LAK and nuptial hooks. However, they are nearly indistinguishable in overall somatic morphology (DFA, 63% on the cross-validation matrix), which can be explained by the slower somatic evolution as predicted by theory. Following further expectations, there is no overlap in spatial-temporal distribution of the species, Two species are temporally displaced (Jun to Aug and Dec to Jan), whilst the two other ones are displaced in altitude (1100 m up to 1350 m and 1700 m up to 1900 m). We therefore invoke sexual selection as a rationale for the evolutionary history and speciation in this lineage, and that their distributions are constrained by competitive exclusion.

Keywords Sexual Selection, Speciation, Firefly

137 *Azteca* colonization pattern in *Cecropia glaziovii*

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Cecropia (Cecropiaceae) is a neotropical genus of fast growing trees which is almost always inhabited by ants of the genus *Azteca* (subfamily Dolichoderinae). Although there are numerous studies regarding *Cecropia*-*Azteca* relationship, the question about how *Azteca* queens choose their host plant is still unanswered. Therefore, we aim to test the hypothesis that there is a pattern for *Azteca* colonization in *Cecropia glaziovii* related to height and diameter of the plant. For this study, we selected 48 *C. glaziovii* individuals of which 25 were colonized by ants and 23 were not. In November 2012, all individuals had its total height and trunk diameter (at 50 cm from the soil) recorded. To determine the factors influencing ant colonization, we applied a logistic regression model including the independent variables (plant height and diameter) and the dependent variable (presence and absence of ants). We found that ant presence in plants was correlated with stem diameter ($F_{1,38} = 29.08$; $p < 0.001$), but not with stem height ($F_{1,38} = 3.98$; $p = 0.05$). In relation to the diameter, we find that plants with a diameter above 15mm have a 100% chance of being colonized by ants. Finally, our results suggest that the diameter of the stem is more important than height in determining the colonization of *Azteca* ants in *Cecropia glaziovii*, possibly because stem diameter is directly linked with space available for ant colonies to develop.

Keywords ants, host, relationship

138 Oviposition and eclosion of eggs in neotropical crickets (Orthoptera: Grylloidea)

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Little is known on demographic parameters of neotropical crickets, limiting questions on ecology and evolution. Here we aimed at quantifying oviposition and eclosion of eggs in three forest litter crickets: *Hygronemobius* sp., *Mellopsis doucasae* and *Neoaclini* gen. sp. we reared last instar nymphs of 15 couples of *Hygronemobius* sp. and *M. doucasae*, and 15 parthenogenetic females of *Neoaclini* gen. sp., in separated flasks (n=45). Rearing started on 9/29/14, in rooms with controlled temperature ($24\pm 2^{\circ}\text{C}$), humidity $60\pm 10\%$ and photoperiod (12h). Flasks had ca. 1cm layer of sterilized soil:sand (2:1), and a piece of cotton, humidified daily. We counted eggs layed into cotton daily, and after female death, we also counted eggs layed into soil. After each counting, the piece of cotton with eggs was put in individual flasks for each female, to count daily egg eclosion. Oviposition occurred from 10/29/14 (*Neoaclini* gen. sp.) to 5/5/15 (*Hygronemobius* sp.), with means of 130 (*Neoaclini* gen. sp.), 149 (*Hygronemobius* sp.) and 402 (*M. doucasae*) eggs per female. Eclosions occurred from 11/28/14 (*Neoaclini* gen. sp. and *Hygronemobius* sp.) to 4/28/15 (*Neoaclini* gen. sp.), totalling 134 (*Neoaclini* gen. sp.), 95 (*M. doucasae*) and 147 (*Hygronemobius* sp.). While *Neoaclini* gen. sp. and *Hygronemobius* sp. oviposited preferentially on cotton (respectively 99% and 94%), *M. doucasae* preferred soil (74%). There were no eclosions from eggs deposited into soil. This explains the low eclosion ratio of *M. doucasae* (24%). We conclude that oviposition of *M. doucasae* diverges from *Neoaclini* gen. sp. and *Hygronemobius* sp., preferring to oviposit into soil, despite similarities among ovipositor morphology of the three studied species. We expect that, in the field, oviposition of *Hygronemobius* sp. and *Neoaclini* gen. sp. would occur mostly into plant material, while *M. doucasae* would oviposit preferentially into soil.

Keywords reproduction, life history, forest litter

139 Greenhouse effect: Contribution of methane generated by termites in ectonal areas between Cerrado and Atlantic Forest

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There is strong evidence suggesting that inhabited and nidificational soils by termites significantly contribute to emissions of gas related to global warming. This may be related to the ecological interactions that termites have with protozoa and bacteria, both located at the vestibule and large intestine of termites. By using static chamber around the termite mounds and holes in the cardboard core, we observed the influence of termites on methane (CH₄) emissions, and our data also show that these emissions vary according to light or dark phases. Furthermore, our results could show that, nearby the termite nests, the mean flow of 1.09 mg/ m².day-1 of CH₄, and the emissions showed an average of 38.78 ppm in the cardboard core of nests. Altogether, this experiment has demonstrated that soils, in which there are termite nests, emit CH₄. Also, when these emission rates increase, it means that the mound is closer and closer.

Keywords Greenhouse Gases Emissions, Methane, Termite, Ecology

140 Early leafing: a strategy against herbivory

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Plants have developed strategies to minimize or avoid the damage caused by herbivorous insects. The phenological asynchrony can affect herbivores directly through the temporal escape and indirectly via the differential production of defense compounds. *Copaifera langsdorffii* (Fabaceae) has outstanding asynchrony that can be effective in the herbivorous attacks. The objective of this study is to evaluate the effects of intra-annual phenological variation in leaf appearance, in the production of phenolic compounds and in herbivory on *C. langsdorffii*. The study was conducted in a closed area between the months July to October 2012 in the municipality of Montes Claros (MG). A total of 131 *C. langsdorffii* adult individuals was monitored every two days. Were collected 20 leaves on each individual to compute the herbivory rate. For quantification of phenolic compounds, 50 leaflets per individual were harvested and the Folin Ciocalteu methodology was used. Generalized Linear Models (GLM) were built, where the herbivory was used as the dependent variable and the leafing time and the concentration of phenols in leaves represented the explanatory variables. Subsequently, the relations between these variables was tested by analysis of variance (ANOVA). A 70 days leafing interval was found among the leaf emission of the plants. The herbivory had a positive relation with the leafing date, suggesting that plants with late leafing were more attacked by herbivores. However, the concentration of phenolic compounds and the phenol interaction vs the leafing time did not affect the herbivory. Although the phenolic compounds are very important for the protection process of plants, in this study the strategy of time escape by early leafing was instrumental in the defense process against herbivory.

Keywords Phenological asynchrony, defense, *Copaifera langsdorffii*

141 Heteropterofauna of the Etá River, Vale do Ribeira, southern São Paulo

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Hemiptera is an order of insects comprising about 67,500 known species, divided into three suborders: Sternorrhyncha, Auchenorrhyncha and Heteroptera. The Hemiptera somehow involved with the aquatic environment belong to the suborder Heteroptera, and are classified into two main infraorders: Nepomorpha and Gerromorpha, which includes 11 and 8 families, respectively. The objective of this work was to study the taxonomic composition of Heteroptera in the Etá River, municipality of Sete Barras, Vale do Ribeira. Samples were collected monthly during the period from Jan to Dec 2013 in four areas along the river (PFA: preserved forest area; TA: transition area - preserved and cultivated; BCA: banana cultivation area; AC: after the cultivation). Three methods of collecting were used with an hour of effort for each: D-type net (250 micron mesh), 25 cm diameter sieve (1 mm mesh) and manual collecting on the rocks. Environmental parameters (dissolved oxygen and temperature) were also measured. A total of 4,970 Heteroptera distributed within 11 families (Corixidae, Gelastocoridae, Gerriidae, Hebridae, Hydrometridae, Mesoveliidae, Naucoridae, Nepidae, Notonectidae, Pleidae and Veliidae) were collected. Veliidae was predominant, with 3,829 individuals, followed by Naucoridae (764) and Corixidae (222). The result of the Shannon-Wiener index indicated that the diversity of heteropteran is higher in and AC. BCA also presented greater wealth. The analysis of multi-response permutation procedure (MRPP) also showed that PFA statistically differed from TA regarding the wealth of families, as well as TA differed from BCA, and BCA from AC. About the diversity, BCA and AC statistically differ from PFA and TA. Compared to the literature, the heteropteran are well represented in Etá River, indicating that this environment is propitious to the development and maintenance of the animals and the human action on its banks can cause certain influence on the diversity and richness.

Keywords Biodiversity, lotic environment, Hemiptera

142 Seasonal variation of insects consumed by *Myiodynastes maculatus* (Aves: Passeriformes) in a Tropical Dry Forest.

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The composition of insects community in seasonal environments may be influenced by foliar deciduousness, as noted in Tropical Dry Forests, changing the feeding ecology of insectivorous. The aim of this study was to determine whether there is seasonal variation in the composition of insects consumed by *Myiodynastes maculatus*. This species are a common insectivorous bird often found in forest vegetation. The study was conducted in the Mata Seca State Park, north of Minas Gerais. The regional climate is dry with the wet and dry seasons well defined. Samples were conducted during six years at the beginning and end of each season. The birds were captured using mist nets and the stomach contents were obtained through regurgitation. The composition of insects associated with the diet of *M. maculatus* in the dry and rainy season was compared by NMDS analysis followed the one-way ANOSIM test. 12 insect taxa were found in the samples. In both seasons beetles accounted for over 54% of all individuals, followed by larvae (20%) in the rainy season and ants (15%) in the dry season. Between periods of drought and rain, there was no difference in insect composition ($p = 0.14$). The highest abundance of beetles in both seasons may be related to the higher species richness and abundance in the environment even in the dry season. In addition, the formicides showed higher abundance in the dry season and were found in colonies with many individuals and therefore they were the most eaten when food resource was low. On the other hand, the larvae had more importance during the rainy season when these organisms are more abundant in the environment. The absence of seasonal pattern in the insects composition may be related to low representation of most taxa sampled. The climatic seasonality did not influence the insects composition associated with the diet of the studied species. Furthermore, the most consumed items may reflect the abundance of these groups in the environment in each season.

Keywords feeding ecology, season, bird

143 Multiple environmental controls on the assemblage of edaphic springtails in a tropical rain forest

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Soil invertebrates are considered dominant in forest ecosystems, and the springtails one of the most abundant and diverse representatives, second only to the mites. Information on its distribution provide ecological data for each species that are very useful in setting up conservation strategies. Thus, the wealth, abundance and species composition of edaphic Collembola assemblage was assessed and the relationship between the composition of this assemblage with environmental variables was tested in an area of 25 km² of forest. The study was conducted in Reserva Ducke in Amazonas State. The site contains a grid that allows access to 30 uniformly distributed sample plots, located 1 km apart along the trails. The springtails were collected in 30 plots using pitfall traps. Pitfall traps was placed giving 10 subsamples per plot. We investigated whether relationships between springtails assemblages and some environmental variables (soil clay content, height of the litter and soil phosphorus content from multiple regressions between each of the first two axes resulting from the NMDS. A total of 4543 individuals of Parollenidae and Isotomidae and a richness of 11 genera and 15 species and/or morphospecies was recorded. The two regression models that best explained the variation in species composition of Collembola edaphics showed that soil clay content, height of the litter and soil phosphorus content explained 30% to 44% of the distribution of these animals in the landscape. Changes in species composition were mainly associated with height of the litter (first axis) and soil clay content and soil phosphorus content (second axis). Changes in ranges of the involved variables influence the distribution of springtails. Thus we can predict fluctuations in the assemblage.

Keywords Distribution, Soil fauna, Species composition

144 Nesting of native bees without sting *Hymenoptera* *Tetragonisca angustula* in periurban areas at North of Minas Gerais

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As a result of frequently burnings and suppression of native vegetation, the increase of occurrence of native bees without sting have been observed in urban and periurban areas, becoming common the view of nests in places that makes possible their survive and difficult the predators action. becoming common the observation of nests in places that allow their survivor and turning difficult the actions of predators. This work aimed evaluate the different nesting places of native bees without sting, Jatai found at IFNMG Campus Januaria. This work was developed at Federal Institute of Education, Science and technology of Northern of Minas Gerais Campus Januaria, Sao Geraldo Farm, at Januaria MG. corresponding a total area of 226,7 ha and having latitude: 15° 27' S, Longitude: 44° 22' W, and altitude of 474 m. The nests were georeferenced with (GPS), and numbers. The strategy of localisation of the nest were by inspection method, observing their occurrence in characteristics places as cracks, and tree and old wood hollows. Were found 20 nests of Jatai bees *Tetragonisca angustula* placed in cracks of facilities, trees, woods and fences. The nests were observed in a bigger a frequency (80%) on chacks in facilities at the Campus, also were observed nests on the others places, totaling 20%. The results obtained show a bigger frequency of bees in cracks in facilities, even in environments with intense human activity, showing the sociability in environments with a large flux of human activity. All places observed presented good offer of resources, as water and pasture beekeeping, reinforcing the hypostasis of that possible the main principle of place selection to nesting be the safety of the nest in relation of predators, that prefer environment with less human activity in order to diversity and resources abundance.

Keywords Habitat; Adaptação; Jataí

145 Attractiveness of Euglossini bees in different odoriferous baits in the Parque Estadual Cachoeira da Fumaça (ES)

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The Euglossini bees (Hymenoptera: Apidae), are known as orchid bees, and due to their collect behavior of odoriferous substances in orchid flowers, aromatic baits are used for collecting them, thus the aim of this study was to detect the attractiveness of four essences in a fragment of Atlantic Forest in the southern state of Espírito Santo. The essences used were benzyl acetate, vanilla, eucalyptol and eugenol. For the capture, cotton wads, wrapped in gauze, were tied in a tree branch 1.5 meters of high, distant 5 meters from each other. Each trap was soaked with a kind of essence and placed in the field from 09:00 to 12:00. Every bee that approached to the trap was captured by entomological net, placed in bottles with ethyl acetate and transferred to tubes containing the name of the essence. Until the moment five collects were performed (November 2014, January, February, April and May 2015 - authorization SISBIO Process Number. 19404-1 of 27/04/2009). The bees collected were transported to the Zoology Laboratory of the CCA / UFES prepared and identified with the relevant literature. A total of 94 individuals belonging to three genus were collected. The most abundant genus was *Euglossa* with 59 specimens, followed by *Eulaema* (n = 23) and *textitEufriesa* (n = 12). The most attractive essence was eucalyptol (86.17%), with 61 males, corroborating with the literature, followed by vanilla (8.51%, n = 8 males), benzyl acetate (3.19%, n = 3) and eugenol (2.12% - n = 2). The results contribute to know the Euglossini fauna in the southern region of the state, and with conservation and environmental education programs developed by the Parque Estadual da Cachoeira da Fumaça.

Keywords Eucalyptol, Vanilla, Orchids

146 Faunistic composition of Odonata in fish farming tanks in Chapadinha and Mata Roma, Maranhão

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The odonatans (Insecta: Odonata), which have wide distributed, can be found associated with every type of freshwater environment whose fauna is distinguished by the presence of predators, both in the larval stage as adult and it is ecological value. In the Brazil studies of this taxon are still scarce, particularly in the Maranhão's fauna. The objective of this study was to inventory the species of Odonata in the municipalities of Chapadinha and Mata Roma, Maranhão. For the capture of specimens we used insect net. The sampling effort was 144 hours of collection, being held every two weeks for twelve months During December 2011 to November 2012 655 specimens of Odonata (Insecta) were caught, distributed among *Ischnura capreolus* (Hagen, 1861), n=193 (29.47%) which represented the most common species and *Erythrodiplax fusca* (Rambur, 1842), n=1, (0.15%); *Erythrodiplax vesiculosa* n= 1, (0.15%); *Libellulidae* sp1, n=1 (0.15%) which represented the most unusual species. Thus this study contributes to the record of 19 species for the maranhão's eastern region and found a correlation between the reduction of abundance and richness of Odonata by reducing the volume of rain in the region.

Keywords Aquatic insects, Dragonflies, Biodiversity

147 Preliminary Inventory of Butterflies in the Botanical Garden of the Universidade Federal de Juiz de Fora

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Butterflies (Lepidoptera: Papilionoidea and Hesperioidea) are, in several studies, identified as important environmental indicators and studies on their richness are fundamental tools for characterizing the species composition in certain areas and that makes possible the creation of conservation strategies. Research on the richness of butterflies in Brazil are still scarce in some regions, being unknown in some areas, incipient or with poor records, these often do not address all groups of butterflies. This work aims to increase the knowledge and understanding of the diurnal lepidopterofauna of the Botanical Garden of the Universidade Federal de Juiz de Fora, Minas Gerais, Brazil, contributing to the knowledge of Lepidoptera in the country and serving as a basis for future studies on biodiversity conservation. The area, known as the "Mata do Krambeck" is a tropical urban environmental reserve, it has 845.000 m² of Atlantic Forest and is located in the city of Juiz de Fora. Sampling was conducted monthly from April to July 2014, from 10am to 16pm in 1 km trails inside the forest. The butterflies were captured by active collection with insect net, totaling 48 hours of sampling effort, the samples later spread, labeled and deposited at the Coleção Científica de Artrópodes of the Universidade Federal de Juiz de Fora. The identification of specimens was made by comparing through literature and consultation with experts. 174 individuals were sampled in total, distributed in 68 species and the following families: Nymphalidae – 51 ssp. (75%), HesperIIDae – 3 ssp. (4,41%), Pieridae – 9 ssp. (13,24%), and Papilionidae – 5 ssp. (7,35%). This work is a preliminary version, but is found a great richness compared to the short time of collection, therefore, it is desired further studies in the region that will contribute to the knowledge of lepidoptera from Minas Gerais, state that has few studies in this area, and also for butterflies's studies in Brazil.

Keywords Conservation; Diversity; Lepidoptera

148 Florivory and insect herbivory in *Tibouchina* (Melastomataceae)

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Florivory is defined as any type of consumer-caused damage to developing floral buds or mature flowers. Within the insects, florivores are found in several orders but have been much less examined in the context of plant-insect interactions than herbivores or pollinators. In this study we examined how florivory and herbivory are related within individual plants of *Tibouchina* sp. (Melastomataceae). Twenty plants belonging to two separate populations (n=9 and n=11 plants) were marked in the field and 975 flowers and 102 leaves were collected and examined. Florivory was calculated as the percentage of flower tissue lost corrected by total petal area and herbivory was calculated as the percentage of leaf tissue removed corrected by the leaf area. Leaves from both populations were also examined for chlorophyll content and leaf thickness. Chrysomelidae beetles were the most common folivores. They were also responsible for the damage in the leaves, with a mean of 4.65% of leaf area lost, and no significant difference between populations (t=2.13, df=19, P>0.05). Damage by florivores accounted for 8.46% of flower tissue loss and florivory was significantly higher in population one (t=6.18, P=0.04). For these plants, there was also a positive and significant relationship between herbivory and florivory in the same individual plant (R²=0.40, P=0.068), indicating that plants that were attacked by herbivores were also attacked by florivores and that these two guilds might be represented by the same insect species. Leaves in population one were thinner (average: 0.48 ± 0.01 mm), but there was no difference in chlorophyll content between leaves of the two populations (P>0.05). This study is one of the first studies to evaluate herbivory and florivory in a common species and indicates the importance of evaluating both interactions within individual plants.

Keywords Florivory; Herbivory; Melastomataceae

149 Proposal of elaboration of benthonic invertebrates' collection for the Parana state rivers

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Aquatic insects and other benthonic invertebrates are of great relevance in biomonitoring programs of aquatic ecosystems. It is supposed that Brazil bears 20% of the world biological diversity, with the greater number of endemic species of the planet. The proposal of elaboration of a database should help scientific researches in the understanding and prevention of impacts of the human actions on aquatic environments. It is important not to consider a collection only as a species list, assuming phylogenetic or biogeography classification, for example. These data are important as a record of the biological diversity, associated to the history of the sampled ecosystem, allowing observations of presence/absence of species in analysis of impacted areas. Besides, it offers contents to be used in environmental education practices. The collection of Macroinvertebrates of the Laboratório de Qualidade de Água e Limnologia da Universidade Federal do Paraná (Water Quality and Limnology Laboratory of the Federal University of Parana), Setor Palotina has specimens sampled at different times, being the oldest record specimen (so far) of 2009. The data are preliminary and, nowadays, there is the record of 232 genus, 55 families and 13 orders of aquatic macroinvertebrates with the prevalence of the Diptera (360 records, 6003 individuals) and Ephemeroptera (175 records, 1472 individuals) orders. Orders with lower occurrence were Lepidoptera (2 records, 2 individuals) and Megaloptera (3 records, 2 individuals). Until the present moment, there is the record of five different substrates, Surber and strainer samplers, and five rivers, indicating that the number of taxa can still grow substantially. The great difficulty in maintenance, little scientific knowledge, low financial support and the great anthropic pressure on the aquatic resources brings the relevance of ensuring these records to know the aquatic fauna and to make different data available for future research.

Keywords Aquatic insects, biological collection, Parana

150 Palatability studies of *Membracis lunata* (Hemiptera: Membracidae)

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The family Membracidae, or treehopper, is worldwide in distribution and contains insects characterized by the enlarged pronotum, that displays a great variety of colors, shapes and ornamentations. There are several hypotheses about the function of pronotum, including to aid in camouflage and sexual selection. Some species show the pronotum aposematically coloured, such as *Membracis lunata* that is black with white stripes. The aposematic coloration acts to warning the predators about the noxious taste and/or dangerous quality of their bearer. However, there is no experimental study about the defense mechanism of *M. lunata*. Therefore, the objective of this study was to verify if this species of treehopper is distasteful to some vertebrate and invertebrate predators. Three kinds predators were utilized: 26 specimens of mantis (*Stagmatoptera binotata*), 26 specimens of jumping spider (*Plexippus paykulli*) and 26 of gecko (*Hemidactylus mabouia*), all obtained in residences of Belém City, state of Pará, Brazil. Thirteen of each kind of predator received membracids and 13 of control group received only grasshoppers. All the grasshoppers were consumed by the three kinds of predators. The spiders did not consume the membracids. They attacked the membracids but ignored them thereafter. In contrast, all the membracids were consumed by the mantises. Only two geckos were able to eat the membracids. These results indicate that *M. lunata* is unpalatable to spiders and geckos, but not for the mantises.

Keywords Aposematic color, treehopper, unpalatability

151 Fungivorous species of drosophilid: a survey in Viçosa, MG

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Brazil has a significant fauna of drosophilids, containing about one-third of the species recorded in the Neotropics. However, this number should be underestimated for several reasons, including the lack of studies and the sample methods, mostly based in banana-baited traps. Among the drosophilids, two genera, *Hirtodrosophila* (16 spp) and *Mycodrosophila* (3 spp) are known for their specific association with fungi. In this work, we actively sampled 480 adults of drosophilid in 60 fungal fruiting bodies found in the Viçosa region. These flies use the fungi as a local for the development of larvae, so we have collected their fruiting bodies and take them to the laboratory where they were kept in containers under controlled temperature (25°C) for subsequent hatching of adults. We morphologically identified the adult males with the aid of a stereomicroscope magnifying glass. In this study, we found a species of *Hirtodrosophila* in *Favulus tenuiculus* and *Mycodrosophila projectans* in *Ganoderma applanatum*. Although *Hirtodrosophila* has been registered in several Brazilian states, this is its first register for Minas Gerais. Indeed, to our knowledge, this is the first time that *Mycodrosophila projectans* was found in *Ganoderma applanatum*. The knowledge of this type of association in different regions of the world is necessary for an environment in constant change, where modifications between well-known associations may be indicative of environmental degradation.

Keywords *Hirtodrosophila*-*Favulus*, *Mycodrosophila*-*Ganoderma*, species associations

152 Plant architecture, insect diversity and herbivory in two species of Piperaceae at a semideciduous forest

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Plant architecture can be defined by three-dimensional organization including branching pattern, crown size, shape and position of the leaves and reproductive organs. According Lawton, insect diversity can be influenced by architecture, thus plants with complex architecture generally exhibit more diversity of insects besides affect the patterns of herbivory and biodiversity. This research aimed to analyze the plant architecture, compare the diversity of arthropods and herbivory of two species of Piperaceae. These data were collected monthly from June to November 2014 in a semideciduous forest located in the southern of Ituiutaba-MG. 15 plants of the specie *Piper* sp. 1 and 15 of *Piper* sp. 2 with up to two meters high were chosen randomly. Monthly were measured: stem diameter, plant height, number of branches and number of leaves per branch. Leaves were classified in young or old according to color and position on the branches. One branch per plant was photographed for the analysis of herbivory. Monthly samples of arthropods were collected from 7 or 8 plants with a plastic bag and identified in the laboratory. Data were statistically analyzed using Kruskal-Wallis one-way analysis of variance and Spearman correlation by Bioestat 5.0. *Piper* sp.1 has average height 106.6cm and *Piper* sp.2, 118.5 cm ($p < 0.05$), average number of branches in *Piper* sp. 1 was 9.3 branches and *Piper* sp.2 was 13.0 branches. The average abundance of arthropods was 2.2 in *Piper* sp. 1 and in *Piper* sp. 2 was found 0.8 arthropods per plant. Plant height were correlated with number of branches ($r=0,77$) and young leaves ($r=0,92$) in *Piper* sp.1 while old leaves were influenced by humidity ($r=0,88$). At *Piper* sp. 2 insect fauna were correlated with herbivory ($r=0,88$) and young leaves were influenced by temperature ($r=1,0$). The plant less structural complexity showed higher abundance of arthropods, concluding that in this case, the hypothesis of Lawton was not supported.

Keywords Ecology, Herbivory, Piperaceae

153 Occupation of trap-nests of bees and wasps in studies of Apoidea community

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It is estimated that about 5% of the species of solitary bees and wasps have the habit of nesting in preexisting cavities. The aim of this study was to verify the overlap in the use of trap-nests (TN) by bees and wasps, according to the material and the dimensions presented by these artificial substrates used in Apoidea community studies. The study was conducted in two fragments of Seasonal Semideciduous Forest (SSF) and two areas of Brazilian Savanna (SA) in Triângulo Mineiro - MG, from March/2009 to April/2010. In this study, we used trap-nests (TN) of two types: bamboo canes (=BC) (n = 414) that presented about 25 cm in length and diameter from 0.5 to 2.4 cm, and black cardboard tubes (CT): large tubes (LCT: 10.5 cm x 0.8 cm) (n = 96) and small tubes (SCT: 5.8 cm x 0.6 cm) (n = 96). These TN were placed in shelters built in the areas of study and inspected monthly. We collected 11 bee species and six wasp species at both phytophysionomies. The areas of SSF ($H' = 2.13$ and $J' = 0.77$) showed higher diversity index and uniformity than those found for SA areas ($H' = 1.66$ and $J' = 0.59$). We collected 1084 nests (bees = 782 and wasp = 302). The most abundant species, *Centris analis*, *Tetrapedia curvitaris*, *Trypoxylon rogenhoferi*, *Trypoxylon lactitarse* and *Tetrapedia diversipes* used both types of TN available. It was found that 67.2% of wasp nests were made in BC diameter <1.0 cm; only 8.9% were in SCT and 15.2% in LCT. For bees, the highest occupancy percentages were in SCT (33.8%), BC (<1.0 cm) and LCT (26.1%). High overlap in using BC <1.0 cm between bees and wasps were observed. Of the total of founded nests (n = 407), 50% were occupied by wasps and 50% by bees. There was less overlap in using of CT type. Comparing types of TN offered, our results suggest that wasps probably choose the substrate according to diameter and type of material whereas the diameter appears to be the main factor of choice to bees.

Keywords Brazilian Savanna; Seasonal Semideciduous Forest; bamboo cane

154 The non-pollinating fig wasps associated with *Ficus maxima*: community structure and colonization sequence

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Mutualisms, such as the fig-wasp interaction, are susceptible to colonization by non-pollinating fig-wasp, which exploit the resource involved therein. Understanding the ecology of non-pollinating fig-wasp communities depend on a good knowledge the colonization sequence of the species involved, which can be gall inducers, kleptoparasites and parasitoides. However, the colonization sequence of Neotropical non-pollinating fig-wasp is poorly known. In this study, we used adhesive traps to establish, for the first time, the community structure and the colonization sequence of a diverse fig wasp fauna associated with *Ficus maxima*, section *Pharmacosycea*. The current study was carried out on an urban area located in Manaus city, Brazil. Field experiments were carried out in three *Ficus maxima* trees from September to November, 2014. We used sticky traps to capture wasps. Three such traps were simultaneously present on each tree, from the first detection of developing fig to five days before the first emergences were recorded. Traps were collected and renewed two days until pollination, then every four day. The fig-wasp community associated to the studied population of *Ficus maxima* was composed of six undescribed species that we identified to genus. The pollinator is *Tetrapus* sp. and the five other are non-pollinating fig-wasps that belonged to the genera *Critogaster*. They consistently showed a temporal partitioning in colonization among non-pollinating fig-wasp species. *Critogaster* sp.1 and *Critogaster* sp.2 colonized figs during the fig receptive and in the beginning of inter-floral phases. In contrast, *Critogaster* sp.3 and *Critogaster* sp. 5 oviposited two weeks later, mainly in the middle of the inter-floral phase. *Critogaster* sp. 4 was later colonizer, and laid eggs during the later inter-floral phase. The results suggest that these Neotropical fig wasps have different strategies of resource exploration, even among species belonging to the same genus.

Keywords *Ficus maxima*, non-pollinating fig wasp, resource exploration

155 Interaction of frugivore insects with *Byrsonima verbascifolia* (Malpighiaceae) in Brazilian Savanna area in Minas Gerais

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The Malpighiaceae family, abundant in the Brazilian Savannah, presents a large variety of flowers and fruits and it's known for performing important interactions with insects. Known as murici, *Byrsonima verbascifolia* has yellow, fleshy fruits, widely used in the alimentation of some insects. The work's objectives were to characterize the frugivore insects' community of this species and to verify if there are preferences for the distinct phases of fructification. Twenty plants with infructescences were selected and divided into four fruit development stages (formation/growth/maturation/senescence), separated in each 20 days. The four stages were designated as ES1, ES2, ES3 e ES4. In each stage, cages of cloth were placed *voile* in the infructescences and left until the fruits' fall. Weekly, these cages were inspected and the frugivorous insects found were manually collected, identified and separated according to the stage they were found. Were found larvae, nymphs, and adults representative of Lepidoptera (n=36), Hymenoptera (n=21), Thysanoptera (n=11), Hemiptera (n=8), Blattodea (n=7), Diptera (n=3) and Coleoptera (n=2). On the degree the fruits passed thorough maturation, the abundance of insects found decreased, being the first stage (ES1) the most abundant (n=35) and the last (ES4), having only three individuals. The similarity index showed bigger resemblance between the two first stages (ES1 & ES2), and the last stage (ES4) being the most distant of all. This difference is explained by the fact that in the end of the maturation, the fruits are not so attractive to the consumers if compared to the early stages. However, the factors that lead to the occurrence of frugivorous insects in Brazilian Savannah plants are the lack of availability of host fruits and the elevated biodiversity inherent to protected ecosystems, forcing the frugivorous plants to constitute in potential infestation areas, once they interchangeably fructify along the year.

Keywords Frugivory; Savannah; Interactions

156 Influence of temperature and precipitation on abundance and distribution of Tipuloidea in salt marshes of Brazil

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Salt marshes are flooded habitats dominated by halophyte vegetation in intertidal zones. These areas are important breeding grounds for insects, especially flies. Despite these, there are few investigations about the biology and ecology of Diptera in salt marshes. Tipuloidea is a super-family of medium and large size gnats, but is little known in the Neotropics. The aim of this study was to evaluate the effect of temperature and precipitation on Tipuloidea assemblages of Southern Brazilian salt marshes. Samples were taken from September/2008 to September/2010 in three salt marshes in Patos Lagoon estuary. Two Malaise traps were used in each one to catch the insects. Temperature and precipitation values were provided by Instituto Nacional de Meteorologia (INMET). A total of 3,109 specimens were collected belonging to 18 species/morphospecies, being *Symplecta pilipes* and *Dicranomyia* sp. the most abundant. The major abundance of the species, in general, was recorded between 14 and 17 °C. The linear regression showed significant relation between the increment of insects abundance and the decrease of temperature for *Dicranomyia* sp. and *Symplecta pilipes* (R:-0.55; R:-0.51, respectively, both $p < 0.05$). However, precipitation did not influence the species abundance. Particularly, *Dicranomyia* sp. and *Symplecta pilipes* have no significant relation about this factor (R:0.21; R:0.13, respectively) being the species collected during low and high precipitation, from 50 to 260 mm, without a clear trend of abundance. The results confirm the fact evidenced by other authors that Tipuloidea are organisms adapted to lower temperatures across the globe. However, the precipitation seems not be a determinant factor on abundance because salt marshes are flooded habitats, so, aquatic breeding is not a limited factor for this insects.

Keywords crane-flies, environmental factors, salt marshes

157 Artificial night lighting and its effects on insect attraction in the countryside of Luz, MG

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The expansion of artificial night lighting (ANL) has resulted in increased brightness of the night sky around the world in recent decades. Despite the undeniable advantages the ANL provides, it is also recognized for its negative side-effects on the environment and living beings. Regarding the insects, it is possible to note that many species are attracted by different light sources, leading in many cases to: collision with the light source, greater exposure to predators, disturbance in navigation and even death. Despite ANL's negative effects, few are the studies addressing the issue, since many people see the ANL as something related to comfort and safety. The aim of this study was to determine whether the abundance of Coleoptera and Lepidoptera attracted by two different light sources, incandescent and fluorescent, differed significantly. Three light-traps were installed in the countryside municipality of Luz, MG. Two light-traps contained lamps of comparable luminous flux, each light-trap containing one of the light sources described above; and a third light-trap, negative control, contained no lamp. The light-traps remained active for nine nights between March and April 2014. The insects collected were preserved in ethanol, they were sorted using a stereo microscope and identified to the ordinal level. Statistical analysis were performed in order to verify if the abundance of insects attracted by each light source were significantly different. All analysis (Shapiro-Wilk test, t-test, Mann-Whitney test) were performed using the software R. We collected 5918 individuals belonging to the orders of interest, with 4755 Coleoptera and 1163 Lepidoptera. Despite the difference in the abundance of insects attracted by light sources analyzed was not significant, it was noted intense attraction of insects by ANL, indicating that the negative impact of ANL on insects should not be overlooked. Besides we noted that Coleoptera are more affected than Lepidoptera.

Keywords Light Pollution, Insect Attraction

158 Collembola (Arthropoda, Hexapoda) of the Botanical Garden of the Universidade Federal de Juiz de Fora, MG, Brazil

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The Collembola Order includes the most abundant micro arthropods in the terrestrial environment. The intimate relationship with the soil is in the fact that these animals feed mainly on fungi and can also consume bacteria, plant debris and animals, thus they are extremely important in nutrient cycling in the soil and can be indicators of its quality. This study aimed to record the diversity of Collembola found in the Mata do Krambeck, a tropical urban environmental reserve, located in the city of Juiz de Fora, MG, which has an area of 291.9 hectares of continuous Atlantic Forest. The springtails were collected monthly between May 2014 and May 2015 using pitfall traps distributed in three different transects inside the forest, with a distance of 10 meters between traps. They collected a total of 1280 individuals distributed in families: Entomobryidae, Hypogastruridae, Onychiuridae, Sminthuridae and Tomoceridae. The most abundant family was Entomobryidae (95.7%), while Tomoceridae had only four records. The highest abundance occurred in the rainy season.

Keywords Soil fauna; Urban Forest; Abundance

159 Challenges and perspectives for conservation of endangered Lepidoptera in Minas Gerais

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The constant anthropogenic changes and reduction of habitats have altered the structure and dynamics of some populations, causing decrease or even local extinction of species. Some taxa of Lepidoptera are extremely sensitive to environmental changes and the more endangered ones were included in the red list of threatened fauna. In order to implement conservation actions for endangered Lepidoptera in Minas Gerais, we created a section of the National Network for Research and Conservation of Lepidoptera (RedeLep) in the Minas Gerais state, the RedeLep-MG. The main aims are to enable the integration and cooperation of research on Lepidoptera in the state. We are gathering information to fill gaps on the knowledge of these insects in Minas Gerais. As the first result, we mapped the geographical distribution of four endangered species: *Actinote quadra*, *Dasyophthalma vertebralis*, *Nirodia belphegor* and *Parides burchellanus*. In the State of Minas Gerais, the species *A. quadra* was registered in the cities of Barbacena, Belo Horizonte, Caxambu, Ibirité, Rosário da Limeira, Alto do Caparaó, Brumadinho (Serra do Rola-Moça State Park) and Santa Bárbara. *D. vertebralis* contains only a record in Teófilo Otoni, but can possibly occur in other places of the river Mucuri valley. *N. belphegor* was recorded in Santana do Riacho and Morro do Pilar (Serra do Cipó National Park), Santa Bárbara (Private Reserve of Natural heritage Santuário do Caraça), Buenópolis (Sempre Vivas National Park), São Gonçalo do Rio Preto (Rio Preto State Park) and Diamantina. *P. burchellanus* occurs in Brumadinho, Campos Altos and was recent discovered in the region of Serra da Canastra National park. A major challenge is to confirm new places of occurrence of these and other endangered species, enabling the population monitoring, and suggestion of priority areas for conservation. There is also the need to promote maximized inventories in poorly known areas, besides identifying possible indicator species of Cerrado and Atlantic Forest environments. These actions would expand the information about the threatened Lepidoptera species and contribute to the conservation of this group.

Keywords Lepidoptera, conservation, RedeLep-MG

160 Assessment of the influence of edge effects on the distribution of entomological fauna of urban forest fragment

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A series of physical, chemical and biological, called "edge effects", strongly influence the dynamics of forest fragments. These factors may interfere with biological processes, in the distribution of species and even lead to death some species more fragile, favoring other to better adapt to the new conditions. The insects are good indicators of quality, because they have huge variety of responses to the quality and quantity of available resources in the middle, and have great diversity and population density. Thus, it is important to know about the distribution, abundance and richness of insects in forest remnants. The objective of this study was to compare the distribution of insects between two points, interior and edge, in urban forest fragment, located in Ipatinga - MG. Samples were taken monthly from March to November 2014, with traps: pitfall; attractive thyrine; and litter. These remained for eight days, at each sample point. Were collected 10,064 insects, distributed in 11 orders and 71 families. Only four families showed significant differences in abundance between points: Fulgoridae (Hemiptera) (Mann-Whitney $Z = 2,013$; $p < 0.045$) and Blattellidae (Blattaria) (Mann-Whitney $Z = 2,013$; $p < 0.045$), were more adapted to the interior, while Ichneumonidae (Hymenoptera) (Mann-Whitney $Z = 2,013$; $p < 0.045$) and Ptiliidae (Coleoptera) (Mann-Whitney $Z = 2,177$; $p < 0.029$), were more adapted to the edge. Despite the statistically significant differences, the abundances found were very close. Despite the statistically significant differences, the abundances found were very close. In this way, it would be expected that had adverse effects caused by the interaction with the open areas surrounding the fragment.

Keywords Forest Fragment; Edge Effects; Atlantic Forest

161 The decomposition of leaf debris with the help of benthic insects in a neotropical stream

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The project aimed to inventory and evaluate the participation of aquatic insects in the leaf decomposition process in a Neotropical lotic ecosystem, and to analyze its relation to seasonality. Samples were collected quarterly from 2013 to 2014, in a stream inside São Camilo State Park. Five sampling sites were selected, over a stretch of 100 meters from the water body, with a distance of 20 m between each point. At each site, 4 sediment samples were removed: 3 for biological analysis and 1 to define particle size of sediment texture, with a Surber sampler for determining the benthic intake. At each collection point, 3 rows of buckets (with 6 buckets each row) were installed to collect the leaves falling in the surroundings. Leaves were identified to family level and incubated in litter bags for 30 days to colonization by aquatic insects. These invertebrates were counted and identified to the lowest taxonomic level possible for interpretation and discussion of results. Riparian vegetation was composed of the families Lauraceae, Rutaceae, Sapotaceae, Malvaceae and Myrtaceae, which were colonized by the invertebrates for 30 days. In litter bags it was observed that Chironomidae, Ephemeroptera and Trichoptera were found in higher prevalence. These taxa are common in studies related to the leaf decomposition, because the feeding habit of the majority is detritivore and shredder, which favored the colonization of leaves by these organisms. The total insects abundance in the winter was 7,975 ind.m², and Chironomidae (5,075 ind.m²), Coleoptera (600 ind.m²) and Ephemeroptera (525 ind.m²) had higher abundance. On the other hand, the higher total abundance was observed in the summer (8,171 ind.m²) standing out Chironomidae (5,063 ind.m²), Coleoptera (1,182 ind.m²) and Odonata (1,553 ind.m²). Organisms richness in the winter was higher than the summer, with 9 and 6 taxa, respectively. The greatest richness in winter was probably related to seasonality, because in this period there are fewer rains and this influences the stability of aquatic ecosystems, improving the conditions for the establishment of communities.

Keywords aquatic insects, riparian vegetation and decomposition

162 First record of *Conura morleyi* (Hymenoptera: Chalcididae) from the Mato Grosso do Sul State, Brazil

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First record of *Conura morleyi* (Hymenoptera: Chalcididae) from the Mato Grosso do Sul State, Brazil. Chalcididae has a worldwide distribution. The members of the family are known by their solitary parasitoid or hyperparasitoids habits, where the females laying their eggs in larvae or pupae of insects. Within the Chalcidinae, the Chalcidini is composed by six genera among them the genus *Conura*, with almost 63 describe species and with restrict distribution to the Neotropical region. Generally, the hosts of *Conura* are pupae of dípteros, himenópteros and lepidópteros. There are several registers for species of *Conura* parasitizing insects as Lonchaeidae, Syrphidae, Tephritidae (Diptera), Pteromalidae (Hymenoptera) and Nymphalidae (Lepidoptera). Among their hosts are the pests of palms, which feeding on the leaves of *Cocos* sp. (Arecaceae). This study shows the first occurrence record of *Conura (Spilochalcis) morleyi* to the State of Mato Grosso do Sul (MS), Brazil. Were collected two pupae of *Brassolis* sp. (Lepidoptera: Nymphalidae) parasitized by *C. morleyi* in an urban area of Campo Grande, MS, during the month of September 2014. The pupae were transported to the "Laboratório de Sistemática de Díptera da Universidade Federal de Mato Grosso do Sul" (LSD/UFMS) and kept on transparent vials until the emergence of the adults parasitoids. Emerged 60 specimens of *C. morleyi*, which were preserved in alcohol 70% and the pupae were kept on dried conditions. The parasitoids and hosts analyzed in this study will be deposited in the collection of "Coleção Zoológica de Referência da Universidade Federal de Mato Grosso do Sul" (ZUFMS). The occurrence of *C. morleyi* to the MS extends their spatial distribution and indicates how the Hymenoptera fauna is poorly known to the MS.

Keywords Parasitoid; Wasp; Neotropical

163 Chewing lice (Phthiraptera) of Ruddy Ground-Dove (*Columbina talpacoti*) from Zona da Mata, Minas Gerais

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The rudy ground dove is a Brazilian species that has adapted itself to the urban environment, despite its original environment of fields and savanna. This bird hosts many parasites, especially the chewing lice, also known as Mallophaga (Phthiraptera: Amblycera and Ischnocera) that may bring a series of problems to their hosts. This study aimed to report the lice occurrence in rudy ground doves in the cities of Juiz de Fora (Botanical Garden of Universidade Federal de Juiz de Fora and Granja Passarada), Chácara (Sítio Paraíso da Barra), and Santa Bárbara do Monte Verde (Fazenda Volta Grande), in Minas Gerais state. The birds were captured from March 2013 to May 2015 by fog nets, marked with CEMAVE rings, weighted and measured; the birds' bodies (excepting the head) were then put into a plastic bag containing a cotton piece imbued with ether, so that the present ectoparasites would be released. Later, we visually inspected the birds searching for any lice not released on the earlier procedure. The lice were stored in vials containing absolute ethyl alcohol and taken to the Laboratório de Artrópodes Parasitos of UFJF for identification. Overall, 63 doves were collected; of these, 80% were parasitized by lice. The found species of lice were *Hohorstiella passerinae* and *Hohorstiella passerinae*. We collected 213 specimens of *Columbicola passerinae*, being 190 adults and 23 nymphs; for *Physconelloides eurysema*, we collected 114 specimens, of which 69 were adults and 45 were nymphs; at last, for *Hohorstiella passerinae*, only 3 adult specimens were collected. Regarding the rainy and dry season, 50% of the parasitized birds were collected on each one. Studies with the relation between rudy ground doves and lice must be developed further, in order to assess the damage done to the birds' conservation.

Keywords Chewing lice; Ectoparasites; Bird

164 Seasonal diversity in subfamilies of Ichneumonidae (Insecta: Hymenoptera) from an area of cerrado in Brazil

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The objective of the present study was to assess the diversity of Ichneumonidae subfamilies in an area of Cerrado in Brazil throughout 12 months. The study was performed on the Biological Reserve Unilavras – Boqueirão located in the municipality of Ingaí, state of Minas Gerais, comprising the phytophysionomies of Gallery Forest, Cerrado Sensu Stricto and Rupestrian Field. Weekly collections using Malaise method occurred from March 2010 to March 2011. The rainfall, relative humidity of air and temperature were measured. Overall, 1355 individuals were collected, which were distributed in 19 families. Campopleginae (321 individuals), Cryptinae (283), Ichneumoninae (153), Orthocentrinae (132) and Banchinae (125) were the most abundant, respectively. From the total, 806 individuals were found on the Gallery Forest, 420 on Cerrado Sensu Stricto and 109 on Rupestrian Field. On the Gallery Forest the most abundant subfamilies were Cryptinae (192 ind.), Ichneumoninae (132) and Campopleginae (107), on Cerrado Sensu Stricto the subfamilies Campopleginae (161), Cryptinae (76) and Banchinae, and on Rupestrian Field the subfamilies Campopleginae (53), Cryptinae (15) and Orthocentrinae (11). Significant relationships between the increase of subfamilies and specimens collected ($R_s = P < 0.05$) were observed as the rainfall increased. Furthermore, a higher abundance was observed on the rainy season, which differed significantly from the dry period ($KW = P < 0.05$). Such results corroborate the hypothesis that Ichneumonidae suffer temporal and spatial alterations on the abundance mainly in areas where the rainy and dry seasons are well-defined. The highest abundances of subfamilies occurred on the phytophysionomy of Gallery Forest, what is an indicator of preference by its wetter habitats.

Keywords Fauna inventory; Abundance; Seasonality

165 What is the role of body size in the distribution of Amazonian fruit-feeding butterflies?

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Functional traits are aspects of the organisms that define their ecological performance and evolutionary fitness. Body size correlates with many ecological features in animals and it is regarded as a performance constraint of ectotherms. We used Amazonian fruit-feeding butterflies as models to test whether 1) species taxonomic composition was associated with environmental gradients, 2) the environment filtered butterflies based on body size and 3) body size variation explained species turnover. Fruit-feeding butterflies were sampled with bait traps and insect nets in 25 km² of forest in Central Amazon. Body size was estimated by measuring the forewing length of all individuals. Vegetation heterogeneity and abundance of insectivorous birds were used as predictors. Butterfly taxonomic composition and body size were used as response variables against plant and bird gradients in multiple regressions. Vegetation heterogeneity predicted changes in butterfly taxonomic composition ($R^2 = 0.18$, $P = 0.03$), while abundance of birds did not ($p = 0.95$). Plots with more heterogeneous vegetation and higher abundance of birds tended to harbor larger butterflies ($R^2 = 0.40$, $P < 0.01$). These relationships may be due to the reported generalist larvae of larger adults, which allow them to forage across more heterogeneous areas without risking the location of suitable host plants. Also, larger wings may serve as deflection tools that misdirect birds' attacks from vital body parts, such as the abdomen, thus contributing to local success of large-sized butterflies. Taxonomic composition was associated with variation in butterfly body size ($R^2 = 0.34$, $P < 0.01$), which indicates that body size might mediate the filtering exerted by the environment on butterflies. We encourage the coupling of functional and taxonomic approaches, in order to expanding the avenues in which to explore species distribution and to gaining extra insights into the comprehension of the functionality of ecosystems.

Keywords Environmental filtering; Forewing length; Functional traits

166 Diversity and richness of fruit-feeding butterflies (Lepidoptera: Nymphalidae) from Serra do Intendente State Park, Minas Gerais, Brasil

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¹Pontifícia Universidade Católica de Minas Gerais, Belo Horizonte-MG, Brazil. Fruit-feeding butterflies (Lepidoptera: Nymphalidae) are insects that have an important ecological role and are being recognized as valuable environmental indicators. The presence of these organisms in a given habitat is related to the availability of food resources and several factors such as temperature, relative humidity and incidence of sunlight. This study aimed to analyze the diversity and richness of the frugivorous butterflies community along the Peixe Tolo River, a Parauninha River tributary, in two areas: one with a high incidence of sunlight and other shaded. The study was performed in the Serra do Intendente State Park, located in Biosphere Reserve of Serra do Espinhaço, Minas Gerais, Brazil. The study area presents vegetation predominant of rocky fields, with mesothermal climate of mild and rainy summers. The study was conducted during ten months and was designed with Van Someren-Rydon traps distributed in two trails of approximately 200 m. For each sample period, twenty traps were positioned in an area with high incidence of sunlight and twenty traps in the shaded area. In total, were performed four samplings (two in the dry season and two in the rainy season). The traps was exposed for five days and checked after 24 hours. To characterize the vegetation structure it was necessary to measure the horizontal density, height and size of the canopy of these trees that had a diameter greater than 5 cm. In this study, a total of 263 butterflies were collected in the traps. These individuals belong to 38 species of Nymphalidae family. In the shaded area were collected 157 individuals belonging to 24 species and in the sunny area were collected 99 individuals belonging to 23 species. The richness and diversity presented were relevant for the sampled region, when compared to other studies.

Keywords Insecta, Distribution, Luminosity

167 Community structure of solitary bees (Hymenoptera: Apidae) of the Serra do Japi, Jundiaí, São Paulo, Brazil

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Bees are essential pollinators for most terrestrial ecosystems. Due the growing devastation of these environments, there is a parallel concern for the conservation of biodiversity and especially of the pollinators. Thus, this work investigated the community structure of solitary bees in the Serra do Japi, located in Jundiaí, São Paulo, Brazil. The bee community was sampled through 4 stations containing trap-nests, installed from 1058 m.l.s to 1121 m.l.s. The traps were made of bamboo canes, with variable diameters and lengths, and also of cardboard tubes, measuring 5.8 cm in length and 0.6 mm in diameter. Sampling was carried out once a month from December 2011 to November 2013. A total of 279 nests were obtained, of which emerged about 636 individuals. The nests were built by females of 16 species of bees. There was a downward trend in the number of built nests, emerged individuals and species richness at stations located at higher altitudes. The nesting season was from December to May, during hot and rainy season, and there were no nests from June to August, the cool and dry season. Emergencies occurred throughout the year, but were more frequent between March and May. The community mortality rate was 30.34%, caused by parasites (18.64%), fungi (5%) and others (6.7%). From 16 species that nested in the traps, 14 of them had nests parasitized by 10 species of enemies. *Tetrapedia diversipes* was the species with highest number of parasitized nests and its main parasite was *Anthrax hyalios* (Diptera: Bombyliidae). *Melittobia sp* (Hymenoptera: Eulophidae) was the parasite with the widest range of host species (N=10). The mean time of development of species was 2.66 months. The most used bamboo diameter was 6 mm. Thus, is possible to conclude that the community of bees in the area presents good condition of conservation, evidenced by the richness of sampled species, low number of parasite species and low mortality of individuals.

Keywords Atlantic Rainforest, *Tetrapedia*, trap-nest

168 Natural history of *Omaspides
brunneosignatta* (Chrysomelidae:
Cassidinae)

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Cassidinae is the second largest subfamily of Chrysomelidae, but little is known about the natural history of the species. The objective of this research was to describe the natural history of *Omaspides brunneosignatta*. The study was conducted in the National Forest of Passa Quatro, MG/BR between October 2010 and April 2011. The beetle began their reproductive and feeding activities on October looking for diapause sites in the middle of April. The female stayed together with juveniles during all development stages. They presented monophagous habits feeding only on *I. syringifolia* (Convolvulaceae) in the study area. Immature stages completed their cycle in 47.2 days on average, from egg to adult. In the first and second cycles the oviposition presented on average 31.4 ± 4.3 eggs/egg clusters (n= 566 eggs in 19 clusters) and 34.7 ± 4.1 eggs/egg clusters (n= 347 eggs in 10 clusters), respectively. The oviposition peaks occurred on November and February. The mean period of egg incubation was 16 ± 2.4 days (n= 15 offspring) for the first cycle and 14.8 ± 1.2 days (n = 122 offspring) for the second cycle. We found the microhymenoptera *Emersonella pubipennis*, ants of genus *Linepithema*, *Solenopsis* and *Pseudomyrmex phyllophilus* acting as natural enemies of eggs. For the first cycle, the larval development lasted 23 ± 1.6 days (n= 15 offspring) counted from eclosion until reaching the pupal stage. In the second cycle the duration was of 22.3 ± 1.2 days (n= 47 offspring). Right after the eclosion the larvae began feeding around the egg mass. Larvae were preyed by ants of the genus *Solenopsis*, *Pseudomyrmex* and, *P. phyllophilus*. The duration of the first and second cycles was respectively 9.1 ± 0.7 (n= 11 offspring) and 9.5 ± 1.2 days (n = 50 offspring). Pupae were parasitized by Hymenoptera *Conura* sp. and *Brachymeria* sp. Adults were preyed upon by unidentified species of Hemiptera and Araneae.

Keywords *Ipomoea syringifolia*, maternal care, reproductive cycle

169 Trap-nesting bees and wasps in Parque Estadual São Camilo, Palotina, Paraná.

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There is a vast scientific literature on trap nest inventories in Brazil but many portions of the main biomes are still not studied. The objective of this study is to evaluate trap-nesting bees and wasps in a Semidecidual Seasonal Forest fragment. A sum of 1500 trap nests were made with bamboo cane internodes and two consecutive years were monitored. In the first year 46 nests were founded and the nesting species were *Pachodynerus grandis* (19 nests), *Pachodynerus gadulpensis* (19), *Centris analis* (2), and *Centris tarsata*, *Megachile fiebrigi*, *Megachile guaranítica*, *Megachile susurrans*, *Trypoxylon* sp.1 and *Zethus smithi* iwith one nest each. This was the first record for *Z. smithi* in trap nests. No statistical differences were found between interior and edge transects for richness, but the species composition was different. In the second year 39 nests were founded by four species, three previously recorded, *C. analis* (7 nests), *P. gadulpensis* and *P. grandis* (6 nests), plus *Mobobia angulosa* with 15 nests. Parasitoids from four families and one cleptoparasite were recorded and the mortality rate was higher in bees. The assemblage structure is similar with previous studies but the species composition can be considered different. These findings reinforce the notion that trap nests assemblages are not directly comparable for richness and composition.

Keywords diversity; Eumeninae, inventory, trap-nests

170 Cerambycidae (Coleoptera) community structure in Araucaria Forest in Southern Brazil

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The state of Paraná has extensive deforested areas and small forest patches of primary vegetation immersed in agricultural and livestock fields. The Iguçu National Park is the last remaining large forest in the south of the country where is still possible to find the Araucaria Forest vegetation type (AF). Since the beginning of colonization, the AF area, like all the other forest systems in the state, have been thoroughly exploited economically. So consequently the AF in southern Brazil is on the edge of disappearance. The coleopterofauna including the Cerambycidae (Coleoptera) family is very little studied in Araucaria forests. In this sense, the objective was to know the structure and richness of Cerambycidae community inhabiting the canopy and ground in (AF) areas of the Iguçu National Park. To collect the insects, eight light traps Luiz de Queiroz were used. The traps were modified, so 500 watt mix lamps fed by generators could be possible. 414 specimens were collected distributed among 97 species, of which 73 were found in the canopy (57 restricted), 40 on the ground (24 restricted) and only 16 species common on both strata. The species accumulation curve shows that on both canopy and ground there is still need for more collections, especially on the ground level showed a greater distance from the formation of a plateau. Due to the specificity that Cerambycidae present in environmental and behavioral relationships, the large number of species found to date might be related to a high plant species richness in AF. A greater abundance and richness of cerambycids were observed in the canopy than in ground, which can be related to the specific niches and the presence of abundant food resources.

Keywords Atlantic Forest, Forest Canopy, Light Trap

171 Assembly rules for fireflies in the Serra do Mar

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It is argued long ago in ecology, about the importance of biological interactions in communities structure. It is believed that competition, as well as reproductive isolation are important in determining the distribution pattern of the species, especially in phylogenetically related lineages. Larvae of fireflies are voracious predators, and adults, usually have complex mating system which makes this taxocenose a rich model to study the patterns and intra- and interspecific interactive processes. In this context, this study aims to test the hypothesis that fireflies assembly is structured in space and discuss the role of biological interactions in this structure. Using Malaises traps arranged along an elevational gradient, monthly collections of fireflies were made in Serra Do Mar between September and November 2014. With these data we performed an analysis of null models, which is the simulation of the community through randomization process, excluding the effect of any structuring factor, but considering the heterogeneity of the environment. Comparing the simulated community with the observed through the C-score and V-ratio indices, we observed that in the matrix of each month the calculated values were significantly different from simulated ones, showing that the fireflies species of the community are not randomly structured. To evaluate if the interactions would be important in community structure, we described the phenological and spatial patterns of congeneric species and therefore with larger similarity. The three species of *Ybytyramoan* and two species of *Amydetes*, presented their peak of abundance segregated in space, suggesting a possible competition. Preliminary results suggest that interspecific interactions within the assemblage may be important in structuring the distribution of fireflies in space.

Keywords null models, spatial distribution, interactions

172 Impacts of different pasture management on dung beetle communities of a transition region between Cerrado/Caatinga

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Transition zones between tropical savanna biomes are widely recognized for its large number of species and high levels of endemism, and even though are being constantly modified by agricultural and livestock activities. Replacement of tropical savannas by exotic pastures is a common activity in these regions, which can represent a great threat to local biodiversity. However, few studies evaluated the impacts of agricultural activities on the biodiversity of transition zones between tropical savannas. This study aimed to investigate the impacts caused by introduced pastures under different management regimes in a Cerrado/Caatinga transition area, using dung beetles (Scarabaeinae) as bioindicators. Samplings were performed in Currais municipality – PI, Brazil, during January and February of 2014. Five areas of each system were sampled: Caatinga, Cerrado, unmanaged pasture (without constant management) and managed pasture (managed with herbicides and mowing). Collections were carried out using pitfall traps baited with human feces. Sixty two species were sampled in a total of 48.659 individuals. Managed pasture presented a smaller species richness. Both, Cerrado and Caatinga, contributed to pastures species composition. This is, probably, because both biomes are naturally open, and when they are replaced by open modified systems, there is an adaptation of dung beetles species. Unmanaged pastures presented a higher conservation value in relation to managed pasture, because it can maintain a high species richness. Besides, unmanaged pastures share a higher number of species with the natural systems than managed pasture, and these species can maintain a greater abundance in those pastures. Our results shows the potential of unmanaged pastures for the conservation of dung beetles species in tropical savannas when compared to managed pastures.

Keywords Tropical savannas, ecotones, conservation

173 Ants as indicators of lake-swamp succession and their recent evolutionary history in the Rio Doce State Park

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This work aims to contribute on comprehension of the distribution of insect species associated with ecotonal forest habitats with lentic environments and lake-marsh succession. We specifically investigated the possible effect of silting, on the ant fauna. To this end, we carried out samples along three edges of ponds in silting process and the adjacent forest within Rio Doce State Park. In each area, pitfall traps were installed on the edge of natural ecotones, forming a transect along the transition line between the swamp and the adjacent forest. Another line of traps was installed inside the adjacent forest, at least 50m apart from that first. The results indicate that the most drained area and probably silted longer, presents more abundance of ants, both on the ground ($\text{Chi}(59,5)=2333$; $p=0.003$), and on the trees ($\text{Chi}(59,5)=41,7$; $p<0.001$). Moreover, the soil ant richness was also higher in this area than in others ($\text{Chi}(59,5)=69.2$; $p=0.01$). In addition, the difference between samples taken at the edge and inside the forest did not differ in richness or abundance (except in the most drained area, where abundance was higher in ecotonal line). Regarding the composition, opportunistic species such *Pheidole reflexans* are present in all areas. The *Sericomyrmex mayr* fungus-growing ants is absent in only one of the areas, it may indicate the latest sedimentation process, since they nests in soil. By the other hand *Labidus praedator*, which present legionnaire behavior, was more abundant in samples of more drained area, possible due to the possibility of movement on not waterlogged soil. These results evidences of landscape evolution in determining the diversity of ant species from Atlantic Forests.

Keywords Atlantic Forest, Natural Succession; Conservation

174 Parthenogenetic reproduction in *Amblyseius herbicolus* (Acari: Phytoseiidae)

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Asexual reproduction through parthenogenesis is often found in mites. There are two types of parthenogenesis. In arrhenotokous parthenogenesis, often found in spider mites, haploid eggs give rise to males and diploid fertilized eggs give rise to females. Thelytokous parthenogenesis, where all eggs give rise to females and no males exist, is less common in predatory mites, but has been reported for *Amblyseius herbicolus* (Acari: Phytoseiidae). Here, we verified whether this is indeed the case. To accomplish this, we scored the sex ratio of two consecutive generations of *A. herbicolus*. Twenty adult female *A. herbicolus* were collected from the rearing and individually incubated for 24 h in arenas with an ample supply of *Typhasp.* pollen as food. Subsequently, the eggs produced (F1) were individually incubated and observed once per day until they became adult. Next, the eggs produced (F2) by the females (F1) were incubated as before and observed until becoming adult and their gender could be determined. All offspring (both F1 and F2) were females, confirming that the mites reproduced by thelytoky. It is known that *Wolbachia* and other endosymbionts are common in mites and may induce sex ratio changes in the offspring of their host. Future experiments should be done to verify the cause of parthenogenesis in *A. herbicolus*.

Keywords reproduction; thelytoky; predatory mite

**175 Seed predation of *Copaifera oblongifolia*:
effects of plant size and resource
concentration**

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The differential allocation of resources affects the plants growth and the ratio between size and number of seeds. These variables also influence the predation of seeds once predators tend to select patches with more resources concentration. The aim of this study was to evaluate the effects of plant size and the amount of fruits of *Copaifera oblongifolia* in seed predation by *Rhinochenus brevicollis* (Curculionidae). The study was conducted in a cerrado (Brazilian savanna) area in the municipality of Mirabela (MG). We sampled 28 *C. oblongifolia* bushes and determined their size (height and canopy diameter) and number of fruits. The fruits were taken to the Conservation Biology Laboratory - UNIMONTES which were dissected to determine predation. Were built Generalized Linear Models (GLM) with the seed predation rate as response variable and the plant height, total number of fruits and number of viable seeds per plant as explanatory variables. There was a positive relationship between the number of viable seeds and the percentage of predation. However, predation was not affected by the plants height nor the total number of fruits per plant. Thus, the predator selects plants with higher amount of viable fruits for oviposition.

Keywords Resource concentration, predation, Pau-d'olinho

176 How is the butterflies response (Lepidoptera: Papilionoidea) to a landscape coffee in Colombia?

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The structural and compositional heterogeneity of the coffee landscapes influences assemblages of butterflies. This phenomenon can be demonstrated across of beta diversity spatial patterns, expecting more turnovers among conserved, with intermediate disturbance, or highly disturbed elements. We applied sampling on the colombian coffee zone to test these assumptions; we used two approaches: four compositional units of 300 ha selected randomly (windows= Min, Car, Sil, Nis) and four structural units (vegetation type: forest, shade coffee, sun coffee and pastures), were placed six traps-fruits and carrion in each unit structural, butterflies were also captured with an entomological net. Were used series Hill's number called measures of true diversity (qD) and we applied multiplicative partitioning to obtain beta diversities into the windows and among the vegetation types. We registered 140 species, 92 genus, and 18 subfamilies of butterflies. We found using a minimum sample coverage (87%), that the window "Min" was more diverse (1.2-2 fold) than other windows, and the highest turnover was in "Car" with values between 58 and 76%. Forests and shade coffees made up a cluster with specialist species and equitable community, this cluster is more diverse than cluster made up of sun coffee and pasture which was dominated by few generalist species. However, in this transition the turnover of butterflies was increased. According to our results, we concluded that spatial patterns of turnover among assemblages of butterflies respond to the intermediate disturbance between conserve (forests) and more disturbed vegetation types (pastures), we also considered that the diversity of butterflies in the coffee landscape reflects the degree of intensity of the practices of crop management including forest preservation and implementation of shadow coffee. Therefore, the higher degree of heterogeneity showed the complementarity of resources in possible landscape structural configurations.

Keywords measure diversity, Heterogeneity, landscape cultural coffee

177 Body size and mass as determinants of territorial contests in a neotropical damselfly

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¹Instituto de Biologia, Universidade Federal de Uberlândia In Odonata, many previous researches have demonstrated that the reproductive success may depend on factors such as body size, physiological condition, wings symmetry and territorial defense. Differences in the individuals territorial capacity may have a direct influence in fitness, so, individuals with higher Resource Holding Potential (RHP) tend to win more contests and occupy the best reproductive sites. The objective of this study was discover if factors as body mass and size influence on the number and time of fights between males that conquest territories in the Neotropical damselfly *Tigriagrion aurantinigrum* (Zygoptera: Coenagrionidae). Altogether, 43 males and two females were marked and recaptured during 45 hours of observation. *T. aurantinigrum* males are territorial and 118 intraspecific agonistic interactions were observed. It was significantly evidenced that larger males have higher body mass, fight and patrol during longer periods of time. *T. aurantinigrum* males which were able to hold a territory and win contests had a significant body size difference when compared to the loser males. Time spent on fighting and patrolling may have a relation with male's reproductive success. During the patrolling they can find a potential female to mate. The contests between territorial males in Odonata are extremely exhausting and the ones which can fight longer may ensure their permanence in territory, which is a potential site for copulation. Once sexual selection may act in species where the intra-sexual competition is great and males have sexual size dimorphism (SSD), particular factors such as body mass and size can determine the reproductive success in textit *T. aurantinigrum* due to greater competition for females.”

Keywords Odonata sexual-selection competition

**178 Defense strategies of stingless bee
Nannotrigona testaceicornes in the city of
São José do Vale do Rio Preto – RJ**

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Stingless bees belonging to the group of eusocial bees, as its name suggests, have stunted sting, this fact in the evolutionary process forced them to develop new defense methodologies. Among the strategies used can be seen, aggressive behavior, association with others beings, construction location of the nest, release and disposal of substances in invading elements. The *Nannotrigona testaceicornes* has non-aggressive behavior that comes increase their viability in rational creation, for the pollination, and the extraction of honey, which has high therapeutic properties. The study was conducted in the city of São José do Vale do Rio Preto - RJ. Where beehives were analyzed, wild and rational it is noteworthy that in most wild swarms occur in the same nesting sites directly with human action. So it was listing the strategies used by *Nannotrigona testaceicornes* for his defense, thus enabling raising important information for the development of future research involving their management and ecological associations of this species.

Keywords Stingless bee, defense strategies, Meliponini

179 Insect galls on *Byrsonima crassifolia* in Camisão, Aquidauana in state of Mato Grosso do Sul (Brazil)

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Insect galls are plant abnormal developments caused by changes of the growth pattern of the plant tissues or organs, in response to the action of an insect. They are induced by Diptera, Hemiptera, Lepidoptera, Coleoptera, Thysanoptera and Hymenoptera. Cecidomyiidae are the fourth family of Diptera in species richness, being responsible for the majority of the galls in all major regions of the world. Data on about Brazilian galling fauna refer mainly to the Cecidomyiidae, however they are still scarce. *Byrsonima crassifolia* is a native plant from Brazil, commonly known as “murici”. It is widely distributed, occurring in all Brazilian regions, except for the South region. Fruits are used for the production of juices, jams, liqueurs and ice creams. The objective of this study is to record the fauna of Cecidomyiidae in *B. crassifolia*. Field works were carried in December, 2012 in Camisão, municipality of Aquidauana (state of Mato Grosso do Sul, Brazil), biome Cerrado. The host plant was inspected for insect galls and galled branches were collected and photographed. Branches of the host plant were pressed, dried and identified by Dr. Gracialda Ferreira (Universidade Federal Rural da Amazonia), and the exsiccate is deposited in the herbarium of this Institution. Part of the galls was dissected to obtain immature and part was placed individually in plastic pots for obtaining adults. The material was deposited in the Diptera collection of the Museu Nacional/UFRJ. Two gall morphotypes were found: 1) one-chambered, glabrous, green, elliptical, leaf gall; and 2) one-chambered, glabrous, brown, globoid stem gall. Galling larvae were obtained only from leaf galls. They were mounted on microscope slides for identification. Stem galls were already empty, when collected, so the inducer was not determined. The larvae obtained from leaf galls were identified as *Contarinia* sp. (Diptera, Cecidomyiidae). This is the first record of this genus in Mato Grosso do Sul (Brazil).

Keywords Cecidomyiidae, galls and Cerrado

180 Arthropods of a fragment of urban forest in Juiz de Fora, MG, Brazil

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The Atlantic Forest is one of the most threatened biomes in the world and more than 12% of the original area is still remaining, being mostly composed of variable length fragments, generally small. The Mata do Krambeck, located in the Juiz de Fora city, Minas Gerais State, is one of those fragments, which includes the called Sítio Malícia, acquired by the Universidade Federal de Juiz de Fora to install the UFJF Botanical Garden. Over the years the Mata do Krambeck represented an important regional wildlife animal refuge, and now researchers are working to register the various animal groups occurrence, being this work the first to investigate the arthropods occurrence in the UFJF Botanical Garden before it is open to the public. With that purpose, collections were made monthly for a year (2014/2015) with 30 pitfall traps installed along three 100m-transects and insect net was passed twice round trip. The collected animals were screened at the Arthropod Laboratory of the Department of Zoology UFJF and identified until family with dichotomous keys. It was collected 9017 arthropods belonging to Entognatha, Insecta, Chilopoda, Diplopoda, Arachnida and Malacostraca (Crustacea), classes. The group of the insects was the most representative. The most representative order was Hymenoptera specially family Formicidae and the less representative was Isopoda order with the registration of only one family, Phyllosciidae. Arthropods abundance at dry and wet season was compared through the Student t-test, before it has been verified data normality (Shapiro-Wilk: $W = 0.96196$, $p\text{-value} = 0.8347$) and homocedasticity (Bartlett: $= 2.73$, $df = 1$, $p = 0.09$). We find no significant difference of arthropods abundance between the dry and wet seasons (Student t-test: $t = 4.38$, $p = 0.06$). All collected and identified arthropods were deposited in the Scientific Collection of the Department of Zoology UFJF.

Keywords arthropods; Atlantic forest; Mata do Krambeck;

181 Determination of sugars and their relation with the attractiveness of food bait to fruit-feeding butterflies

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Keywords Fermentation; Lepidoptera; Method; Nymphalidae

182 Predation And Parasitism Eggs From *Anagasta kuehniella* (Zeller) (Lepidoptera: Pyralidae) In Corn Culture (*Zea mays*)

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The culture of corn has great importance worldwide as it is very harvested by humans as a food source. Because of this importance, you have the need to observe the diversity of insects on a plantation not only corn but in any other crop. The study aimed to assess the level of predation and parasitism corn in pedoamento stage in north of Minas Gerais. This study was conducted at the experimental farm of IFNMG-Campus Januária in mid-April 2015. It was released approximately 0,028g eggs parasitized by *Trichogramma pretiosum* Riley Hym.: (Trichogrammatidae), distributed 72 cartouches being distributed with approximately 60 eggs of *Anagasta kuehniella* an area of 94.24 m². The cards remained in the field for 36 hours, with three replications. After collecting the eggs were counted present on the card and eggs were parasitized and then made the average. In the area observed the presence of several Arthropods, including predators and parasitoids in their activities. Were seen high rates of predation on the cards in compared to parasitism, where predation was 15.37 times the parasitism, this occurred even with the release of parasitoids. About 44.552% of eggs laid in the area were preyed upon, and only 2.83% were parasitized.. This means that on average 15.448 eggs were found in each deposited cartouches in the field while only 2, 898 eggs were parasitized on average in each cartouche. Despite the release *T. pretiosum*, predation was manifested in greater numbers compared to riding. This result is due to the ecosystem of insects already be established at the stage where the culture was. Should perform further work to determine the population levels found that stage of the culture.

Keywords index; diversity; insects

183 Chrysomelidae (Coleoptera) at Itatiaia National Park, Brazil: sampling methods, temporal and altitudinal variation

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Chrysomelidae comprises ca. 35,000 species, being the second richest family of Coleoptera, and can be sampled by different methods of varying efficiencies. In general, chrysomelids are more abundant during the hot rainy season, and the relative importance of the subfamilies can vary in time and space. In this context, this study aims to compare two sampling methods and describe the temporal and altitudinal distribution of the family at Itatiaia National Park, State of Rio de Janeiro. Beetles were collected using entomological sweep nets in 2014 and Malaise traps in 2014. The total number of chrysomelids and the relative abundance of each subfamily was calculated for each of these methods at three altitudes: 1100 m, 1700 m and 2250 m. Malaise traps sampled more individuals at 1100 m and 1700 m, while sweep sampling at 2250 m. It is probable that the larger sampling effort of Malaise traps accounts for the difference in abundance at the lowest sites, but for sampling at the sparsely distributed vegetation of the highest altitude, sweep nets show better results. Also, a larger array of subfamilies was recorded through sweep netting, however, in both methods, Galerucinae was the most abundant subfamily, followed by Eumolpinae. Thus, the choice of the best method to sample Chrysomelidae depends on the objectives of the study and the characteristics of the habitat. Malaise traps provided monthly data to describe the temporal and altitudinal pattern of chrysomelids at seven altitudinal sites: 1100 m, 1320 m, 1500 m, 1700 m, 1900 m, 2100 m and 2250 m. Beetles were more abundant in the warmer and rainy season and less abundant during the colder dry season. Galerucinae showed the greatest abundance at 1690 m and Eumolpinae at 1320 m, indicating that, despite their similar biology, there is a possible differentiation in the spatial occurrence of these groups.

Keywords Elevation, distribution, Chrysomelidae

**184 Fluctuating asymmetry in the wings of the
tropical butterfly *Morpho helenor*
(Nymphallidae) in response to habitat
fragmentation**

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With the increase of fragmentation and environmental impacts, there is a growing demand for better and efficient biomonitoring tools. Fluctuating asymmetry (FA) represents minor and random differences in the left and right sides of bilaterally symmetrical traits and several recent studies have suggested the use of FA as a reliable indicator of stress levels, with increased FA under unfavorable conditions. We examined how the tropical butterfly *Morpho helenor* responded to stress caused by forest fragmentation by examining morphometry of its wings from individuals sampled along an edge-interior gradient. One hundred and seven butterflies were sampled and FA measurements were taken on the right and left wings, considering wing length, wing width and eyespot diameter. The FA index 1 was calculated as $FA = |Ri - Li|/N$, where Ri=character measurement on the right wing, Li=character measurement at the left wing and N= number of measurements taken. Butterflies were grouped into 5 sampling points along a 300m transect, where point 1 represents the edge (0m) and point 5 represents the interior (300m). *Morpho helenor* exhibited true patterns of fluctuating asymmetry, as demonstrated by the unsigned left minus right values that did not significantly deviate from the mean of zero. Wing width exhibited the highest values of FA (mean:1.45 mm, SE=0.09) and eyespot diameter was the most symmetric trait. Although there was high variation in wing morphometry of *Morpho helenor*, wing width was the only trait that differed significantly along the gradient ($F_{4,102}=2.6$, $P=0.038$), with lower values of FA at intermediate distance from the edge. There was no significant difference in FA of wing length and ocelli diameter along the edge-interior gradient (all $P>0.05$), indicating that wing traits respond differently to habitat fragmentation and changes in abiotic factors commonly associated to fragmentation might influence *Morpho helenor* behavior, feeding patterns and development.

Keywords Fluctuating asymmetry; Forest Fragmentation; Morpho helenor

185 Body size of bee pollinators of yellow passion fruit can be affected by landscape context?

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Native bees depends directly on the landscape context in crop areas, which use pollen and nectar of several plants as a food source. Habitat loss can affect bee populations through reduction of species diversity, density and body size of individuals. The species *Xylocopa frontalis* is an important pollinator of native and cultivated species. Among the diverse cultures pollinated by *Xylocopa* species, the yellow passion fruit (*Passiflora edulis* f. *flavicarpa*) stands out both for its economic importance and its dependence on cross-pollination in order to obtain fruits. Thus, the overall objective of the study was to verify if the landscape context present a significant effect on the body size of *X. frontalis* bees. The study was performed in three bee creation areas, which were classified according to the natural vegetation proportion as high quality, medium quality and low quality. For morphometric analysis we considered the body size of the individuals, which was determined by the intertegular distance. Based on the results, the average intertegular distance of *X. frontalis* populations presented a significant difference from areas with different landscape contexts. The highest mean was measured in individuals from the area with a greater proportion of natural vegetation and the lowest mean was observed in individuals from the area with lower natural vegetation proportion. These results suggest a possible effect of the landscape context in the body size of individuals, which corroborates with the need for conservation of natural vegetation surrounding crops areas as a tool for maintaining native pollinators of pollinators.

Keywords habitat loss; morphometry; brazilian savanna

186 Stable isotopes of C and N as indicators of Neotropical cricket diet (Orthoptera: Grylloidea)

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Although crickets are held as omnivorous, little is known on specific field diet and on differences among coexisting species. Stable isotope values are used to indicate nutrient assimilation during an organism's lifetime, but varies also with the organism's metabolism. Here we aimed to disentangle the effects of diet from species-specific characters, on isotope values. We compared 3 cricket species (*Mellopsis doucasae*, *Phoremia rolfsi* and *Phoremia* sp.) maintained with controlled laboratory diet (fish food), to individuals of the same species fed in the field. We expected that, if species-specific differences prevailed, isotope values would differ among species, irrespective of their diet, while if diet prevailed, individuals raised with similar diets should present similar isotopic values. Moreover, we expected that isotopic values of crickets under controlled diet should match the diet's isotopic values, with 3% enrichment for $\delta^{15}\text{N}$, and 1% for $\delta^{13}\text{C}$. For controlled diet, we collected crickets between the 1st and 2nd instar, kept them up to 168 days or until adult molt. We analyzed $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ values for 5 to 20 individuals of each diet/species ($n = 96$), and 3 lab food samples. Lab food had values of 4.35% $\delta^{15}\text{N}$ and -23.44% $\delta^{13}\text{C}$; lab-raised crickets: 5 to 8% $\delta^{15}\text{N}$ and -24 to -22% $\delta^{13}\text{C}$; field-fed crickets: 2 to 4% $\delta^{15}\text{N}$ and -28 to -26% $\delta^{13}\text{C}$. For both $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ values, there was an interaction of species identity with diet ($F_{2,95}=22,32$; $P<0.0001$; $F_{2,95}=9.01$; $P=0.0003$). Both $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ values showed greater differences between field and lab-raised crickets, than among species within same diet, with the unique exception of $\delta^{15}\text{N}$ in *M. doucasae*. Our results showed that both, diet and species-specific characters affect isotopic values, but showed also that diet has greater effect. Therefore, stable isotope values are good indicators of crickets' diet, and are a promising technique for investigating cricket feeding habits.

Keywords Forest litter; food niche; isotopic composition

187 Parasitism of *Cotesia* sp. (Hymenoptera, Braconidae) on *Ascia monuste orseis* caterpillars (Lepidoptera, Pieridae)

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The leafworm kale, *Ascia monuste orseis* (Godart, 1819) (Lepidoptera: Pieridae), is a common pest of kale (*Brassica oleracea* L. var. *acephala*), whose caterpillars go through five instars and actively feed leading to a severe defoliation. The five instars can be parasitized by *Cotesia* sp. (Hymenoptera: Braconidae), in which females can insert multiple eggs within a caterpillar that continues its development. Seeking to observe the occurrence of parasitism by *Cotesia* sp. in organic cultivation three caterpillars of *A. monuste orseis* from 4th and 5th instar were collected on 11 and 16.07.2014 respectively. In laboratory, the caterpillars were kept individually in pots sealed with voile and fed using kale leaves. After the larvae emergence, pupation and the adult parasitoid emergence, each caterpillar was observed regarding to the number of pupae and adults of *Cotesia* sp., thus comparing the number of: pupae undeveloped, emerged adults and adults not emerged between the two instars of the host. For this, generalized linear models (GLM) were built using the R program. For caterpillars from the 4th instar was observed 84 pupae (mean 27.67/caterpillar) in which 69 adults parasitoids (mean 23/caterpillar) emerged from them. For the 5th instar caterpillars was obtained a total of 140 pupae (mean 46.67/caterpillar) in which 134 adult parasitoids (mean 44.67/caterpillar) emerged from them. There was no significant difference between the 4th and 5th instar regarding to the number of pupae that have not developed ($F=1.864$, $p=0.243$) and the number of non emerged adults ($F=0.186$, $p=0.688$). However, for the number of emerged adults parasitoids, the 5th instar presented a number greater than the 4th instar ($F=36.111$, $p=0.003$). This result confirms the idea that the first female individuals of *Cotesia* oviposit in smaller numbers, thus increasing the number of eggs in subsequent attacks, and also the parasitism may have different patterns according to the parasitized instar.

Keywords leafworm kale; parasitism; kale

188 Characterization of insect galls in two species of *Copaifera* (Leguminosae)

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¹Department of Entomology, Federal University of Western Bahia Entomogenous galls are modifications on plant tissues or organ of plants, as a result of an action of pathogenic organisms and it is a very specific relationship between insects and host plant. The aim of this study was to investigate the insect fauna in galls of two species of *Copaifera*. This research was carried out in Serra da Bandeira, in a region of Cerrado biome, located in Barreiras, in Western Bahia. Samples of *Copaifera luetzelburgii* Delf. and *Copaifera depilis* Dwyer were collected from January to July in 2013. As result, it was found 10-11 morphotypes of entomogenous galls among these two host species. Four of them were unique to one of the plant species. In addition, differences related to colour pattern was observed during the development of galls. The leaves were the most affected organs in both species (72,72%). As associated fauna, were observed representatives of Cecidomyiidae, which are inductors. Moreover, it was found larvae and pupae of hymenoptera, which probably are parasitoids, and successors species represented by mites.

Keywords Entomogenous galls; Cerrado; *Copaifera*

189 Occurrence of *Schismatodiplosis lantanae* (Diptera, Cecidomyiidae) in the Parque Nacional do Itatiaia

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¹UFRJ/Museu Nacional, Depto Entomologia, Rio de Janeiro, RJ *Schismatodiplosis* (Diptera: Cecidomyiidae) comprises a single species: *S. lantanae* described based on material from Cabo Frio (RJ) and Tubarão (SC). This gall midge induces leaf galls in *Lantana camara*, *L. urticifolia* and *L. hispida* (Verbenaceae), these last two do not occur in Brazil. The first is a native plant of tropical and subtropical Americas, and one of the ten most noxious weeds in the world. The galler is Neotropical and can be found in Mexico, Guadeloupe, Trinidad, and Brazil. Although its host plant has been recorded in almost all Brazilian states, *S. lantanae* occur in few states - PA, RO, PE, MG, RJ and SC. In RJ, the galler has been recorded in Valença, Mangaratiba, Maricá, Cabo Frio, Casimiro de Abreu, and Rio das Ostras. Few galling species have been recorded in the Parque Nacional do Itatiaia (PNI). The PNI is situated in the Southeast region of Brazil (SP, RJ, and MG). It is located in the Atlantic Forest and has two physiognomies (related to the altitude gradient): altitude fields and ombrophilous forest. Our objective is to contribute to the knowledge of galler fauna of the PNI. Field works were monthly done (II/2014-III/2015). 21 paths were investigated and the altitude of each one was obtained using GPS. The plant was identified by the authors. Galls were photographed and some samples were collected, dried and deposited in the collection of Museu Nacional/UFRJ (MNRJ) as voucher material. Other samples were dissected to obtain the galling larva and pupa. The specimens were mounted on microscope slides and identified based on gall and immature morphology. They were also deposited in the MNRJ. Globose galls on leaves of *L. camara* were found in the only two paths - Ecoarte (alt. 739m.) and Visitors Center (alt. 877m), both situated in low areas. The plant is also restricted to the lowest altitudes of the PNI and it is represented by few individuals. The galler was identified as *S. lantanae* and this species is recorded for the first time in the PNI.

Keywords Gall; plant-insect interaction; new record

190 Can buckwheat flowers complement an aphid-based diet fed to coccinellids?

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¹Instituto de Ciências Agrárias, Universidade Federal de Viçosa, Campus Florestal Conservation of natural enemies is an important strategy to promote biological control. Conservation may be attained, at least in part, by altering the agroecosystem landscape to provide alternative food for natural enemies. For example, the adoption of intercropping or planting stripes of flowering species along the borders of the main crop can provide natural enemies with shelter and alternative food such as nectar and pollen. On the other hand, natural enemies seldom encounter alternative food in monoculture systems, which may impair their establishment and pest biological control. In addition, the lack of alternative food for female predators or parasitoids may impact indirectly the growth and behavior of the next generation of natural enemies via maternal effect. Thus this study investigated how flowers of buckwheat *Fagopyrum esculentum* Moench can complement an aphid-based diet fed to adult female coccinellids *Hippodamia convergens* Guérin-Méneville. Each adult female was daily subjected to one of the four treatments: I) 10 flowers of buckwheat, II) 30-40 aphids, III) 10 aphids, and IV) 10 aphids + 10 flowers of buckwheat. Each treatment had 12 replicates which were represented by a plastic arena (7 x 10 cm, H X D) containing a female coccinellid. The parameters assessed were: adult female longevity, fecundity, F1 survivorship. In addition, the population growth was estimated for each treatment using the Leslie matrix population models. The results show that buckwheat flowers alone may sustain the survivorship of female coccinellids for about a week. This could be important in times of prey scarcity in the field. Nonetheless, the highest survivorship and fecundity were achieved only when female coccinellids had access to aphids.

Keywords Conservation biological control, Coccinellidae, Maternal effect

191 Sexual size dimorphism and sexual selection in the firefly *Pyrogaster angustatus* (Coleoptera: Lampyridae)

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Sexual size dimorphism (SSD) is defined as differences in morphology and body size between the sexes of a species, and is a widespread phenomenon in various groups of organisms. These differences may be due to natural and sexual selection acting differently in the growth of structures, producing characters with differential scaling rate between the sexes. Sexual dimorphism can be either isometric or allometric (differences in slope or intercept in regression analyses), the latter generally bearing evolutionary signatures of sexual selection. Firefly species of the mating system II, as the income breeder *P. angustatus*, use mainly light patterns for intraspecific recognition and reproduction. The sexes behave differently in reproductive events, as males seek sedentary signalling females using luminous displays. Furthermore, females of the Photurinae species are famous for their aggressive mimicry, barely recorded for males. However, there is no comprehensive study on morphometric differences between the sexes for any photurine firefly. In order to track sexual dimorphism in this model system, we collected 35 adult males and females (total=70) of *P. angustatus* between January and February 2015 at Parque Nacional da Serra dos Órgãos, Rio de Janeiro, Brazil, kept them in 92% ethanol, and measured 16 morphological characters. Pronotum width was deemed as the best surrogate for body size in Principal Component Analysis (factor load: 0.936), and so used as the predictor variable in subsequent analyses of Reduced Major Axis regression. We found a SSD significantly biased to females. However, even with smaller body size, the eyes and lanterns of males were significantly larger than those of females. We observed that structures involved in reproduction, to say, eyes and lanterns, had significantly different allometric patterns between the sexes. Taken together, SSD and allometry, suggest selection to be acting in a sex-specific way, as predicted by theory.

Keywords allometry, reduced major axis, morphometry

192 Positive indirect effects of community management of river beaches on invertebrate assemblages in west-central Amazonia

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Keywords community-based management, fluvial beach, sandy beach arthropods

193 Trophic preferences in dung beetles communities in the Atlantic Forest of Parque Estadual do Rio Doce (PERD), Brazil

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¹Instituto de Ecologia e Sistemática, Cuba; ²Setor Ecologia, Depart. de Biologia, Universidade Federal de Lavras Dung beetles are considered polyphagous insects. However, some studies have found alimentary preferences among scarabaeinae's species, although these vary by geographic region studied. This work aims to verify whether there is food preference of communities of dung beetles in the subfamily Scarabeinae; for it was conducted a study in the Parque Estadual do Rio Doce (PERD), which is the largest reserve of the biome Brazilian Atlantic Forest or Mata Atlântica, in the state of Minas Gerais, Brazil. The field work was made at the end of the dry period in October, 2014. It was conducted a field experiment in blocks, with a total of 15 blocks. Each block consisted of four pitfall traps type, three of them baited with feces 20g of native wild animals typical of the region and the fourth without bait, as control. The baits used were: carnivore's feces (jaguar-*Panthera onca*), omnivorous' feces (peccary-*Tayassu peccary*) and herbivores feces (deer-*Mazama* sp.). We collected a total of 496 individuals and 28 species of beetles in the subfamily Scarabaeinae. Were significant differences in the abundance and species richness between the treatments (for Abundance: $n = 15$, $F = 36.73$, $p < 0.001$; for Wealth: $n = 15$, $F = 37.97$, $p < 0.001$), and the carnivore's feces had the greater attractiveness. The NMDS and ANOSIM conducted also showed that community composition differ among the studied treatments, especially in carnivore's feces. The dominant species in this treatment were two species of the gender *Canthon*, *C. sulcatus* and *C. staigi* with telecopridios habits, which find nitrogen-rich resources to compensate the restricted amount of feed resource they use.

Keywords dung beetles, trophic preferences, Atlantic Forest

194 Entomofauna caught with pitfall-traps in a fragment of urban forest in Juiz de Fora, MG, Brazil

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¹Depart. de Zoologia, Universidade Federal de Juiz de Fora The Botanical Garden of Federal University of Juiz de Fora is placed on Mata do Krambeck, which is a tropical urban environmental reserve. This area presents different vegetation types in medium and advanced stages of regeneration of Atlantic Forest, which is one of the most threatened biomes in the world, being a priority area for biodiversity conservation in Minas Gerais State. Before the Botanical Garden is open to public visit, we aimed to know its insects abundance and diversity. To do so, samples were collected monthly during a year with 10 pitfall traps without bait distributed in three different tracks, placed 10 meters apart from each other, totaling 30 traps kept in field for 48 hours. Specimens collected were packed in the Arthropod Laboratory of UFJF, screened and identified to the family level, and then deposited in the Entomological Collection of UFJF. Insect abundance was compared between dry and wet seasons through the Student t-test. 7154 specimens were collected, from 15 orders and 87 families. The most abundant order was Hymenoptera (57,8%), with 4139 specimens, followed by Diptera (1125), Orthoptera (990) e Coleoptera (519). We find no significant difference of insect abundance between the dry and wet seasons. These findings contribute as basis for more extensive research in the future about the different groups found and about the study area itself.

Keywords Atlantic forest; Mata do Krambeck

195 Population dynamics of brazilian leaf beetles in Bt Maize and Conventional

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Brazilian leaf beetles are insects that feed on roots in the juvenile stage (root worm) and leaves in adult stage. These insects feed on various crops including maize, the main damage is in the adventitious roots, which when consumed lose sustainability and make the corn bend, calling him kneeling corn. This project evaluated the amount of brazilian leaf beetles adults in an area with conventional corn (PR 1150) and an area with GM corn (LG 6304 VTPro®). project was carried out at Fazenda Bom Sucesso, Gleba Três Irmãos, located in Palmeiras de Goiás - GO during the months from March to June 2015. The methodology used to sample the caterpillars and natural enemies was the Cruz et al (2008), which were evaluated visually and photographically pests in 15 sampling points in each of the systems, the conventional corn and GM corn. The adult brazilian leaf beetles accompanied throughout the crop cycle in both cultivars, but in the area with conventional corn during the reproductive phase the insect population was average of 5.53 adults per point while in cultivating GM corn was average 2.4 adult per point. In the physiological maturity stage, the cultivar of conventional corn haven an average of 0.66 adults per point while in the GM corn don't have no brazilian leaf beetles in none point during the last three weeks of ripening corn. These results demonstrate the efficiency of use of the refuge area for biological conservation of individuals susceptible to Bt proteins from transgenic cultivar. It was also observed more corn "kneeling" in the conventional corn than GM corn.

Keywords Brazilian leaf beetles; Maize; Sampling

196 Flannel Board In Science Teaching: A Strategy For Dissemination Of Parasitoids For Biological Control

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The flannel board is a material used in initial classes to improve the narrative. This teaching tool is formed by a screen or board that is usually covered with felt or flannel, where the dolls that will make the story you want to tell will be set. In this work, the flannel board was used in a class of 6th grade of a private elementary school in Santa Teresa-ES, with the intention of share knowledge on agroecology and use of parasitoids insects as alternative to the use of pesticides. Before starting the story, it was placed on blackboard keywords to be discussed with the students: pesticides, insects, biological control, parasitoids and wasps. Then, the students exposed their knowledge related to each keyword, as well as asked questions about their doubts about the theme. After this, the flannel board was exposed and the students created a story according to what they have just learned. Among the narrative they used as characters: fish, river, lakes, pesticides, trees, planting crops, insect eggs and parasitoids wasp. Students set up two environment, one representing conventional agriculture and another one representing an agroecological farming. In agroecological farming they used the parasitoid wasp "parasitizing" the plague eggs and in the conventional agriculture they used pesticides as typical. During the activity, students put the fish close to the agroecological system. They justified it based on the pollution caused by pesticides in planting crops, which leads to mortality of fish. The development of this activity allowed the significant acquisition of knowledge and the narrative constructed by the students demonstrated the clarity of understanding concepts and ideas, which is the main goal of this work.

Keywords Ensino, controle biológico, vespas.

197 Leaf-cutting ants aren't always villains: teaching children the ecological role of these insects

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Leaf-cutting ants are insects that have the habit to cut and transport parts of plants to the interior of their colonies. These fragments are used to create a fungus garden that feeds the whole colony. The popular name “leaf-cutting ants” comprises the genus *Atta* and *Acromyrmex*. Due to the cutting behavior, they have great economic importance, causing damage in many agriculture systems and devastating crops such as sugarcane and eucalyptus. Although these ants are widely known only by their harmful role, they can perform a positive role in the environment, as revolving, aerating and draining the soil. Considering the popular lack of knowledge of the ecological role of leaf-cutting ants in the environment, we aim to develop a pedagogical practice in order to present this theme to students of a public school in the municipality of Viçosa (MG). Moreover, we showed curious peculiarities of these insects, such as the colony organization, feeding behavior and nest architecture. The study was conducted in a class of 35 students attending the eighth year of basic education at the Arthur Bernardes College. The activity started with the objectives’ presentation and then a pre-test was applied to analyze the students’ prior knowledge. Subsequently, we conceptualize social insects and presented all the proposed theoretical content. Then, an entomological collection containing specimens of leaf-cutting ants was shown to the students in addition to pictures and a video technology resource. The results were very satisfactory since the students’ interest was clear during the class. We concluded that when is possible the contact of the students with the object of study, they absorbed the scientific knowledge with quite excitement. Thus, science teaching classes that adopt methodologies grounded in the direct contact of the students with the biological object should be performed when possible.

Keywords leaf-cutting ants, pedagogical practice, technological resources

198 Construction and application of a paradidactic material for teaching pollination

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This paradidactic support material was developed with the purpose of aiding teachers and inspired in the movie "Silence of the Bees" by Doug Shultz. In it, various educational exercises for elementary and secondary education are shown to the students, in order to promote better assimilation of content through games, texts and a folder. The material was put together so that teachers could teach their classes with different strategies, through activities about this topic, since pollination is so much more than what's depicted in didactic books. The folder's theme is the anthropogenic actions that harm the pollination process and a few solutions on how to ease the problem are shown. Several subjects are presented in this material: pollination mechanisms, plant morphology and their attraction mechanisms, pollinators, insect morphology and where they are mainly found, insect-plant interaction, human kind nutritional dependence and the use of genetics, always emphasizing the causes of disappearance of the pollinators, most of the times human related. This work was applied in two schools with little didactic resources, high level of poverty and violence, and little information. In total there were around 50 students from 7th grade and EJA. In a first stage, a debate about pollination and the disappearance of pollinators was established and then a questionnaire was applied to measure the level of knowledge about this subject. In a second stage, the subject was introduced in a more dynamic and structured way, mainly using the proposed material, with the objective of explaining the importance of pollination and the current environmental problems. In a third stage, another debate was promoted and one of the exercises of the didactic material was given to the students, followed by another questionnaire (equal to the first) to measure the degree of understanding of the students. The analysis of the results shows that the proposed material is extremely helpful since research on didactic books revealed a deficient approach to the subjects, which are commonly explained in a short and mechanical way, with very few of them explaining the importance of pollinators and their disappearance.

Keywords Pollinators; Pollination education; Science education

199 Comics coleopera: beetles as characters in Marvel and DC universes

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Comic books are magazines that use illustrations to tell stories. Composing the so-called Ninth Art, comics represent a well-disseminated mean of communication within the public. The composition of a comic book character often has interesting real-life inspiration. Beetles (order Coleoptera) get great highlight in the comic world, especially due to its great morphologic diversity. Spare comics and websites were used to gather information about the characters. They have been classified according to publisher, social role (hero/villain), biological constitution (presence or absence of Coleoptera features). Forty-four characters were accounted with morphological characteristics resembling beetles, being 31 from DC and 12 from Marvel. As for taxonomical classification, the characters have been identified in six families: Scarabaeidae, Lucanidae, Lampyridae, Carabidae, Coccinellidae, and Dytiscidae. Scarabaeidae was the most abundant one, being represented by 50,56% of all individuals. This could be explained by the story of the Blue Beetle character (DC), which involves various derivations of the same origin story (an alien artifact named The Scarab). Despite that, the significant majority of DC characters is of villainous nature. On the other hand, Marvel presents greater balance between villains and heroes. There were considerable statistical difference between Marvel and DC's number of characters, but no statistical difference was found between those of heroic and villainous nature. This is surprising in some way, since insects tend to be considered harmful to the public. Most characters presented predominantly human biological constitution, though having at least one beetle feature. The possible reason to coleopterans being more common in comic books is their cultural and historical interactions with humans.

Keywords Coleoptera, Pop-Culture, Cultural Zoology

200 Environmental Education and Conservation: learning entomology with live insect observation and manipulation

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Historically, society has seen nature as an endless source of resources to supply humans' necessities, a vision that has provoked changes to the natural landscape through exploration and ecosystem degradation. Environmental education aims to turn human activities sustainable through educational activities to inform the population about environmental issues, by understanding biological and ecological processes. The Laboratory of Terrestrial Animal Ecology (UFSC) has an extension project, Insect Diversity in the Corrego Grande Ecological Park: Environmental Education and Conservation, that through short lectures together with observation and manipulation of live insects raised in captivity, sought to promote the non-formal knowledge of ecological processes and demystify prejudices about insects, demonstrating its importance in ecosystems and relating their morphoanatomy characteristics to its ecological functions. In an urban park in the city of Florianopolis, SC, Brazil, two insectariums are maintained the "Borboletário Woody Benson" (Woody Benson Butterfly Garden) and the "Jardim das borboletas" (Garden of Butterflies), which provide, respectively, the observation and manipulation of insects in general (beetles, mantis, bugs, etc.), fruit-feeding butterflies, and nectar-feeding butterflies. In 2014, the project received 4,028 park goers, of which 2,568 were students (64% of the visitors), 319 teachers (8%), and 1,141 people from the general public (28%). Among the students, 44% of visitors were pre-school students, 43% were from elementary school, 6% from the middle school, 6% from high school, and 1% from higher education. The insects that better adapted to life in captivity and were used all year long during lectures were: beetles from the family Passalidae and Chrysomelidae, and an assortment of fruit-feeding butterflies, where *Caligo brasiliensis* was the most successful in terms of reproduction.

Keywords Environmental Education, Conservation, Ecology

201 Did you understand or should I draw it? Illustrative theme note of some classes of phylum Arthropoda

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Various assumptions explain why men have started drawing on the walls, be it to register a big hunt, to mark the passage of time or even to count the day to day of their lives. What to do when words fail to reach our target audience? The best way to make yourself understood is by illustration. Through schematic drawings, are represented the main classes of the Phylum Arthropoda: Insecta, Crustacea, Arachnida and Chilopoda. For the making of the illustrations graphite mines were used, pens and smudge and were made in the Entomology and Nematology Laboratory of UENP / CLM, Bandeirantes - PR, white A4 paper, in the Canson brand. The insects have their body divided into three regions: head, thorax and abdomen. The head feature a pair of compound eyes, antennae and jaws. The chest, three pairs of legs and to two pairs of wings, this being a unique feature. Crustaceans have body divided into cephalothorax and abdomen; they have a cluster of protective body plates; in the cephalothorax there are two antenna pairs (unique feature) and a variable number of pairs of legs, usually more than four. In the arachnids the body is divided into cephalothorax and abdomen, but are devoid of antennae, they have eyes (none up to eight), a characteristic that defines the main families of spiders, a pair of chelicera and four pairs of legs. Centipedes have elongated and flat body, divided into two regions: head and torso; the number of segments of the torso is variable, but in each there is a pair of legs. The head features a pair of antennae, compound eyes, jaws and Tree forcipules, characteristic that identifies centipedes. Thus, through the illustrations, we can see how different these four classes of Phylum Arthropoda are. When just words are not enough for understanding, a scheme or a detailed drawing are needed to absorb all of the information.

Keywords Illustration; Invertebrates; Education.

202 The application of didactic kits of *Aedes aegypti* as a constructivist method of teaching in schools in Campo Grande - MS

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This study's object is to discuss about the utilization of didactic kits of *Aedes aegypti* for cognitive learning and contextualization in schools. Based on the limitations found on dengue's content in the text book called 'Ciências – os seres vivos – 7º ano', by Carlos Barros and Wilson Paulino - distributed according to PNL D (2008) to the city of Campo Grande, in Mato Grosso do Sul - this research used the hypothetical-deductive method, according to the parameters of qualitative and experimental research; also performing bibliography's review in books and literature about Science Education, from 2008 to 2014. In this context, Campo Grande has showed biogeography's requirements to provide the favorable habitat for the development of the transmissor mosquito, becoming ordinary this disease epidemics in the county. Considering that student's scientific contact has been limited to the text books, this became an epistemological obstacle to the knowledge construction and to the capacity of an anthropological's intervention from the student to the society, for dengue's prevention. Intending to provide for the student both physical and visual contact with the theme, it was suggested the application of the didactic kits which containing specimens of larval, pupae and adults stages, as well as the eggs in state of dormancy of the *Aedes aegypti*; also discussing informations about mosquito's ecology and habitat. The comprehension is that by utilizing others teaching-learning methods, baseds on student's contextualization, approaching science and quotidian's knowledge, it will favour the student's comprehension of scientific information. Thus, this paper looks forward to demonstrate the possibilities about teaching the sense of citizenship, besides the ecological, social e environmental perceptions, to the students of elementary school; putting them as direct agents in prevent and efficient behavior, which would guarantee materializing the school content to their reality.

Keywords didactic model, entomology, dengue.

203 Didactic games on myrmecology teaching

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Science teaching lies in scholar curriculum, including subjects about animals, as the insects. In Technical, Agricultural and Environmental Schools, insect studying is directed to management and control approaches, mostly about ants. The study about ants – Myrmecology – is a subarea of Entomology. Considering that formal teaching methods usually cannot stimulate enthusiasm, interest and curiosity in students, we have analyzed the efficiency of a treasure hunting game as a tool for myrmecology teaching. This research was made in four third grade high school classes, integrated to Technical Professionalizing courses of IFES (Federal Institute of Espírito Santo), one of which is linked to an environmental course, and three others to an agriculture course. First of all, we did a conversation circle about ant ecology and biology, when students could ask questions and share experiences. The second moment was the interaction on the “Myrmecological Treasure Hunting”. This game was about unveiling riddles that would guide to the next spot where questions about ant biology should be answered. All those spots were in separated places in the school. If a team missed a question, they should wait for the explanation about the right answer, increasing their time. The winner team would be that who did the whole circuit on the shorter time. We realized that, during the whole conversation, students interacted, questioned and showed a lot of interest, because they could share opinions and experiences. In the treasure hunting, teams showed propriety in the question answering, indicating the learned subject. After these activities, students reported: “activities like these, that take us of the classroom, are pretty much pleasurable than those activities inside the classroom”. Given this, we consider that treasure hunting has a great potential as alternative teaching tool and it is able to contribute to a good learning process.

Keywords Treasure Hunting, Ant, insect

204 Learn to preserve: the use of research in favor of conservation in the Vale do Aço – MG

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Many results of academic research on the diversity of insect fauna of a particular area are not passed on to the local communities. This behavior removes the communities the opportunity to take possession of knowledge about biological diversity around them. This behavior also contributes to the perpetuation of exploitation or neglect with the wealth of fauna and flora, which could be enjoyed and even used in a sustainable and responsible way. The students and teachers of Biological Sciences of Unileste have the objective of promoting the exchange of experiences between communities in rural and urban areas studied over the last few years. This was done by the use of a collection of representatives of the entomological fauna region, collected by several monograph and research financed companies and agencies. The specimens were classified to the lowest taxon, then stowed in boxes to be used in trade fairs of science in schools in the region. Each box was prepared in such a way as to show: the diversity of local insect, the insect pollinators and predators of pests, insects of medical and veterinary importance, and insect indicators of environmental quality. This material was presented at schools and various regional events to publicize the importance of the preservation of species and habitats, as well as the services that each ecosystem can provide. Two field guides were created for the species that exist in a conservation unit of the region, one for the identification of frugivorous butterflies and another for dragonflies. More than 5,000 people, including students of public and private networks as well as representatives of various local communities understood and interacted with the material prepared. The results show that this community work has awakened in undergraduate students the motivation to disclose their results of research in the communities, as well as, the awakening of the interest in the population to know about the local entomological fauna.

Keywords Services of the ecosystem; Dissemination of Science; entomofauna

205 Bugs in games: entomological analysis and didactic application

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Video games, apart from serving as an informational tool, greatly influences its users, serving as a mechanism in the learning process. Many game characters are inspired by various animals and, among them, insects. They are the most dominant animals on Earth, with stunning richness and abundance of species, greatly thriving in many environments, especially due to its adaptations. This study aimed to analyze insect-inspired characters from different platforms, rating its respective real life accuracy (RLA) in comparison to Insecta. A hundred characters, from the three most famous console companies in the gaming universe (Nintendo, Sony and Microsoft) were found. Their exclusive and in common franchises were classified according to their inspiring insect's order and RLA, which considered morphological and ecological characteristics. Then, it was applied a detrended correspondence analysis for the groups and analysis of variance for the RLA. Fourteen orders were found, with Hymenoptera (34%), being the most representative one, followed by Coleoptera (21%) and Lepidoptera (10%). Nintendo's exclusive games had the greatest variety with 45% overall, being well related with the Hymenoptera, but a mediocre RLA (48.78%). Due to having older franchises, in 8-bit, it's most likely that, the texture restricts its RLA. PlayStation's exclusives (17%), did not show strong correlation with any order, nor a significant RLA difference (44.41%). Possibly because it started with a newer technology. Xbox's exclusives, as a recent platform, represents only 2% of total characters, having a strong relations with Coleoptera and Orthoptera, and no RLA difference (41.55%). Non-exclusives games, however, had a better RLA and significant correlations with more orders, due to its more recent generations. Hence, they have more credible insect-inspired characters, which enhances public access and turn games into, not only a source of entertainment, but also a tool for entomology teaching.

Keywords Insects; Consoles; Ludic Learning

206 Beetles associated with decomposing pig carcasses in southern Brazil: abundance, richness and relation with abiotic factors

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Beetles are recognized for providing important entomological evidence in the medico-legal field, particularly in the later stages of decomposition. The aim of this study was to determine the influence of abiotic factors in the composition of beetles colonizing carcasses in Southern Brazil. Samples were collected in January/2014 (hot and dry weather) and in September, 2014 (cold and wet weather), in Porto Alegre, State of Rio Grande do Sul, Brazil, in a transition rural-urban area. Three domestic pigs were used, slaughtered by gun shot and immediately placed in cages with wire mesh. For sampling coleopterofauna, lethal bottles, manual collection and pitfall traps were used, daily at noon. A total of 402 individuals belonging to 66 species were collected, and the highest amount of specimens (86.5%) was recorded in the pitfall trap. The number and diversity of beetles was significantly higher in September ($19.3^{\circ}\text{C}\pm 1.8$; RH $78.47\%\pm 5.97$) when we observed 78% of the total sampled and 51 species. In this period predominated *Dermestes maculatus* (Dermestidae), *Euspilotus sp.* (Histeridae) and *Oxelytrum discicolle* (Silphidae), representing respectively 30.9%, 19.1% and 9.9% of individuals. In January ($31.3^{\circ}\text{C}\pm 4.4$; RH $55.31\%\pm 14.76$) 22 species were collected, and the predominant taxa were *Chaetocnema sp.* (Chrysomelidae) with 32.9% and *Necrobia rufipes* (Cleridae) with 19.3% of the specimens collected in this period. Therefore, the results show that the colonization of the carcass by the beetles was strongly influenced by abiotic factors. The composition of species observed here differs from surveys conducted in other parts of the country. These results point to the importance of regional entomological forensic studies.

Keywords Coleoptera; environmental conditions; forensic entomology

207 Foraging of *Polybia scutellaris* (White 1984), in carcasses of *Rattus norvegicus* (Berkenhout 1769)

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The despite the recent growth of forensic entomology in the country, there are few studies on the foraging social wasps in animal carcasses. Thus, the aim of this study was to report the fly predation in *Rattus norvegicus* carcasses by social wasp *Polybia scutellaris*. This wasp have a generalist and opportunistic foraging, which comprising carbohydrates and proteins. *P. scutellaris* can obtain these substances through predation of the Diptera family Tabanidae, Syrphidae, Muscidae and Anthomyiidae. The observations were made in August 2014 in the municipality of Itaara, Rio Grande do Sul (29°36'56.1"S; 53°48'27.6" W). For that, were used Shannon traps with carcasses of *Rattus norvegicus*. *Polybia scutellaris* attacked only flies of Sarcophagidae's family during the winter in traps placed in forest area. *P. scutellaris* presented four stages during the foraging of Diptera: I – capture of the prey using jaws; II- decapitation of the prey; III – removal the prey's wings and IV-removal and transport of the prey's abdomen to the colony. In this research, the foraging's pattern is similar to the behavior of other species of social wasps previously studied: *Polybia ignobilis*. In this article, social wasps behave as opportunistic predators. They forage the prey trapped in traps, which are attracted by carcasses of animals. In this study, we realize the importance of understanding the issues ecological of the social wasps in the community of necrophagous, since the presence the wasps foraging insects with forensic importance, mainly, Calliphoridae and Sarcophagidae, could influence the amount and diversity of these families' species and, as a result, underestimate the postmortem interval.

Keywords Wasps, entomology forensic, fly

208 Sarcophagidae (Insecta: Diptera) associated with a decomposing *Sus scrofa* carcass in Várzea Forest area on Eastern Amazonia

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The Sarcophagidae insects family, commonly inhabit the decaying organic matter, are considered important to support criminal investigations, being the first to find, and colonizing the bodies in rotting process, to be used to estimate the Post-Mortem Interval (PMI). This study aimed to know the richness, abundance and succession of species of sarcophagidae with forensic importance in a Várzea Forest area. The experiment was conducted in the District of Abacate da Pedreira, in the rainy season, using as experimental model a pig carcass with 12 kg. Adults were daily collected, using insect net, watching their occurrence at each stage of decomposition, putting them in plastic recipients, and taken to the Arthropoda Laboratory for identification procedures. The specimens were collected at the phases of: gas-staining, *Oxysarcodexia amorosa* (1) and female (72); coliquativa in phase, *Oxysarcodexia amorosa* (11), *Oxysarcodexia intona* (14), *Sarcodexia lambenz* (1), *Peckia crysostoma* (7), *Helicobia morionella* (1), *Oxysarcodexia paulistanensis* (4), *Oxysarcodexia parva* (1), *Oxysarcodexia fluminensis* (1), *Oxysarcodexia riograndensis* (3), *Oxysarcodexia avuncula* (1) and female (338); in skeletonization phase, , *Peckia crysostoma* (8), *Peckia anguilla* (1), *Peckia resona* (1), *Peckia intermutans* (2), *Oxysarcodexia intona* (24) and female (217). The females were not identified to species. More samples are necessary in order to obtain a larger number of species. The list of species generated will contribute to forming a larger database which will help in the solutions of cases found by the Technical and Scientific Police.

Keywords Post-Mortem Interval, Arthropoda, database

209 Calliphoridae (Diptera) associated with the carcasses of *Rattus norvegicus* in Santa Maria, Rio Grande do Sul.

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The criminal forensics has the support of various sciences in the search for solving the crimes. The reconstruction of the criminal scenes using animal carcasses in different simulations of death is one way to study the real situations. In addition to observing possible differences in the decomposition, it is possible to know the local necrophagous fauna. The family Calliphoridae, is usually the pioneer in colonization of carcasses, actively participating in the decomposition. The purpose of this study is to show the species of blowflies with forensic interest in Santa Maria, Rio Grande do Sul, as well as determine their participation in the stages of decomposition. In the sampling were used two carcasses *Rattus norvegicus* (Berkenhout 1769), placed in cages covered by a metal mesh (30x20x25 cm). To capture the flies were made traps with PET bottles of 2L, cutting off the top of the bottle, and placing it upside down, like an inverted funnel, not allowing thereby the exit of insects. The period of sampling, carried out daily, extended from 15 January 2014 to 22 January 2014. Periods of putrefaction were determined according to Bornemissza (1957): early stage of decomposition, stages of putrefaction and black putrefaction, fermentation butyric and dry decomposition. The pioneer species were *Chrysomya albiceps* (n= 2), *Lucilia eximia* (n= 1) by appearing primarily on the second day, already when the carcasses were in decay stage. At the stage of black putrefaction, in the third and fourth day, were found in greater abundance *C. albiceps* (n=320), *Chrysomya megacephala* (n=316), *Chrysomya putoria* (n= 195) and *L. eximia* (n= 34). At the stage of butyric fermentation, in the fifth and sixth day, were captured *C. albiceps* (n = 758), *C. megacephala* (n=392), *C. putoria* (n=160) *L. eximia* (15) and *Cochliomyia macellaria* (n=2). In the dry decomposition stage, during the seventh and eighth day, were captured specimens of *C. albiceps* (n=27) and *C. megacephala* (n=18).

Keywords Calliphoridae; decomposition; criminal forensics

210 *Macrocheles* sp (Acari) associated with carrion beetles in gallery forest in the Brazilian Cerrado

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Mites are a diverse and heterogeneous group of Arachnids, comprising approximately 40,000 species. Their small size, short lifecycle, diverse feeding habits and ability to live on virtually all environments on the planet explain their remarkable evolutionary success. In addition to their economic importance, their use as evidence in criminal investigations has increased recently, which lay the basis for the development of forensic acarology. Several species can be found in association with animal carcasses and human cadavers in different stages of decay, while others exhibit some degree of phoresy on the body of necrophagous Coleoptera and Diptera. In this paper, we report for the first time the presence of mites of the genus *Macrocheles* (Acari: Macrochelidae) in association with two species of carrion beetles (Coleoptera): *Oxelytrum discicolle* (Silphidae) and *Eurysternus caribaeus* (Scarabaeidae). Adult beetles were collected on 36 carcasses of piglets (*Sus scrofa*) at variable stages of decomposition. The experiment was carried out in a preserved fragment of gallery forest in the Cerrado biome, at the University of Brasilia Experimental Farm. From a total of 256 *O. discicolle* collected, 73% were infested with mites, while 43 out of 48 *E. caribaeus* had mites on their bodies. In total, 961 mites were collected, distributed on the legs, antennae, under the wings, and, most frequently, on the thorax. The mean number of mites per beetle was 32,03. The highest level of infestation was 51 mites on a specimen of *O. discicolle* and 38 on *E. caribaeus*. Phoresy was reported on male and female adults. The presence of mites on adult carrion beetles may be an indication of the presence of a decomposing body in the vicinity, which reinforces their forensic relevance.

Keywords Forensic entomology; phoresy; Acari

211 Composition of Fanniidae captured at Chapadinha - MA

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The dipterans belonging to the family Fanniidae are found in practically all the geographical regions, but predominantly in regions of temperate climate and they comprehend a small family with 285 species described and distributed among four genera: *Australofannia* Pont, 1977, *Euryomma* Stein, 1899; *Piezura Rondani*, 1866 and *Fannia Robineau-Desvoidy*. Having in mind its relevance within the area of Forensic Entomology and with the area of Public Health, in this latter case, their being reported as mechanical vectors of possible diseases, the aim of this study was to know the Fanniidae species associated with decomposing meat. The work was carried out in four areas: man-disturbed cerrado localized in the Centro de Ciências Agrárias e Ambientais (Center of Agrarian and Environmental Science), in an environmental protection area, in a grassland area and in an urban area of the municipality of Chapadinha. During the period of January to December of 2014, the insects were captured in these areas using traps built with PET bottles, where inside were deposited beef on a layer of sand and hanged in trees. The traps were exposed in field conditions for 15 days, at which time the insects were collected and restored the substrate. 15,796 specimens of Fanniidae were recorded; standing out *F. pusio*, as the most representative to the study. The months from January to June were those which were observed the most abundant group of these insects and in these months were also recorded the highest rainfall index.

Keywords Insecta, Forensic Entomology, Fanniidae

212 Calliphoridae (Diptera) collected in carcasses of rabbits in a cerrado area at Chapadinha, MA

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The use of dipterans belonging to the family Calliphoridae with regard to forensic investigations which involve Forensic Entomology techniques has received great attention by researchers in many parts of the world, in addition, some species have great medical and veterinary importance being mentioned as decomposers of organic matter, mechanical vectors of pathogens and myiasis causing in several species of animals including man. Having in mind the relevance of this group of insects and the scarcity of works for the state of Maranhão, the present study aimed to do an inventory of blowfly species associated with carcasses of rabbit *Oryctolagus cuniculus*. The work was carried out in a rainy period in the month of February, which is regarded the first month of the rainy period in the municipality of Chapadinha, MA and in the others of the Center-North of the state. Three carcasses of rabbits were exposed in cages constructed of metal in a closed area on campus IV of the Center for Agricultural and Environmental Sciences, Federal University of Maranhão. The carcasses were placed at a distance of 200 meters apart. The insects were captured with the aid of an entomological net and the wingless or immatures with forceps every 24 hours. The arthropods captured were euthanized in flasks containing 70% alcohol and forwarded to the Laboratório de Entomologia Básica e Aplicada do CCAA/UFMA (Laboratory of Basic and Applied Entomology of the CCAA/UFMA), where they were identified to the level of species. The most abundant species of flies captured most abundant were: *Chrysomya megacephala* (29.61%), *Chrysomya albiceps* (28.15%) and *Cochliomyia macellaria* (17.96%). Further, five decomposition stages were observed, with average duration between them of 6.5 days. Considering the occurrence and frequency of the blowfly dipterans in this study, we can suggest that both *C. megacephala* and *C. albiceps* are important species which can be utilized in forensic studies in the Chapadinha region.

Keywords Forensic entomology, species, decomposition

213 The first instar larvae of *Oxelytrum discicolle* (Coleoptera: Silphidae): a bionomic report

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Oxelytrum discicolle (Coleoptera: Silphidae) is a species native from the Neotropical region that has been registered in association with ephemeral resources, especially decomposing animal carcasses. It has been reported in field studies on ecological succession of necrophagous insects in Brazil, which has stimulated research on its forensic potential. Currently, three larval instars have been recognized, differentiated by the following parameters: (i) distance between the dorsal stemmata, (ii) width of pronotum and (iii) total length of the larvae. In this paper we describe aspects of the bionomics of the first instar *O. discicolle*, reared in laboratory in semi-controlled conditions of temperature, humidity and photoperiod. Two colonies (A and B) containing 15 couples were observed at 12 hour intervals for 42 days. A total of 81 eggs (44 eggs in the colony A and 37 in the colony B) and six larvae (L1) from which colony were fixed. The overall length measures of first instar larvae (newly hatched) were: 4.14 mm +/- 1.30 mm (excluding antennas and urogenfos). The maximum width of pronotum was, on average, 0.94 mm, and this measurement varied from 0.85 mm to 1.02 mm. Finally, the mean distance between the dorsal stemmata was 0.64 mm. These results differ from a similar study that recorded a total length of 12.26 mm for the first instar larvae, about three times higher than that observed in this research. The antagonism of these results can cause major misunderstandings studies on in post-embryonic development and bionomics. In particular, the data provided here contributes to an accurate estimation of the post-mortem interval (PMI) in cases in which *O. discicolle* larvae are found on cadavers victims of homicide.

Keywords *Oxelytrum*; immature; PMI

214 Development of immature of two blowfly species (Diptera: Calliphoridae) of forensic importance at different temperatures

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Calliphoridae (Diptera) is of forensic importance in many countries for frequently being used for the post-mortem interval (PMI) estimate. The PMI is the time elapsed between death and discovery of the body. To calculate the minimum PMI (PMI_{min}) is essential to know the biology of the species that are rearing on the corpse, such as the equation of temperature-dependent development of the species. This study presents the developmental equations of *Chrysomya megacephala* and *Chrysomya putoria* (Diptera: Calliphoridae) reared under six temperatures: 13, 17, 20, 25, 30 and 35°C. Fresh rabbit muscle was used as rearing substrate. Newly hatched larvae were placed to develop on the muscle in a proportion of 1.5 larvae/1g of tissue, and kept on growth chambers with controlled temperature. Five larvae were weighted individually every 12 h until they reached the pupal stage. Two experimental vials were made for each species/temperature and kept at the same chamber at the same time. The linear regression was calculated according to Ikemoto and Takai (2000) model: $(DT) = k + tD$, where D is duration of development, T is temperature, t is developmental zero temperature and k is thermal summation constant of the species. ANCOVA test was performed to compare the slopes and intercept of both species. ANOVA and Tukey Multiple Range test were performed to compare the weight of the species at every age of each temperature. At 13 °C the immature of both species died before reaching the pupal stage, therefore this temperature was not used on the analysis. The equations for the development are, for *C. megacephala*: $y = 1810.152 + 10.471x$ ($R^2 = 0.94$) and, for *C. putoria*: $y = 2916.039 + 7.369x$ ($R^2 = 0.62$). The slopes are different ($F = 7.238$; $p = 0.036$), therefore the time-temperature relation is different for the species. The mean weight of each age was similar in some cases and different in others, for both species.

Keywords Carrion insects; *Chrysomya*; Post-mortem interval

215 Preliminary survey of insect fauna associated with the decomposition of pork in Ipatinga, MG

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The forensic entomology deals with the use of arthropods in solving any litigation. Because the climatic variations and different biomes of the full extent of Brazil, it is assumed there is considerable variation in the diversity and abundance of fauna cadaverous. The lack of studies make required the knowledge of associated fauna with decaying carcasses in different vegetation types. This is the first study of the Vale do Aço region and aims to increase the insects records that make up the cadaverous fauna, collaborating on medical-criminal investigations. From 3 to 9 of June 2015, we collected insects associated with the decomposition of pork, within riparian forest fragment, in the campus of the Centro Universitário do Leste de Minas Gerais (UNILESTE). For this, we used a piece of 0,280kg of pork belly with skin intact, kept inside a trap type Shannon. The temperature and humidity were measured daily until complete decomposition. The specimens were collected with entomological nets, killed with ethyl acetate, stored in labeled bottles. We collected a total of 363 Diptera, represented by eight families: Muscidae; Sarcophagidae; Phoridae; Calliphoridae; Coelopidae; Tephritidae; Micropezidae and Chamaemyiidae, corresponding to families usually found in decomposing corpses. The Muscidae family was the most abundant, with 55.09%, followed by Sarcophagidae (16.25%) and Micropezidae (12.12%). The five stages of decomposition suggested in the model of Early e Goff were observed: Fresh, bloated, decay, dry and remains, they lasted one, one, three and one days respectively. During the study, the temperature was about 21°C and relative humidity was in average 80%, both showed little variation. There was no high species richness. The number of families collected indicates that this site is a good place to study because it is near the Parque Estadual do Rio Doce - PERD. The continuity of this work is to demonstrate the wealth and the standard succession as found in the PERD.

Keywords Decomposing; Forensic Entomology; Diptera

216 Evaluation of two collection methods and seasonal patterns of Coleoptera (Insecta) on carcasses of rodents exposed in Southern Brazil

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The insects can be found in all types of environments, including criminal scenes. Forensic entomology is an area of entomology that aims to study the biology and ecology of insects, associated to other forensic procedures, to clarify judicial questions. The Order Coleoptera (Insecta) is among the most important group of organisms associated with decaying organic matter of animal origin. The objective of this study was to evaluate two methods for collecting beetles and observe seasonal behavior of the species of greatest forensic relevance, at a forest environment in the municipality of Santa Maria, State of Rio Grande do Sul, Brazil. Collections were carried out every three months in the Botanical Garden of the UFSM (29°43'2.88"S 53°43'52.24"W) from January 2014 to January 2015. Four carcasses of *Rattus norvegicus* (Rodentia) of approximately 400 g were exposed, simultaneously in each of the four seasons, protected by an iron cage, indoor, by varying the type of trap: [1] conventional pitfall trap, consisting of four containers with 1000 mL capacity, arranged circumferentially around each carcass and 20 cm from the ground level, which contained a mixture of water and detergent; and [2] pitfall-tray, with 31 cm by 21 cm, disposed 15 cm below ground level, with each carcass located in the center and islanded by water and detergent. In total 1,869 individuals were collected belonging to 14 families, of which 10 have been reported to be of forensic importance. The highest abundance (65.86%) was recorded in the pitfall-tray. The largest number of individuals was collected in the spring (N = 1,006), followed by summer (N = 518), winter (N = 319) and autumn (N = 26), respectively. The study of necrophagous fauna in the State of Rio Grande do Sul is still scarce. It is expected that this study may contribute to the improvement the database necrophagous beetles species from the State, whereas the same is composed of a wide variety of physiogeographic profiles.

Keywords Beetles; Seasonality; *Rattus norvegicus*

217 Susceptibility characterization of residual Brazilian populations of *Triatoma infestans* (Hemiptera: Reduviidae) to deltamethrin pyrethroid

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Despite years of efforts towards the elimination of *Triatoma infestans* in Brazil, residual foci still persist in some areas of the states of Bahia and Rio Grande do Sul. The persistence of these *T. infestans* populations in the country has two different origins of equal concern: operational failures or insecticide resistance. Thus, the objective of this study was to characterize the susceptibility profile of the residual Brazilian populations of *T. infestans* to deltamethrin. The susceptibility reference lineage was derived from CIPEIN/Argentina. The populations studied were manually collected using a dislodging agent in peridomiciles in the States of Bahia (Novo Horizonte) and Rio Grande do Sul (Santa Rosa and Doutor Maurício Cardoso) States. Serial dilutions of deltamethrin were prepared and applied at the dorsal abdomen of first instar nymphs. The control group received only pure acetone. Mortality was evaluated after 72h. Qualitative tests assessed the mortality of a diagnostic dose of 1xLD99 (2.76ng a.i./nymph) was carried. The deltamethrin profile characterization of the *T. infestans* populations revealed a RR50 ranging from 1.73 to 3.26. The mortality percentage in response to a diagnostic dose was 100%. The results of this study indicate that the persistence of residual foci of *T. infestans* in Bahia and Rio Grande do Sul is not related to insecticide resistance but may be associated with operational failures. In Rio Grande do Sul, we must consider the possibility of continuous reinfestation by Argentina individuals, which justifies active and efficient epidemiological surveillance.

Keywords Triatominae; *Triatoma infestans*; Insecticide resistance; Deltamethrin

218 New records of Culicidae species to the state of Paraíba, Brazil

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Mosquitoes are insects of the family Culicidae (Diptera) that have great health importance because of the female blood-sucking habit of most species, and thus they can act as vectors of several viruses. This study aimed to make a baseline descriptive study of the genera, and when possible, species occurring in the Mata do Buraquinho, João Pessoa, Paraíba. In the period from March 2008 to September 2010, antibodies presence in robust capuchin monkeys (*Cebus libidinosus*) to nine viruses was observed in different titrations. This seroepidemiological survey was used to confirm the need for epidemiological surveillance, given that such viruses can be carried by the species that have been described to the State. The capture method used was entomological net and oral suction for 5 days (November, 17-21th, 2014). It was collected 88 specimens of mosquitoes corresponding to 7 genera. The following species and genus were recorded for the first time in Paraíba: *Aedes fulvithorax*, *Aedes scapularis*, *Aedes serratus*, *Aedes taeniorhynchus*, *Anopheles nimbus*, *Coquillettidia albicosta*, *Coquillettidia venezuelensis*, *Limatus durhamii*, *Mansonia titillans* and *Wyeomyia*. Culicidae present in Mata do Buraquinho may be subject to adaptations and narrow their relation with the urban environment, subsequently causing several diseases in the population located at the vicinity of the forest. Thus, there is a need for more studies on Culicidae diversity in Paraíba.

Keywords Biodiversity; Epidemiology; Mosquitoes; Vectors

219 *Amblyomma varium* (Koch, 1844) and *Amblyomma calcaratum* (Neumann, 1889) in a sloth (*Bradypus variegatus*) from the Atlantic Rainforest in Bahia State

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The expansion of human settlements is contributing to the displacement of wild species from their natural habitat. Wild animals are natural hosts of several ectoparasites, including ticks, and there are few scientific reports about the diversity of ticks in forest fragments, as well as the zoonotic agents that can be transmitted by them. Considering the fact that the continuous degradation of the Atlantic rainforest fragments is leading to a more close contact of wild animals with humans, it is important to expand the knowledge on their ectoparasites and their participation on the cycle of zoonotic protozoa and bacteria. In this work, ticks from a sloth (*Bradypus variegatus*), captured from a periurban rainforest fragment in the north of Bahia State, were identified through their morphological features. Using dichotomous classification keys, two different ticks collected from the sloth were identified: *Amblyomma varium* and *Amblyomma calcaratum*. These two ticks are already described as parasites of mammals, especially those from the Xenarthra Superorder. *Amblyomma varium* (Koch 1844), also known as the sloth's giant tick, can be found from the south of Central America until the South America's midlands. *Amblyomma calcaratum* (Neumann 1899) is described as a tick which the adults have a preference to parasite animals from the Edentata group, but the larvae and nymphs are more commonly found in birds; they have a wide geographic distribution, being already described parasiting animals at the United States, Central and South America. Further studies are being conducted with these ticks, focusing in the molecular identification of zoonotic protozoa and bacteria in the gut, Malpighian tubules and salivary glands of these two ticks.

Keywords Ixodídeos; animais silvestres; mata atlântica

220 Assessment of insecticidal activity of (*E*)-cinnamaldehyde over pupae of *Musca domestica* (Diptera: Muscidae)

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Musca domestica is a fly with wide geographic distribution, considered an important mechanical vector of several diseases that affect humans and animals. The misuse of synthetical insecticides has selected resistant populations of this specie. Given these problems, an alternative that has shown good results is the use of plant insecticides. So the purpose of this study was to evaluate the activity of the phenylpropanoid E-cinnamaldehyde on pupae of *M. domestica*. It was used eight concentrations of the substance (from 0.625 to 30.0 mg/mL) diluted in acetone 50%. Two controls were made (distilled water and acetone 50%). The contact test was used with 10 repetitions (n=10) for each concentration tested and for the controls. For the tests, Petri dishes (9x1.5cm) lined with filter paper were used, and 10 pupae with 1-2 days old were placed on each dish. Over each pupa, 50 μ L of the substance to be tested were pipetted. After wait 15 minutes for the evaporation of the solvent, the dishes were closed. The experimental and control groups were kept in separate growth chambers (28 \pm 2°C and 60 \pm 10% RH). To the effectiveness of the pupal treatment (EPT) the pupal mortality (PM) and the percentage of bad development of adults (PBD) after six days of treatment were calculated. (*E*)-cinnamaldehyde showed significant pupicidal activity (32%) at concentration of 10 mg/mL with PBD of 3.6%, contributing to EPT 34%. The highest pupicidal activity (49.3%) was observed at 30 mg/mL, the PBM 43%, and the EPT 67.2%. The use of E-cinnamaldehyde presented considerable pupicidal activity, making its use promising for environmentally safer formulations in control of immature stages of *M. domestica* and may be indicated in an Integrated Pest Management program.

Keywords trans-cinnamaldehyde; housefly; insecticide

221 New technology for monitoring the mosquito *Aedes aegypti* (Diptera:Culicidae) at Nilton Lins University, through the trap BG-Sentinel

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¹Laboratório de Entomologia Aplicada, Unicenter Universidade Nilton Lins Depart. de Parasitologia da UFMG e Biogents/Alemanha The mosquito *Aedes aegypti* (Diptera: Culicidae) is the vector of the Dengue Virus, belonging to the Flavivirus genus and Flaviviridae family, currently has four distinct serotypes: DENV-1, DENV-2, DENV-3, DENV-4. The aim of this study was to monitor the mosquito's population *A. aegypti*, at Nilton Lins University, through the trap to catch adult mosquitoes, BG-Sentinel. The traps were installed at 15 locations on Campus from May to December 2013 to February 2014. A total of 5,532 mosquitoes were captured, and 5,003 of the species *Culex sp*, 307 females and 210 males of *A. aegypti*, seven females and five males *Aedes albopictus*. The results showed that *A. aegypti* was captured throughout the study period and the months where the largest catches occurred were May and December 2013, January and February 2014, the corresponding period of the rainy season. The vector was captured in 12 of 15 installation places of BG-Sentinel trap, with the largest catches were observed in Unicenter, Building Police (J Block) and Guardhouse 2, places widely circulated for people. This study demonstrated the potential of BG-Sentinel trap for monitoring the mosquito population *A. aegypti* in the University Campus and can be used as a new tool for monitoring the species in urban areas.

Keywords Monitoramento, Dengue, Armadilha

222 Can socioeconomic characteristics of urban populations influence the occupation of breeding sites by *Aedes aegypti* and *Aedes albopictus*?

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The urban distribution of *Aedes aegypti* and *A. albopictus*, dengue vector, is an important factor to be considered in the vectorial control measures. The study had the objective to examine if the socioeconomic characteristics in the urban area of Belo Horizonte, MG could influence the occupation in the breeding sites for these mosquitoes. Ovitrap were distributed in 25 sites, in neighborhoods with the best and the worst indicative of infrastructure according with the Census of 2010 – IBGE. To establish the socioeconomic sectors, that could influence the site of collected sample, it was determined a 200 meters radius buffer surround each collected site. The sectors confronted with one of the buffers were used in analyzes (we used six socioeconomic index of them). Egg density index (EDI) was considered as the response variable. A total of 25,357 eggs were collected, being 253 positive ovitraps of the 414 available in the sample period (2015/02/03 to 02/28). Through the Simple Linear Regression it was possible to associate the EDI with the socioeconomic variables. There was a negative relationship between EDI and the rate of households with piped sewage ($p < 0.05$, $R^2 = 0.17$) and the index of individuals per households ($p < 0.05$, $R^2 = 0.16$). More than 94% of households have garbage collection and water supply network, which may explain the non-significant result in the variables. The presence of sewage network varying from 80 to 99% and it was negatively related to the EDI, possibly because drainage ditches are potential breeding grounds for mosquitoes. The population density is associated with areas with higher incidence of dengue and increased occurrence of vector. However, variables such as the index of inhabitants per km² and the index of households per km² were not significant, possibly because many sectors have part of their area without human occupation. Thus, the number of individuals per household was a better measure for the population density.

Keywords Dengue Fever, Vector Control, socioeconomic characteristics

223 Inheritance and heritability of deltamethrin resistance under laboratory conditions of *Triatoma infestans* from Bolivia

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¹Laboratório de Triatomíneos e Epidemiologia da Doença de Chagas, Centro de Pesquisas René Rachou - FIOCRUZ Minas Over the last few decades, resistance to pyrethroids in *Triatoma infestans* has been demonstrated and high levels of insecticide resistance, mainly on the border between Argentina and Bolivia. Understanding the genetic basis as the mode of inheritance and heritability to insecticides under laboratory conditions is very important for vector management and resistance monitoring. Few studies were carried to characterize the mode of inheritance to pyrethroids in *T. infestans*. This study aims to characterize the inheritance and heritability of deltamethrin resistance in *T. infestans* populations from Bolivia. We carried out experimental crosses between a susceptible (S) a colony with a resistant (R) and reduced susceptibility (RS) colonies in both directions (Female x Male and Male x Female), and mode of inheritance was determined based on degree of dominance (DO) and effective dominance (DML). Select pressure was carried out for two generation from dose diagnostic (10 ng. i. a. /nymph) from resistant a colony and realized heritability (h²) was estimated. The progeny of the experimental crosses and selection were tested by a standard insecticide resistance bioassay. The result for DO (< 1) and DML indicates that resistance is an incompletely recessive character and inheritance is autosomal and not sex-linked. The LD50 progeny of Female(S) x Male(R) and Male(S) x Female(R) was 0.74 and 3.97, respectively, which is indicative of dilution effect. In the resistant colony, after selection pressure, the value of h² was 0.37, the LD50 value increased 2.25-fold (F1), and 26.83-fold (F2) compared with parental colony. This suggests that resistance is an additive and cumulative factor, mainly in highly structured populations with limited dispersion capacity, such as *T. infestans*. These results are very important for the management program of control in problematic areas where high resistance ratios of *T. infestans* have been reported.

Keywords *Triatoma infestans*, inheritance, resistance

224 First occurrence of *Cimex hemipterus* (Hemiptera: Cimicidae) in the state of Ceará, Brazil

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Bed bugs are hematophagous insects, temporary ectoparasites belonging to the Order Hemiptera and Family Cimicidae. They are characterized by a dorsoventral flattened body, ovoid shape and reduced hemelytra. *Cimex hemipterus* is the most resistant species to environmental temperature variations among them, supporting up to 30°C, but are susceptible to low temperatures. However, this species can survive on average 180 days in the fasted state at 10°C. Despite its resistance and tolerance to high temperatures this species had not been registered in the State of Ceará, Brazil. The aim of this study is to report the first occurrence of *Cimex hemipterus* to this State. Some specimens were sent to Laboratório de Zoologia Experimental (Universidade Federal do Ceará), fixed and preserved in 70% ethanol, then observed and photographed under stereomicroscope and microscope. They were identified through comparisons with literature information and experts helping. The domestic cimicids *Cimex hemipterus* and *C. lectularius* have been the subject of several researches aiming to clarify their potential as vectors of diseases, such as hepatitis B. Although no transmission record has been observed, their bites leaves unique marks that cause dermatitis whose symptoms are severe itching, presence of papules and erythematous urticaria. The bite also can cause anaphylaxis in susceptible people, leading to the risk of death. Only *C. lectularius* had already been registered to Ceara State. The presence of these animals should be alerted and they should become a target of new studies and actions related to sanitary surveillance, as in a general context, they could represent a major public health problem.

Keywords Bed bugs, Northeastern Brazil, Vector insects

225 Lice: Study about the infestation level and the perception by the public school students at Chapadinha about pediculosis

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The louse *Pediculus humanus capitis*, which has lived with the human being since the beginnings of the human kind, are obligatory blood-sucking insects which fed several times a day on the individual's head and can transmit a number of diseases to man, their being responsible for the transmission of pediculosis. In school environment, in general, its level of infestation becomes relatively high, mainly due to the inadequate hygiene habits among children, particularly in the age range between six and twelve years. Within this context, this study was intended to verify the degree of infestation by lice among students as well to verify the status of knowledge of these individuals about pediculosis. The work was conducted with 370 students which were studying between the first and fifth grade of elementary school, 183 individuals were of the male gender and 187 belonging to the female gender. The head of each individual was observed for around three minutes, evaluating the following parameters: gender, school grade, age, length and type of hair of the students. In addition, compound questionnaires of objective questions related to the ectoparasite were applied. Pediculosis found itself disseminated among municipal public school students of Chapadinha - MA, with a prevalence of 22.16%, this level of infestation being greater in children of female gender who stood for 50.54%, a fact that may be related to the poor knowledge about the lice, since we found that the students ignore the causes of the likely infestation and the possible methods of prevention and control.

Keywords Pediculosis; Ectoparasite; Phthiraptera

226 Study of Menoponidae and Philopteridae lice parasiting wild birds in captivity at IBAMA, Juiz de Fora city

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The diagnosis for ectoparasites is an important tool that allows the elucidation of aspects related to indexes of morbidity and mortality caused by parasitic diseases in different bird species, some of them being at extinction risk; furthermore, some bird parasites have zoonotic potential, which makes them a public health issue. However, there are few studies on the presence of lice in wild birds apprehended and in captivity, which are more susceptible to parasitism due to the limited physical space they are confined to and a bigger host density, therefore easier for the parasites to access them. It is necessary, then, to build up efforts to detail the host-parasite interaction in captivity. We analyzed 226 birds from different species kept on Instituto Brasileiro de Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA) in Juiz de Fora city, Minas Gerais state, regarding the presence of lice. We recorded a prevalence of 7.75% parasited birds, with an parasitic intensity of 0.328. The lice were preserved in isopropyl alcohol and then mounted for later identification. To the moment, we identified the species of lice *Colpocephalum maculatum*, *Acutifrons caracarensi*, *Kurodaia* sp., *K. subpachygaster*, *Strigiphilus microgenitalis*, *Strigiphilus* sp., *Paragoniocotes aratingae* and *Menacanthus eurysternus* parasiting the birds *Polyborus plancus*, *Strix aluco*, *Tyto Alba*, *Glaucidium brasilianum*, *Otus choliba*, *Aratinga leucophthalma* and *Turdus rufiventris* respectively. The process of lice identification is still being carried on for other sampled specimens.

Keywords Ectoparasites; Chewing Lice; Phthiraptera

227 Influence of precipitation and favorable temperature on colonization of ovitraps by *Aedes* sp.

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Understanding the variations in the size population of insect vectors of disease is essential to target the disease control strategies. In Brazil, Dengue is transmitted by *Aedes aegypti* and *Aedes albopictus*, which have shown population variations following environmental conditions such as temperature and rainfall. The sample period was after of the weeks rainless in the summer, occurring exactly when rain returned, aiming to follow the increase of oviposition in response to increase of breeding sites, along 3 weeks, in Belo Horizonte, MG. Was installed 150 ovitraps in field between February 3 to February 28 of 2015, being 10 ovitraps by district. For statistical analysis, the data was divided by week, being considered the eggs total, ovitraps positivity index (OPI) and egg density index (EDI). Were used ANOVA One Way and Tukey protocol test to compare the data. At week 01, were collected 5352 eggs; at week 02, were 7829 and on week 03 were collected 11128 eggs, but there was no statistical difference when this variations they were compared ($p > 0.05$). The OPI showed differences among the evaluated weeks ($p < 0.01$, $F_{2,16} = 15.22$), the differences being between the first and third weeks ($p < 0.01$, $F_{2,16} = 15.22$) and the second and third week ($p < 0.01$). Regarding the EDI, there was no difference between treatments. Although there was no significance in the analysis comparing the total number of eggs, there is a great variation between weeks with twice the oviposition when compared the first and third week. Increased colonization of ovitraps is a result of increased number of females mosquitoes and the trend of increased colonization of oviposition sites with the increase of breeding sites available. It was possible to observe a significant increase of the population of vectors in response to rain, indicating the presence of permanent breeding sites, that maintains populations of mosquitoes in the rainless period.

Keywords Climatic Variables, *Aedes aegypti*, Oviposition

228 Cross resistance between deltamethrin and indoxacarb insecticides in Brazilian populations of *Aedes aegypti*

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Strategies for the control of *Aedes aegypti* continue to rely heavily on the use of insecticides. In the last decades, pyrethroid insecticides have been widely to control such mosquitoes. However, the detection of *A. aegypti* populations resistant have been threaten the sustained use of pyrethroids and other insecticides. These difficulties resulted in an urgent need to develop alternative insecticides for controlling *A. aegypti*. Oxadiazines (e.g. Indoxacarb and its active metabolite DCJW) meets the *A. aegypti* control criteria and have been replacing the use of pyrethroids. Here, we evaluated the resistance levels between two Brazilian populations of *A. aegypti* to deltamethrin (pyrethroids) and indoxacarb. Fourth instar larvae of the both populations were exposed to increasing concentrations of deltamethrin and indoxacarb in glass jars containing 200 mL of insecticide solution. Five replicates were used for each insecticide concentration. After 24 h of exposure, we estimated the lethal concentrations (LCs) and the resistance ration (RR) between the populations. The most susceptible population presented LC50 = 0.002 ppm for deltamethrin and LC50 = 2.58 for indoxacarb. The results for the less susceptible population demonstrated a resistance ratio between populations of approximately 2180-fields for deltamethrin and 18-fields for indoxacarb. Thus, although the resistance levels are more moderate for indoxacarb, the less susceptible population showed cross resistance between both insecticides. Further investigations aiming to study the reasons of this cross resistance are urgently needed.

Keywords Mosquitos, cross-resistance, insecticides

229 Secondary analysis of the occurrence of insects in the municipality of Canarana - BA

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The Chagas disease is a serious problem to public health due to social and economical impacts on society. The vector transmission is the main carrier of the parasitic infection being associated to the contact of man with the triatominae hematofagos insects of *Trypanosoma cruzi*, the etiological agent of the disease. Considering the lack of information about the presence of possible transmitters of the disease in Canarana, BA, a recent bibliographic analysis has shown that social science contributions remain scarce. Current research seeks more information about the species of triatominae found in the district and fact that makes it easier to the presence of the same ones. Where was analysed the distribution of triatominae through secondary data found in the archives epidemiological vigilance referred to the requirements done in the years of 2012 and 2013 in the phase of vigilance of PCDCh. The data shown, show the presence of five species of triatominae which are: *Triatoma sordida*, *Triatoma pseudomaculada*, *Triatoma melanocephala*, *Panstrongylus diasi* and *Panstrongylus geniculatus* showing the constancy of in the residency of the same ones. It is possible to conclude the environmental modifications of the anthropic origins and the daily habits of the local population are facts more dominant to the migration of triatominae the artificial ecotypes created by man, meaning a risk of infection by the *T. cruzi*.

Keywords Chagas Disease, Distribution, Triatomíneos.

230 Trypsin-like activity inhibition in tomato fruits as response to *Neoleucinodes elegantalis* attack

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Neoleucinodes elegantalis (Lepidoptera, Crambidae) is one of the most important pests of Solanaceae. Its larvae causes expressive damage on tomatoes fruits. Their attack triggers specific biochemical events that affect the expression of genes that encode compounds such as protease inhibitors. These inhibitors hamper the action of digestive proteases present in the herbivore gut. Thus, our goal in this work was determine the induced defense activity through trypsin-like inhibitors on attacked and non-attacked tomatoes by *N. elegantalis*. Tomato plants were cultivated at experimental field Diogo Alves de Mello at Universidade Federal de Viçosa. Tomato fruits (4 cm of diameter) were infested with first instar larvae. After 7 days, infested and non-infested fruits were collected and frozen in liquid nitrogen. Inhibition of trypsin-like activity was determined in 3 parts: mesocarp, columella and seeds. The experimental design was randomized blocks with three replications and performed in triplicate for each part. Inhibitor trypsin-like was determined using bovine trypsin. The analysis was made using 0.5 mL L-BApNA 1.2 mM, 0.5 mL Tris-HCl 0.1M, pH=8.2 containing 20 mM of CaCl₂ and 50 μ L of vegetal extract. The control was composed with 0.5 mL of substrate and buffer. The analysis proceed using a spectrophotometer at 410nm and the inhibited trypsin-like was determined by pattern equation. Data were subjected to ANOVA. Mesocarp region exhibited a significant increase in inhibited trypsin-like on infested fruits ($P < 0.05$). Columella and seeds did not show significant difference between treatments. Therefore, *N. elegantalis* attack alters trypsin-like inhibitor activity in mesocarp region but not in the two other regions (columella and seeds), suggesting that fruit defense is more effective in the mesocarp. Thereby, this may be associated with the success of larvae feeding in a region with less biochemical response.

Keywords Proteases inhibition, *Solanum lycopersicum*, plant defense

231 Defense characterization of tomato fruit by lipoxygenase pathway

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The herbivore insects are serious problems to agriculture. The plants have induced and constitutive defenses and they may control herbivorous insects when are attacked. Biochemicals alterations are presents in this local attacked and promotes signaling cascade to protect the plants. To induced defense, the lipoxygenases pathway produces aldehydes, jasmonic acid and traumatin. Therefore, this via is crucial to plants defense. The research goal was to verify lipoxygenase activity in attacked tomato fruits or not by larvae of *Neoleucinodes elegantalis*. Tomato plants were cultivated at the experimental area Diogo Alves de Mello, Fitotecnia Department at Universidade Federal de Viçosa (MG-Brazil). The green fruits had around 4 cm of diameter and received larvae of *Neoleucinodes elegantalis*. After 7 days, tomatoes infected and not infected were harvested and frozen with liquid nitrogen to lipoxygenase analyze. The lipoxygenase activity was carried out in three parts of the fruits: mesocarp, columella and seeds. The experimental design was performed in randomized blocks to 3 repetitions. The enzymatic assays were prepared in triplicate to the parts of the tomatoes. The lipoxygenase activities were significantly different in the mesocarp between infected and not infected fruits ($P < 0.05$). The columella and seeds did not show the significant difference to the two tomatoes ($P > 0.05$). Increased lipoxygenase activity in the mesocarp of infested tomato possibly triggers defense molecules. The larvae mesocarp feed until achieve the columella region, and in this part, it remains on period its development. Therefore, in the columella do not occur significate defense. Thereby, the larvae of *Neoleucinodes elegantalis* are protected and they survive within fruit until to reach pupa stage.

Keywords Plant defense, Oxidative enzymes, *Solanum lycopersicum*

232 A game of thrones: gyne selection in colonies queenless of *Plebeia lucii*

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Stingless bees have an usual production of gynes but some colonies may lose the queen without having one to replacement. When this occurs in *Frieseomelitta varia* and *Plebeia lucii* auxiliary cells are built closely to a brood cell containing a worker larva which may fed on additional food from auxiliary brood cell and develops in a queen. A great number of auxiliary cells occur in queenless colonies of *P. lucii*. However, the emergence of many queens and its supersedure process remain unknown. This study monitored daily, for four months, five orphan colonies of *P. lucii*. The mean number of auxiliary cells per colony was 15. One royal chamber (prison) was built just after the emergence of the first gyne, even without another queen. The first emerged gyne moves excitedly in the colony, with aggressive behavior characterized by advances and workers throws with the lateral region of the abdomen. Such aggressiveness cease within 24 h and gyne often walk slowly by colony. The queens that emerged later, may be arrested in royal chamber and killed, or killed just after emergence by workers. There was a difference between the reaction of the workers to the first emerged queen and the others. Royal court occurred for the first gyne, others were frantically pursued by workers until they are immobilized by the antennae, legs, wings and abdomen tip while their abdomens were torn apart by workers. Our findings show new insights in the great gynes production in response to orphaned, since almost all new queens will be killed by workers after the emergence of the first one.

Keywords supersedure process; gynes production; stingless bees

233 Cataloging of the *Camponotus* gender at invertebrates collection (ants) of the Paraense Emílio Goeldi Museum

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The level of identification, organization, maintenance and repair of a collection are of great scientific importance and responsibility for science, even if there are difficulties to obtain a good standardization. The work aimed to catalog and insert into database the copies of the genus *Camponotus* deposited in the Invertebrate Collection (ants) of Paraense Emilio Goeldi Museum (MPEG), making it possible to expand the availability of this scientific community collection. The specimens preserved in a dry environment (mounted on pins) were organized in entomological boxes, by specie and geographic distribution (country, state, city and locality) and digitized in database on Excel. In the total, were digitized in 1084 specimens (981 records) of 46 species of the genus *Camponotus*, with representation in 11 countries of the Americas. Of these 93.89% (944 records, 21 species) are occurring in Brazil and 6.11% (37 records, 26 species) occur outside Brazil, and six countries are represented by a single species (1 record). Of the 13 Brazilian states, Pará has the largest representation (800 records, 21 species), followed by Maranhão (55 records, 6 species) and Amapá (27 records, 6 species). The species of *Camponotus femoratus*, *C. senex*, *C. arboreus* and *C. melanoticus* are more representative and corresponding to 72.78% of the specimens, whereas the other 42 species represent only 27.22% of this material. However, the species of *Camponotus chilensis*, *C. compositor*, and *C. nigeranus* are represented by not one specimen of Brazilian origin. Therefore, extend the level of identification, organization and computerization of genre *Camponotus* of Collection of Ants of the MPEG, genre very diverse, rich and abundant genre in amazon region, with a variety of habits and habitat distribution, will improve the availability of such information, which is of paramount importance to base further research and zoning proposals, management and wildlife conservation in the Amazon.

Keywords Amazon, *Camponotus* and Entomological Collection

234 Stingless bees: education for conservation–environmental concientization in focus in schools of Viçosa (Minas Gerais)

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Bees of Meliponini tribe, also known as stingless bees, are responsible for pollinating 30-90% of Brazilian plants. Therefore, the use of stingless bees, as a teaching tool in fundamental schools are an interesting way to teach basic concepts about science, biology and ecology. This study, involving three public elementary schools in Viçosa (Minas Gerais), proposed the use of stingless bees as a way to demonstrate to students the behavioral habits of stingless bees and the importance of preserving these species. In this context, nests of two different stingless bees, *Tetragonisca angustula* and *Plebeia lucii* were installed in schools so that students could observe their behavior and accompany the development of the colonies. Observations were done for approximately six months. Despite external factors (children curiosity, winter and non-adaptation to local vegetation) have hindered the development of the colonies, nests remained alive throughout the observation period. During these observations, students were able to observe the construction of brood and real cells as well as construction of honey and pollen pots, the laying and foraging processes. During the monitoring of nests, students involved in the project also learned and developed handling techniques and practical knowledge that can be used in the preservation of stingless bees. Students showed great interest in the activity and nowadays are able to express the importance of stingless bees for the environment, becoming important multipliers of information about the habits of these bees and the need to preserve them.

Keywords stingless bees; environmental education; preservation

235 Evaluation of the repellency action of commercial products as a strategy for individual protection against bites of insects

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Initially the natural habitat of *Trypanosoma cruzi*, etiologic agent of Chagas' disease (DCH), was restricted to the wild environment. Changes in natural ecotypes resulted in a disease of extreme political and social importance. Due to the peculiarities of the epidemiology of DCH, new challenges arise in relation to the structuring of actions for attention, surveillance, prevention and control. This paper aims to contribute to the generation of actions aimed at coping and alternative and individual control, and the main objective is to evaluate the repellent effect for the vectors of DCH from industrialized and commercially available. A survey of commercial products with repellent activity against insect's easy access to the products being selected in the market was completed a part of the research, repellency is the sole protective factor and does not overlap with the formulations and chemical compositions that are carried out. The repellent power of selected products are tested topically in anesthetized mice, which are offered as a food source for groups of 10 nymphs of 2nd stage of *Rhodnius neglectus*, with fasting of eight days, for 30 minutes. The evaluation of repellency action is made by direct observation of bloating nymphs due to the ingested blood. Were selected 13 products in the survey phase. Experiments were performed with eight of the selected products. For each product, we used 100 nymphs in the test and control groups. Statistical tests showed significant values between the number of nymphs who obtained the meal in the experiments testing and their respective controls ($p < 0.05$), indicating the repellent action of the products tested to date on the triatomine.

Keywords Triatominae Control Repellents

236 Brood cell construction, provisioning and worker oviposition in orphan colonies of *Plebeia lucii*

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The stingless bees (Meliponini) have a morphological dimorphism between workers and queens. Workers bees are responsible for maintaining the colony and queens lay eggs. In bees, sex determination occurs by haplodiploidy, which females arise from fertilized eggs and males from unfertilized ones. However, in some cases workers may activate its ovaries. Since workers are not mated, eggs produced by them are always haploids and therefore can only produce males. The *Plebeia lucii* has the workers with activate ovaries, however, studies on oviposition behavior in *P. lucii* workers are absent. This study describes the behavior of cells building and worker oviposition in *P. lucii*. A total of three cell building were found in orphans colonies. All three events were construction of auxiliary cell and therefore related to the production of emergency queens. Two events were oviposition by workers. The frequency, location and other aspects of *P. Lucii* oviposition were different from other species of the genus *Plebeia*. One aspect was the mean time of workers oviposition, which is longer than reported for other species of this genus. Another factor was the absence of oophagy in *P. lucii*.

Keywords *Plebeia lucii*, Workers Oviposition, Cell Construction

237 Metabolic rate of nymphs of the jamaican cricket: *Gryllus assimilis*

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Species from Gryllidae live typically on the ground and they are rarely found on trees, but, usually use leaves as camouflage. With sizes varying between 10 and 50 mm, these species are most nocturnal and solitary, and when they are found in groups cannibalism may be observed. *Gryllus assimilis* is known to be a pest, mainly in eucalyptus crops. From a laboratory rearing of *G. assimilis*, 2.5 months old nymphs were taken to measure their metabolic rates. Q-Box RP1LP Low Range Respirometry Package was utilised for the measurements. Each animal was assayed individually in a 21mL chamber connected to the respirometer tubing. For each individual, measurements were taken during 14 minutes, as follows. The first 7 minutes were allowed for readings stabilisation as animals may be stressed due to handling. During this period, the system was open, i.e., fresh air was flowing through the experimental chamber. After the first 7 minutes, the system was closed, i.e., the same air recirculating through the chamber, and readings of the % O₂ in the chamber - initially 20.9% - were recorded. Subsequently it was estimated the rate of O₂ consumption (% O₂/s), and this figure was used to calculate the total - whole animal - oxygen consumption (VO₂, μL/min), taking into consideration the total volume of the system (chamber+tubing+drying column). Finally, VO₂ was divided by the animal weight (g) to obtain the estimate of the weight-specific metabolic rate - WMR - in μL O₂/g*min. Mean±SE WMR was 15.21±1.58 and no significant difference was found between males (16.76±1.94) and females (13.66±2.50). In comparison with unpublished data of this research group, the mean WMR of nymphs was higher, but not statistically different, from that estimated for newly moulted adults. However, when compared with data from older post-reproductive adults, a significant decrease in WMR was found. It is concluded that there is a gradual decrease in WMR from nymph phase to the adult phase.

Keywords Gryllidae, Respirometry, Oxygen

238 Characterization karyotypic of *Frieseomelitta* sp of Amazon region using techniques cytogenetics classical and molecular

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The *Frieseomelitta* genus belongs to the Meliponini tribe, has 16 species distributed in South America, Central America and Mexico. Only five species had their karyotype described. Thus, this study aimed to broaden the cytogenetic information of bees of *Frieseomellita* genus through conventional techniques and physical mapping of rDNA 18S sequences. The bees *Frieseomellita* were collected in Altamira, PA. The metaphases were obtained from the cerebral ganglia of larvae in defecation stage and stained with Giemsa. The C-band technique was used for the location of heterochromatin. The chromosomal mapping was done by fluorescence in situ hybridization (FISH) using a probe of rDNA 18S labeled with digoxigenin. The chromosomes were counterstained with DAPI Fluoroshield (Sigma) and analyzed in an epifluorescence microscope Olympus BX53 (Olympus Corporation, Tokyo, Japan). Approximately 10 metaphases were analyzed per individual. The *Frieseomellita* showed chromosomal number $2n = 30$ and karyotype formula with $2K=4Ae+2Ai+20AM+4M+2Mct$. The probe for the 18S rDNA scored a pair of chromosomes. The diploid number was similar to the number described for the genus, but this pattern is not commonly found for the Meliponini tribe. The karyotype formula and the predominance of pseudoacrocentric chromosomes were consistent with the genus. The markings obtained with the probe of 18S rDNA serve as a basis for future work on population analyzes and studies of evolution karyotype.

Keywords cytogenetics, stingless bees, FISH

239 Chromosome banding patterns in some populations of the ant *Camponotus rufipes* (Formicidae: Formicinae)

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Camponotus rufipes is an ant with wide geographical distribution and is included in the subgenus *Myrmothrix*. This subgenus is characterized by having some species with conserved karyotype (number and morphology). Cytogenetic data are available for two populations of *C. rufipes*: Uruguay and Viçosa-Brazil, both with $2n=40$ chromosomes. Considering the lack of data on chromosome banding in *C. rufipes*, this study aimed to investigate the heterochromatin pattern of and regions rich in GC/AT base pairs of seven Brazilian localities: Viçosa-MG, Ubá-MG, Ponte Nova-MG, Lavras-MG, Rio de Janeiro-RJ, Petrópolis-RJ and Curitiba-PR. The mitotic chromosomes were obtained from the cerebral ganglia larvae, subjected to a hypotonic solution of colchicine and fixatives. The chromosomes were stained with Giemsa, C-banding technique and treated with the fluorochromes CMA3/DAPI. The karyotype presented $2n=40$ ($4sm+34st+2t$) in all populations. Pericentromeric and interstitial discontinuous blocks of heterochromatin were observed. GC-rich markings were observed in the second submetacentric pair using CMA3. There were no AT rich regions. The number and morphology of chromosomes observed in *C. rufipes* reinforce the conserved karyotype maintained in the *Myrmothrix* subgenus. Heterochromatic blocks, as well as the observed markings with CMA3/DAPI, were similar to other *Camponotus* spp. previously studied. The population survey achieved in this study regarding chromosome banding of *C. rufipes* may enrich any further cytogenetic discussions belonging to this group of ants. Therefore these results also contribute to a better evolutive understanding of the chromosome variation among *Myrmothrix* ants, providing data for comparison with other species of the genus *Camponotus*.

Keywords Cytogenetics, Formicidae, Evolution

240 Cytogenetic characterization of *Sitophilus granarius* (Coleoptera: Curculionidae)

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The *Sitophilus* genus, belonging to Curculionidae family, is considered a pest of stored grain. According to reviews conducted, this genus comprises 14 species, of which only four are economically important, *S. zeamais*, *S. granarius*, *S. linearis* and *S. oryzae*. The species chosen for this study, *S. granarius*, also known as woodworm-of-wheat, is able to attack a large number of hosts such as rice, corn, wheat, rye and oats, resembling *S. zeamais* in this respect. Thus, considering that cytogenetic data are important for the characterization of species, especially those which are morphologically very similar, the aim of this study was to characterize the karyotype of a population of *S. granarius* from Manhattan (Kansas), USA. The metaphases were obtained from cerebral ganglia larvae undergoing hypotonic solution of colchicine. For morphological analysis of chromosomes, we used Giemsa staining 5%. The C-band technique and the sequential fluorochrome staining (CMA3/DAPI) were used to highlight the heterochromatic and the regions rich in GC and AT, respectively. Results showed that this species has $2n = 24$ chromosomes, being 11 autosomal pairs and one sexual pair, being the X chromosome submetacentric and the Y, metacentric. The C-banding technique showed centromeric markings in a single autosomal pair and in the X chromosome. The CMA3 staining also demonstrated the presence of a single pair as the carrier of the nucleolus organizer regions (NOR) in this species. Therefore, the data obtained in this work show chromosomal markers that allowed the cytogenetic characterization of this species and consequently, may assist future comparative studies involving the other species of this genus, as well as evolutionary and phylogenetic studies of the Curculionidae family.

Keywords weevil, karyotype, evolutionary studies

241 B chromosome and cytogenetic characterization of the specie *Polybia phatycephala* (Hymenoptera: Epiponini)

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In the order Hymenoptera, B chromosomes are rare, in wasps only three species were identified with it. The genus *Polybia* has 58 species distributed from the southern United States to northern Argentina. Within this genus only eight species were described cytogenetically. *Polybia phatycephala* does not have its karyotype known. Thus the aim of this study was to describe the karyotype in mitotic cells of *Polybia phatycephala*. The nest was collected at Viçosa Federal University in the central apiary, it was used pre-pupae cerebral ganglia to obtain the metaphase chromosomes. To characterize the distribution of heterochromatin, we used the C-band technique. Fifteen metaphases per slide of 38 individuals were analyzed, classified according to the size of the chromosome arms. For the 18S rDNA mapping, fluorescence in situ hybridization was used. The chromosome number found was $2n=34 + 1B$ for females, being $24m + 10sm + 1B$ the karyotype. The heterochromatin was distributed at the centromere of 11 metacentric pairs, and in the smaller arm of the five submetacentric pairs. Also presented a pair of metacentric euchromatic chromosomes. In relation to the chromosomes of complement A, the chromosome B had reduced size and showed itself fully heterochromatic and rich in AT base pairs (DAPI+). It was present in 68% of pre-pupae analyzed, showing no variation between cells the same individual. The FISH with 18S rDNA probes scored a pair of metacentric chromosomes in the adjacent region to the heterochromatin, and it revealed no marking on chromosome B. The described karyotype with B chromosome may help the understanding of evolutionary processes, phylogeny and population of *Polybia*.

Keywords *Polybia phatycephala*, FISH, B chromosome

242 Neurobiological activity of the venom of *Pachycondyla striata* (Formicidae: Ponerinae)

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The venom of different animal species has been the target of studies to evaluate the biotechnology and therapeutic potential of their compounds. This work evaluated the neurobiological activity of the venom of the ant *Pachycondyla striata*, and the potential of the venom in neuropathology treatment. Cannulas were implanted into the lateral brains ventricle of mice. For neurobiological assays the mice were randomly divided into six groups: Control group, crude venom group 25, 100 and 250 mg/mL and heat denatured venom group 25 and 100 mg/mL. Each animal was intracerebroventricularly microinjected with 1 μ L of saline solution or venom. For the test in neuropathology treatment, mice had convulsive seizures induced by bicuculline. These mice were divided into two experimental groups: control group and denatured venom 25mg group. In the control group, mice received intracerebroventricular 1 μ L of distilled water and the treatment group 1 μ L venom (25 mg/mL), both followed by 1 μ L of bicuculline (10 mg/mL). In all experiments the mice were placed in a circular arena and recorded by 1200 seconds. All videos were analyzed and the behavior patterns of exploration, immobility, "grooming", procursive and tonic-clonic evaluated. Significant differences were found in relation to the behavior of immobility and exploration in mice treated with crude venom. In anticonvulsive assays no differences were observed in behavior between the control group and animals treated with denatured venom. Although venom denatured show that it is ineffective against bicuculline induced convulsions, the presence of neurotoxins indicates that *P. striata* venom may be an important source of compounds with potential for pharmacological studies to the comprehension of neurotransmission mechanisms.

Keywords Neurobiology, Tonic-clonic seizures; Anticonvulsant;

243 Classical and molecular cytogenetic analysis of two social species of wasps of the genus *Polistes* (Hymenoptera: Polistinae)

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The genus *Polistes* contains over 200 species with cosmopolitan distribution. The application of cytogenetic in insects is important in phylogenetic, taxonomy and mechanisms of speciation studies, besides being an additional tool to understand evolutionary events. However there is a lack of cytogenetic studies with social wasps. Therefore, the purpose of this study was to perform either classic and molecular cytogenetic characterization of two social species of wasps. Two nests were used in this study, *Polistes sp.* (from Palotina-PR) and *P. versicolor* (from Viçosa – MG). Cerebral ganglia of pre-pupae were used to obtain the metaphase chromosomes. The distribution of heterochromatin was characterized using the C banding technique. There were analyzed 15 metaphases in each slide and the classification of the chromosomes was based in the heterochromatin distribution. The fluorescence in situ hybridization was used to map the 18S rDNA. Both *Polistes sp.* and *P. versicolor* showed the same number of chromosomes, $n=31$ for males and $2n=62$ for females. There was a wide chromosomal variation in the *Polistes* genus, ranging from $n=9$ to $n=34$, showing some interspecific diversity. *Polistes sp.* showed chromosomes of similar size, meanwhile *P. versicolor* showed a gradual decrease in its chromosomes size. Based in the heterochromatin distribution, the karyotype formula for *Polistes sp.* and *P. versicolor* was $K= 2M+ 1A + 28 AMc$ and $K= 1M+1A + 29 AMc$, respectively. There were found 18S rDNA signals in the terminal region of the chromosome AMc in both species, wherein the *Polistes sp.* had one pair of chromosome marked and *P. versicolor*, two pairs. Even though there was a similarity in the number, morphology and karyotype formula, the 18S rDNA mapping allowed recognizing a significant difference between the species, demonstrating the importance of cytogenetic techniques used together.

Keywords FISH; rDNA 18S; cytogenetic

244 Accessing population structure of *Helicoverpa armigera* in South America through three mitochondrial genes

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Recently, the invasive *Helicoverpa armigera* (Lepidoptera: Noctuidae) was found in Brazil causing significant economic losses (about US\$ 4 billion) infesting mainly soybeans. Genetic and population studies around the world have showed that this pestiferous moth can migrate very long distances and haven't detected significant population structure by geographical distance. Here, we aim to provide insight into the population structure of the *H. armigera* in South America through different approaches of analysis of molecular variance (AMOVA). 222 larvae or adults of *H. armigera* were collected and preserved in 100% ethanol at -20°C, including: Argentina(n=2), Paraguay(n=5), Mato Grosso(n=11), Minas Gerais(n=16), Bahia(n=21), São Paulo(n=36), Roraima(n=14), Rondônia(n=21), Maranhão(n=28), Tocantins(n=6), Pará(n=2), Rio Grande do Sul(n=3), Piauí(n=49) and Mato Grosso do Sul(n=8). Total DNA was extracted using the phenol:chloroform method and partial sequences of the cytochrome b (Cyt b), cytochrome c oxidase subunits I (COI) and II (COII) mitochondrial genes were amplified and purified. Resultant amplicons were sequenced by the ABI3730xl DNA Analyzer and the sequences of the three genes were verified in sequence scanner v1.0 and concatenated in MEGA v. 6.0. Then, the sequences were aligned using the Clustal Ω algorithm. Arlequin v.3.5 was utilized to perform four different AMOVA approaches in three hierarchical levels: (1) 4 geographic regions, (2) semesters, (3) youth/adults and (4) winter/summer like groups in each approach. Comparisons of genetic variation by AMOVA indicated that the greatest amount of total variation was accounted within populations in the four approaches (>95% P<0.05) and little genetic differentiation occurred in the other two levels of the populations analyzed. Taken as a whole, our results found no evidence of population substructure, corroborating similar studies of this pest made by other authors.

Keywords *Helicoverpa armigera*; AMOVA; mitochondrial genes

245 The Meiosis in *Podisus nigrispinus* Males

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Asopinae (Heteroptera, Pentatomidae) representatives are widespread with approximately 300 species. *Podisus nigrispinus* is a predatory Pentatomidae with potential use for biological control in agriculture and forest. The genetic system of Heteroptera has some unique features among insects with holocentric chromosomes, achiasmatic meiosis and post-reductional to the sex chromosomes. The chromosome studies in Asopines are hard, due to the small size of holocentric chromosomes. This study evaluates the karyotype and chromosomes features during the spermatogenesis in *P. nigrispinus*. The chromosomes were obtained from the brains in nymphs and testes of adult males *P. nigrispinus* and stained with acetic orcein, submitted to C-band techniques and sequential staining with fluorochromes (DAPI/CMA3). The chromosome number of *P. nigrispinus* was $2n = 16$, with holocentric chromosomes, which was also found in germ cells ($2n = 14+XY$). During meiosis, in the diplotene of prophase I, the sex chromosomes remain together and heteropycnotic, always associated with the nucleolus, the autosomes are paired forming bivalent with chiasmata. During metaphase I sex chromosomes separate and become isopycnotics, then the number of visible chromosomes is nine, seven autosomal bivalents, and two unpaired sex chromosomes, all highly condensed, then they are linked to the division spindle and arranged on the equatorial plate, followed by separation of chromatids at anaphase I. In anaphase I the Y chromosome has noticeably equational segregation while the autosomes have segregate independently, showing an inverted meiosis to the sex chromosomes. At the end of anaphase I and telophase I the chromosomes are separated into two groups. In metaphase II the sex chromosomes seems to be paired, forming a heterochromatic pseudobivalent. Chromosomes stained with DAPI/CMA3 fluorochromes showed a more intense staining for the autosomes, while the Y chromosome was negatively marked for both fluorochromes and the X chromosome remained similar to autosomes. Weak staining of chromosome Y by DAPI or CMA3 indicates that the chromosome does not have very large regions rich in AT or GC, but small regions interspersed, or that the technique used was unable to detect the expected differences and needs to be improved for the species.

Keywords cytogenetics, chromosomes, inverted meiosis

246 Let it roll, baby, roll: Species specificities in dung removal by two dung beetle species

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Most dung beetle (Scarabaeidae: Scarabaeinae) species use dung as food and oviposition resources, showing different strategies for resource allocation. Roller beetles rolls dung into round balls, roll them to some distance away from the food source and finally bury it. Several studies associate dung removal and burying by dung beetles with a set of ecological functions and services, such as soil fertilization, improved nutrient cycling. Although most studies have assessed the functions performed by dung beetles communities, the individual species contributions remains poorly understood. We conducted a study on dung removal by individuals of two roller species (that *Canthon smaragdulus* and *Canthon sulcatus*) collected in 'Rio Doce' State Park. We tested two hypotheses:(1) dung removal differs between species, and (2) dung beetle biomass is positively correlated with dung removal. The experiment was carried out in the laboratory with 30 repetitions per species. Each repetition consisted of a bucket with 5 kg of soil, 100 g of mixed pig and human dung (4:1, respectively) and two unsexed individuals of one species per bucket. The test lasted 48 hours. After this period, all remaining dung were collected and weighted. We also used humidity control 10 repetitions (without beetles) to avoid the overvaluation of dung removal by dung beetles. Our results demonstrated that *Canthon smaragdulus* (18,1 g) removed significantly more dung than *Canthon sulcatus* (10,2 g) (GLM: $F_{1,56} = 9.06$; $p = 0.01$). Oppositely to the expected, the individual biomass was not related to the dung removal function (*Canthon smaragdulus*,(GLM: $F_{1,26} = 0.0811$; $p = 0.77$;and *Canthon sulcatus* GLM: $F_{1,26} = 0.0082$; $p = 0.9285$). Our results show that dung removal can be species-dependent. In addition, we believe that fine scale data based on individuals can be very useful for better understanding and valuating of ecological services provided by dung beetles.

Keywords Ecological services, dung removal, Scarabaeinae

247 Age and time related pheromone production in *Helicoverpa armigera* (Lepidoptera:Noctuidae) from Brazil

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High infestations of the invasive polyphagous cotton bollworm *Helicoverpa armigera* began occurring in Brazil in the 2011/2012 growing season, causing major losses in corn, cotton and soybean crops. One of the methods considered for the control of this pest is the monitoring using sex pheromone traps. Given that geographic variation of the sex pheromone can occur in different populations of the same species, we evaluated the frequency of production and quantification of the major component of the sex pheromone of *H. armigera* females, (Z)-11-hexadecenal (Z11-16Ald), in Brazil. A colony was established by insects originated from larvae collected from soybean fields in Bahia state. The larvae were reared on an artificial diet in climate-controlled chambers (25±2°C, 70±10% RH and 14L:10D photoperiod). The Z11-16Ald was extracted with hexane from pheromone glands of virgin females of 1, 3 and 5 days old every 2 hours, starting 2 hours before the start of the scotophase and finishing 2 hours after the end (n=5). It was analyzed by a GC-FID. The females of all ages had the highest amount of pheromone at the last 4 hours of the scotophase, declining its production after the onset of photophase (Negative Binomial GLM, Chi-square test followed by contrast analysis, p<0,001). There was no difference in the amount of pheromone produced by females of different ages (p=0,82). The productivity peak coincides with the peak calling behavior of other populations, although the mean amount of Z11-16Ald obtained in the brazilian population was higher. The also polyphagous moth *Helicoverpa zea* is commonly found in corn crops in Brazil, where it was probably established via a founder event from *H. armigera* about 1.5 million years ago. Since both species share the same pheromone components, further studies regarding their chemical communication are important to know if the invasive species can interfere the chemical communication of the native species.

Keywords Cotton bollworm, (Z)-11-hexadecenal, Heliothinae

248 Larval activity of *Eriopis connexa* (Coleoptera: Coccinellidae) in two different populations

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The insect activity behavior is characterized as an important component in the strategies of history of their lives, any alteration might cause a direct influence in the success of those individuals such as in searching for food or a partner and also as escaping from predators. The Ladybug, *Eriopis connexa*, is a natural and generalist enemy that during all of its phases of development (larval and adult) is capable to control many plague insects such as aphids and mealy bug. The research aim was the evaluation of behavioral activity in 2 populations of *Eriopis connexa* in the phase of larval development. To the experimental part were used 2 populations of Ladybug, where one was susceptible to the insecticide Lambda cyhalothrin (pyrethroid) with DL 50 2.4mg of the technical product, the another one was resistant to the insecticide, presenting a DL 50 of 312.5mg. A tracking system was necessary to conduct the experiments by using a video camera coupled to a computer (View Point Life Sciences Inc Montreal – Canada). The insects were placed in arenas (Petri dish of 9 cm de diameter, 2cm of height) and evaluated for 10 minutes. The repetitions were counted as 58 insects (susceptible population), 84 insects (resistant population). Parameters such as distance walked (cm), resting time (s) and average velocity (cm/s) were evaluated. Throughout the ANOVA analysis, the data were evaluated by using the software SAS (SAS Institute, 2008). Regarding the speed (cm/s) the susceptible population was 0.80 ± 0.05 (mean followed \pm standard deviation) and the resistant one was 1.35 ± 0.12 , $F=32.24$ $P < 0.001$. On the top of all this, there is also a parameter of resting time (s), where the susceptible population was 266.14 ± 15.93 , and the resistant one was 186.44 ± 10.90 , $F=20.88$ $P < 0.001$. The results suggest that the resistant population had an unusual standard behavioral, when compared to the susceptible population, by assuming more risk in search for food and partner, and also regarding escaping from predators.

Keywords Ladybug, behaviour, activity

249 Larval activity of *Eriopis connexa* (Coleoptera: Coccinellidae) in two different populations

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The *Eriopis connexa* is a generalist predator during all stages of development (larva and adult) that has the ability to feed on insect pests like aphids, scale insects, mites and psilidios. Among the main characteristics of the specie in studies, we can mention its high voracity where there is the presence of aphids, their preferential prey; studies report that this species can feed up to 10 aphids per day. The aim was to evaluate the behavioral activity of aggressiveness in two *Eriopis connexa* populations in the stages of larval development and adult. Two *Eriopis connexa* populations were used, one susceptible to the insecticide Lambda cyhalothrin (pyrethroid) with DL 50 of 2.4 mg of technical product and the other resistant to the pesticide having a LD 50 of 312 , 5 mg of technical product. The number of repetitions was 58 insects (susceptible population) 84 insects (resistant population), the behavioral parameter of Aggressiveness was evaluated two times in each insect (larva stage and adult). An *Eriopis connexa* individual (predator) was placed in one of the arena extreme , and the aphid (*Brevicoryne brassicae*) placed in the middle of the arena. The maximum observation time was 10 minutes. The end of test was when the ladybug started eating the aphid. The latency to attack data were analyzed by ANOVA, the SAS program (SAS Institute, 2008). The result was that there is a difference in the behavior pattern among populations in the larval stage, but not for adults. Average latency to attack , in the susceptible population, followed by its standard deviation 100.27 ± 14.27 , resistant population have 231.63 ± 3.18 $F = 26.68$ $P < 0.001$. But in adults both populations exhibited the same behavior profile $F = 12.25$ $P < 0.61$, susceptible population with average and standard deviation of 261.15 ± 19.27 and the resistant population 256.60 ± 26.60 .

Keywords Behavioral, *Eriopis connexa*, Aggressiveness

250 Attractiveness of 'boldo', *Vernonia condensata* to leafhoppers in a commercial citrus orchard in 'Recôncavo' of Bahia

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The bacterium *Xylella fastidiosa*, causal agent of citrus variegated chlorosis (CVC) is registered in all sweet orange cultivars. It can be transmitted by infected citrus propagation material and by leafhoppers of family Cicadellidae and Cercopidae. This work aimed to evaluate the attractiveness of 'boldo', *Vernonia condensata*, to species of leafhoppers in a commercial citrus orchard of sweet orange cv. Pera. Fortnightly collections of the leafhoppers present on eight 'boldo' plants were performed from January 2014 to January 2015. All the leafhoppers species collected were identified. Leafhoppers monitoring was undertaken from April 2014 to September 2015 by using 15 yellow sticky traps. The faunistic indices Frequency (F) and Constancy (C) were analyzed. Collection on 'boldo' plants: a total of 171 individuals were collected, which were classified into the following species: *Oncometopia clarior* (86), *Acrogonia citrina* (41), *Homalodisca spottii* (17), *Tapajosa fulvopunctata* (11), *Crossogonalia hectica* (8), *Hortensia similis* (6), *Dilobopterus* sp. (2). *O. clarior* and *A. citrina* were considered as constant species; *T. fulvopunctata* and *H. spottii* as Accessory and the others species as Accidental. Collection using yellow sticky traps: a total of 157 leafhoppers were trapped, which were classified into 9 species: *A. citrina* (64), *O. clarior* (48), *C. hectica* (18), *H. spottii* (15), *Diedrocephala variegata* (5), *H. similis* (3), *T. fulvopunctata* (2), *Curtara* sp (1), *A. flagelata* (1). The species *A. citrina*, *O. clarior*, *C. hectica* and *H. spottii* were Constant; *D. variegata* was accessory and the others were Accidental. There was a similarity among the species attracted by 'boldo' plants and those trapped on yellow sticky traps. *V. condensata* was attractive to the leafhoppers, demonstrating the feasibility for its use as a trap plant.

Keywords *Xylella fastidiosa*, citrus variegated chlorosis, trap plant

251 Courtship behavior of *Euschistus heros* (Heteroptera: Pentatomidae) and differences between mated and virgin couples

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The brown stinkbug *Euschistus heros* (Hemiptera: Pentatomidae) is an important pest of soybean in Brazil. Despite of the increasing emergence of *E. heros* in many regions in Brazil, a few studies have been made about the biology and reproduction of this species. Therefore, the aim of this study was understand and clarify the courtship behavior of *E. heros* and evaluate the differences between mated and virgin couples. Under controlled temperature conditions, we paired sexually mature adults separated into petri dishes without any element that could make interference and were it was possible to record the courtship behavior uninterruptedly. The duration of courtship was measured from the moment the male moves towards the female until the beginning of copulation. When the male is close to the female, the male climbs on the female's dorsum. Subsequently, the male goes down and with the middle segments of the antenna touches the abdomen of the female. Afterwards, the males exhibits three types of behavior, which are: most of the males touche the female distal part of the abdomen with the antenna; other males touche the lateral parts of the female abdomen; a few males realized the two types of touches. After this movement of the male antenna, the female can reject the male moving away from it, and then the male might give up or make a new attempt latter. Otherwise, when the female accepts the male, the male raises the distal part of the abdomen. Subsequently, the male rotates the body until the distal part of the female and male abdomens were close. At that time the male exposes its genitalia, and male moves the abdomen in different directions to reach the female genitalia. The behavior of courtship was very similar between mated and virgin couples. However, the duration of courtship was longer in mated couples indicating possible differences in female receptivity.

Keywords Courtship, behavior, mated, virgin

252 Flexibility in the choice of foraging strategies in *Pachycondyla striata*

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Behavioral flexibility is one of the factors that enable ant ecological success, since changes in behavioral patterns allow populations to adapt to environmental changes. This feature is particularly important for the workers of a colony during foraging activities as it is often necessary to adopt different behavioral strategies to obtain food resources. In the species *Pachycondyla striata*, which retains ancestral behavioral traits, foragers may decide to obtain food solitarily or to recruit other ants to it through tandem-running (a behavior where one ant leads the other through direct physical contact to a location), according to the situation. To evaluate whether distance, type of food and time of permanence at the food source are relevant factors for decision-making about foraging strategies, laboratory experiments were conducted. Two rectangular arena colonies were connected to tracks of 4.50 m. Two factors were studied: distance to the food source (1,90m or 4,5 m) and food type (tuna or cricket). The time spent at the food resource and the foraging strategies employed by the ants, solitary or tandem-running were measured. We found that a greater distance of the food resource and the time of permanence at the food source influenced the type of strategy adopted, increasing the likelihood of recruitment regardless of the kind of food. Through the results obtained in this study, we can conclude that the motivation and behavior of ants during foraging activity is influenced by environmental factors, suggesting that flexibility in the decision-making process can reduce the cost associated with exploration and optimize foraging. However, additional research is needed before a clear understanding of the mechanisms behind this pronounced flexibility is achieved.

Keywords flexibility, foraging, *Pachycondyla*

**253 Ant biology *Dolichoderus attelaboides*
(Hymenoptera, Formicidae, Dolichoderinae)
in the Brazilian Amazon**

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The family Formicidae belongs to the order Hymenoptera, is one of the most diverse, with about 12,500 described species and 312 genera; distributed in all terrestrial ecosystems. The Formicidae family is the one with the greatest diversity of biologies. *Dolichoderus attelaboides* is a common species in the Amazon and that their biology has been little studied. So this paper aims to conduct a study on various aspects of *Dolichoderus attelaboides* biology. Samples were collected at two sites in the city of Bethlehem: Bosque Rodrigues Alves and Environmental Park of Bethlehem, Utinga. Search collections were made active on the trails into the woods and collected ants were taken to the laboratory. It has built an ethogram in which there were 20 behaviors, the most common being: food water with honey, stop inside the nest, carrying larvae. The trophallaxis behavior, very common in ants, was not observed. Plants in which *D.attelaboides* was observed were: *Heliconia psittacorum* (Heliconiaceae); *Ischnosiphon sp.* (Marantaceae); *Calathea sp.* (Marantaceae); *Brunfelsia sp.* (Solanaceae); *Sanchezia* (Acanthaceae); *Inga sp.* (Fabaceae). The Hemiptera related ants were those belonging to Aphididae and Membracidae families. The results related to *D.attelaboides* behavior were similar to those already obtained in other studies of species.

Keywords Behaviors, biology, ants

254 Effect of aqueous extract of plant structures of *Hedychium coronarium* in behavioral action of *Sitophilus zeamais*

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¹Universidades Estadual Paulista Júlio de Mesquita Filho – UNESP The development of research on alternative pest control tactics such as the use of plants with insecticidal action, has proven to be a good tool in integrated pest management. In this context the work aimed to evaluate in the laboratory the insecticide activity of plant parts bud, stem, leaf, root and rhizome of *Hedychium coronarium* the weevil of the cereals *Sitophilus zeamais*. After collecting the plant structures plant were separated and transferred to an oven with forced air circulation regulated at 40°C for drying, then milled to obtain the vegetable powder, which are stored individually in sealed glass containers and stored in the dark until the preparation extracts. For the preparation of the aqueous extracts was adopted concentration of 10% were weighed 20g of each plant structures separately and diluted in 200 ml of distilled water and homogenized, sealed with parafilm and left to stand for 24 hours, subsequently strained with the aid of voile. The insects used in the tests were obtained maintained in the laboratory setting. In repellency test each part of the plant was evaluated separately being held ten repetitions, using arenas made up of five circular plastic boxes, being the central box linked to the others with plastic tubes diagonally. On each side of the box were deposited 10 g of corn grains, which at two opposite symmetrical containers grains were treated with distilled water (control) and in the other two grains were treated with the aqueous extract. In the central container they were released 20 insects and after 24 hours was counted the number of insects per plastic box. The tests were conducted in a climatic chamber at 25 ± 2°C, relative humidity of 60 ± 10% and photoperiod of 14 hours. All treatments proved to insect repellents. The aqueous extract of bud, stem, leaf, root and rhizome of *Hedychium coronarium* species may present some potential for use in the management of *Sitophilus zeamais* adults.

Keywords repelência, grãos armazenados, *Sitophilus zeamais*

255 What determines the occurrence of ants in mangroves? A review of nesting and foraging

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Mangrove is an ecosystem located between terrestrial and marine environments often flooded and may limit the occurrence of ants. This work aims to analyze the mechanisms of nesting and foraging may explain the presence of ants in mangroves. Therefore a total of 21 articles were analyzed, of which 18 were chosen. The selection of articles was made through the keywords: mangrove, ants, nest, inundation, extrafloral nectaries, food items through the ISI Web of Science sites, Google Scholar, Scielo and CAPES. Research refined the material found, taking into account 13 articles of nesting, which confirmed the presence of ant colonies in plants and soil, and 06 articles foraging, which proved food items consumed by the ants. The remaining articles were disregarded. Most work shows a preference for plants such as nesting site. Only *Polyrhachis Sokolova* presents specializes in nest and forage in the muddy soil of the swamp. The main items to foraging are extrafloral nectaries and coccidea exudatos available in straight plant crustacean carcasses on the ground. This work is also important, so that many researchers feel is motivated to investigate nests, habits and ecological interactions of ants inhabiting Mangroves in Brazil, as the studies presented in this article point to a wide range of information from abroad related to the theme.

Keywords Ants; Inundation; Food Items

256 *Diaphorina citri* responses to volatiles from *Ruta graveolens* and *Murraya paniculata* in olfactometer bioassays

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The citrus plant is one of the crops that show a high number of insect pests. However, few of them are actually considered important for the crop. *Diaphorina citri* Kuwayama is the vector of the bacterium that causes Huanglongbing (ex-greening), one of the most severe diseases worldwide. The aim of this study was to evaluate the behavioral response of *D. citri* adults in relation to plant volatiles. The experiment was performed under laboratory conditions at average temperature of 24°C and relative humidity of 68%. A four-arm olfactometer (multiple choice) was used. Charcoal-filtered air was pushed into the olfactometer at the rate of 0.2 L/min, at a pressure of 25 psi. Two treatments were evaluated, (i) *Ruta graveolens* and (ii) *Murraya paniculata* (control) branches with 45 replicates. The insects starved for 1h were released into the central area of the olfactometer through a small hole (0.8 cm in diameter) (the same one used for drawing the air). Only females were used. The evaluations were undertaken to obtain the residence time in each one of the four arms during the experimental period (10 min). At each replicate, a different insect was introduced into the olfactometer. The residence time was analyzed by t test considering paired samples (one-tail). For each bioassay, similar branches as regarding to the mass were used for both plants. Just after the branches were removed from the plants, they were immersed in water. Before the bioassays had started, a cotton ball previously immersed in water was used for keeping the branches turgor, which was covered by a plastic film and aluminium foil for preventing volatiles contamination inside the aeration chambers. There were no significant differences between the treatments ($p < 0.05$), indicating that both are attractive to *D. citri* females. *M. paniculata* is cited as a preferred host plant for the insect. Research is required for studying *R. graveolens* potential for monitoring and/or controlling *D. citri*.

Keywords HLB; Attractiveness; Preference

257 Evaluation of the repellent effect of plants extracts on the *Tetranychus bastosi* in physic nut

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Tetranychus bastosi is a major pest of physic nut plants. Laboratory trials were conducted to evaluate the repellent and toxic properties of the Caatinga plants extracts - *Myracrodruon urundeuva* (Anacardiaceae), *Croton blanchetianus* (Euphorbiaceae) and *Ziziphus joazeiro* (Rhamnaceae) - on the mite. The experiment was performed in two discs of physic nut leaves: treated with the plants extract x treated with distilled water (control), interconnected by a cover slip 18 x 18 mm in Petri dishes, in which they were released three adult females mites. Each extract was tested individually in a completely randomized design, with two treatments (extract versus control) and three replications. The bioassays were assessed during 4, 8, 24 and 48 hours after installation of the experiments, observing the number of mites and eggs laid on each disc. The repellency index (RI) was calculated. The mite *T. bastosi* both remain and lay their eggs on the disks that containing the distilled water. The presence of mites was observed largely on the control. The oviposition was well observed in the last hours of evaluation, where it was verified that they laid more eggs in the control. The extract of Aroeira there was no significant difference among treatments. However, in extracts of Velame there were significant differences to the number of attracted females with 4, 8 and 24 hours. In extract of Juazeiro, it was observed difference only in the past 48 hours, both to attracted females as for oviposition. All dosages of Juazeiro extracts showed repellent effects, except dosage of 20% to attracted females. In the treatments with extracts of Velame only the dosages 20% and 15% (oviposition and attracted females, respectively) showed lower repellency of the extract, the others showed greater repellency. For treatments with extract of Aroeira, only the dosage of 20% (oviposition and attracted females) showed less repellency compared to the control.

Keywords Oviposition, repellency, attraction

258 Effect of previous herbivory in citrus plants on *Diaphorina citri* Kuwayama (Hemiptera: Liviidae) behavior

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HLB (Huanglongbing) represents the main threat to the sustainability of citrus agroindustry in Brazil. Currently, there is no cure for the disease, therefore the methods for reducing crop losses are based on the control of the vector, the psyllid *Diaphorina citri*. The understanding of the vector/host plant interactions is primordial for the development of strategies for integrated pest management. Thus, this study aimed to evaluate the behavior of adults of *D. citri* in response to plants submitted or not to previous herbivory. Olfactometer bioassays were performed using Pettersson olfactometer (multiple choice). The air was pushed inside the olfactometer at a rate of 0.5 l/min in each one arm. The bioassays were conducted under laboratory conditions (temperature: 25±2°C, relative humidity: 70±10%, during the period between 9h00 and 16h00) using citrus plants cv. Sunki Maravilha planted in plastic bags. The bags and the soil were wrapped with aluminium foil. Plants submitted to previous herbivory were infested with adults for five days by confining them in voil cages (proportion of 10/cage). Before testing, the insect remained unfed for 1 hour. At each bioassay, held for 10 minutes, a fresh insect was placed into the olfactometer. There were 15 replicates. The residence time, the number of entries in each arm and the first choice were registered and data were analyzed by t test. The percentage of responding insects was 80%. There were no significant differences between the treatments for the variables evaluated ($p < 0,05$). The high variability observed in the experiment might be consequence of testing both males and females, since they show different behavioral responses. It is also possible that there was an associated effect of volatiles released by insects and plants. It is recommended that the next bioassays be conducted testing only males or females or using a higher infestation pressure or time lasting, discriminating the insects according to the sex.

Keywords HLB; Preference; Chemical Ecology of Insects

259 **Atractiveness of *Ruta graveolens* e *Murraya paniculata* to *Diaphorina citri*
(Hemiptera: Liviidae)**

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Diaphorina citri is considered one of key pest of citrus crop due to its ability to transmit the bacterium that causes Huanglongbing (HLB). The control of *D. citri* is based on the intensive use of insecticides. This can lead to serious environmental and human health hazards. Thus, alternative methods for controlling this pest are required. The understanding of insect behavior can help to develop strategies of control. This study aimed to evaluate the attractiveness of *Ruta graveolens* and *Murraya paniculata* on *D. citri* in free choice tests. The experiment was performed under laboratory conditions (temperature: 25 ± 2 °C, relative humidity: $70\pm 10\%$ and photophase: 14 hours). A plastic cage (47x47x47 cm) with anti-aphid screened walls and frontal plastic opening was used. The experimental design was completely randomized with two treatments, one of them constituted by a branch of *R. graveolens* and another of *M. paniculata* (test) and the second treatment formed by two *M. paniculata* branches (control), with 15 replicates. The branches of the plants, kept in a phenolic foam piece immersed in water, were placed on the opposite corners of the cage, at the same distance from each other. The *D. citri* adults (15) were released in the center of the cage. The evaluations were started 1 hour after the insect release and continued at intervals of 1 hour for more 3 evaluations, counting the number of adults on the branches. After the last evaluation (4 hours after the insect release), the quantity of alive and dead insects was determined. The data relative to the average of the evaluations for each treatment was submitted to variance analysis. It was registered a higher attractiveness to the insects for the treatment that contained a *R. graveolens* branch related to control, there was a significant difference between the treatments ($p < 0,05$). The percentage of alive insects was higher than 80%. For the conditions of this study, it is concluded that *R. graveolens* is attractive to *D. citri*.

Keywords citrus pest, alternative management, attraction

260 Identification and distribution of richardiidae (diptera, acalyptratae) from the entomological collection of Museu Paraense Emílio Goeldi (mpeg) Belém

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The family Richardiidae comprises 34 genera and 178 species of small to medium sized flies restricted to New World. There are 62 species in 13 genera of Richardiidae in Brazil, of which 16 have been recorded from Brazilian Amazon. The present study brings a survey of richardiidae flies from the Entomological Collection of Museu Paraense Emílio Goeldi, Belém city, state of Pará, Brazil, that is one of the most important collections of Brazil. This collection includes 826 specimens, 28 species and ten genera: *Automola* (2 species), *Beebeomyia palposa*, *Coilometopia* (2 species), *Epiplatea acurata*, *Hemixantha* (7 species), *Melanoloma* (3 species), *Odontomera* (2 species), *Richardia* (5 species) and *Setellia* (2 species) and a new genus (1 species). The species *Automola atomaria* and *A. caloptera* are newly recorded from the state of Acre, *Epiplatea arcuate* is newly recorded from the states of Roraima and Acre and *Hemixantha ornamentata* and *Hemixantha cyanogaster* are newly recorded from the state of Pará. The most representative species are *Automola caloptera* (94 specimens) and *Richardia pectinata* (84 specimens). Most of the specimens were collected in the state of Pará (81%) and only 8% in Acre and 3% in Rondônia which are poorly sampled places of Brazilian Amazon.

Keywords Diversity, Brazilian Amazon, Record

261 Egg morphology of *Martarega bentoi* (Heteroptera, Notonectidae)

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The Notonectidae family consists of aquatic species, which are commonly called backswimmers, because within of Hemiptera are the only to swim upside down using exclusively the hind legs. In nature their eggs are laid on the surface of twigs or submerged plants, while in the laboratory was observed that the eggs are deposited on the wall of the plastic container in which they found themselves. The morphological characteristics of the eggs, especially the surface of the chorion, exhibit differentiation in several taxonomic order of insects, so they are widely used to phylogenetic analyses. So, to extend the information about the *Martarega bentoi* biology and searches also contribute with data to the systematic of Notonectidae, morphometric and morphologic analysis were realized with light and scanning electron microscopy of embryonated eggs from notonectid *M. bentoi* maintained in the Ultrastructure Cell Laboratory – UFV. For morphometry, the eggs were fixed in 2.5% glutaraldehyde and photographed in stereomicroscope (Zeiss Discovery V-20) and light microscope (Olympus BX-60) with attached digital camera; were later measured with the Image Pro-Plus software. For morphologic analysis was used a scanning electron microscopy Zeiss (LEO VP1430), following the routine methodology. The eggs of *M. bentoi* measure about 1.3 mm in length and 0.55 mm in wide. In this species, the outer surface of egg exochorion displays a polygonal pattern, predominating the hexagonal, with numerous spicules. There is a gelatinous substance with a thickness of about 0.15 mm, which involving the eggs and serve to attach them to the substrate. The micropyle is observed at one end. Heteroptera eggs have a stable form due to chorion sclerotized, as observed in *M. bentoi*.

Keywords Aquatic insects, chorion, micropyle

262 Morphology of sperm and reproductive system of *Lasioderma serricorne* (Coleoptera: Anobiidae)

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The cosmopolitan beetle *Lasioderma serricorne*, popularly known as "tobacco weevil", is considered a primary pest of tobacco (Powell, 1931). It is also pest of other stored food products as: wheat flour, grain and spices (Minor 1978; Ashworth 1993; Zakladnoi and Ratanova 1987) and, in addition, it has frequently appeared on the stored soybeans. It causes serious damage to affect the quality of products offered in domestic and foreign markets (Ferri et. al, 2012). In general, the male reproductive system in insects consists of a pair of testes connected to a pair of vas deferens, which empty into the ejaculatory duct. The testes are composed of follicles, which can vary greatly in number and shape among insects (Phillips, 1970), sometimes even between closely related species. For a description of the reproductive system in this beetle were realized techniques of light microscopy and transmission electron microscopy. The Anobiidae *L. serricorne* has the male reproductive system consisting of two isolated testes, each with two follicles, and five pairs of different accessory glands. From each testis leaves a vas deferens, the two vas, along with the accessory glands, end at the anterior extremity of the ejaculatory duct. The follicles are filled with cysts in different stages of spermatogenesis. At the end of this process we observed, in average, only 28 sperm (1400 μm in length each) by cyst. This number of cell indicates 5 division cycles (25) during spermatogenesis. This differs greatly from most of beetles, in which are generally observed 256 (28) spermatozoa per cyst (Virkki, 1969). However, according to this author, the number of sperm per cyst can range from 16 to 256, with the more derived species tending to the smaller number. If so, this small number of sperm per cyst indicates that Anobiidae is among the most derived families of Coleoptera.

Keywords tobacco weevil, stored foods, male reproductive system

263 Description of the male of *Onega sanguinicollis* (Hemiptera: Cicadellidae) with a new record from Colombia

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Leafhopper species of *Onega* share the crown-frons transition with a carina; apex of crown and superior portion of frons with concavities; pronotum wider than transocular width of head; scutellum swollen; and paraphysis, when present, as a median sclerite. The genus is restricted to South American countries: Bolivia, Ecuador, Colombia, Peru, and Paraguay, in addition to a controversial occurrence in Cuba of *O. sanguinicollis*. The latter species is only known by the female lectotype, and its record in Cuba was previously considered erroneous, however, its correct geographical distribution was unknown. Based on the study of the external morphology of a specimen from Colombia (Depart. de Caldas), it was identified as *O. sanguinicollis*. Therefore, this paper aims to describe the unknown male of *O. sanguinicollis* and record the species for the first time in Colombia. The analysis of the structures of the male genitalia was made as follows: (1) the abdomen was removed; (2) placed in 10% KOH in water bath; (3) washed for 5-10 minutes in hot water; (4) placed on a concave slide with glycerol for observation and illustration; (5) illustrated using a camera lucida coupled to a Zeiss dissecting microscope with an objective of 1.6X and 4X magnification; and (6) stored in a small genitalia vial with glycerol pinned below the specimen. The right fore wing was mounted on a slide with cover slip to be drawn. Photographs of the dorsal and lateral habitus of specimens were taken on a digital camera attached to a Leica stereomicroscope at different focal points and stacked with the program CombineZP. The Colombian male has the genitalia similar to *O. orphne*, but differs from it by its red habitus coloration; pygofer with distinct spine-like processes and a small lobe at the posterior margin; and aedeagus without a ventral asymmetrical spine and dorsal region of the dorsal process forming a serrated flange.

Keywords Taxonomy, Andes, Colombia

**264 A new genus and species of Asphondyliini
(Diptera) associated with *Simarouba amara*
Aubl. (Simaroubaceae) from Brazil**

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A new genus and species of Cecidomyiidae associated with *Simarouba amara* Aubl. (Simaroubaceae) is described based on material from Chapada dos Guimarães (Mato Grosso-Brazil). This work aims to characterize this new galler. The galls collected in Chapada dos Guimarães were photographed, characterized and transported to Laboratório de Diptera (Museu Nacional / UFRJ). The galls were dissected and reared to obtain immature and adult stages, respectively, that later were mounted on microscope slides. Samples of the host plant were identified as *S. amara* Aubl by Dra. Gracilda Ferreira (Universidade Federal Rural da Amazônia). The gall was characterized as cylindrical, glabrous, one-chambered, and developing from bud and leaves. The new genus presents ovipositor, cerci and wings similar of *Proasphondylia*, however the later has adults with sinuose circumfila, 3-segmented palpus, and pupae without antennal horn, frontal horns present, and all facial papillae present. The new genus is unique in having: male cylindrical flagellomeres, reticulate circumfila in both sexes, 1 or 2-segmented palpus, empodia shorter than claws, wide aedeagus; long, striate and protrusible ovipositor, tapering to the apex, with sclerotized base, fused and elongated cerci, setose at apex; pupae – small antennal horns, dorsal abdominal spines absent; larvae –2-toothed spatula. The new species presents: male – eighth abdominal tegument unsclerotized, triangular and wide gonocoxite, semi-circular gonostylus, triangular and narrow hypoproct, bilobate cercus, short and trapezoid parameres; female –eighth abdominal segment, with two lobes; pupae – protoracic spiracle short; larvae - one pair of both lateral papillae and terminal papillae.

Keywords gall midge, taxonomy, insect-plant interaction

265 Variation in wing venation in different populations of *Scaura latitarsis* (Hymenoptera: Apidae: Meliponini)

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Scaura is a neotropical little diverse genus of stingless bees and widely distributed. It is recognized for having the third basitarsus as wide as or wider than the tibia, and malar area shorter than the diameter of the flagellum. Among the five valid species, *Scaura latitarsis* (Friese, 1900) is the most widely distributed with occurrence records from the state of Tachira, Venezuela, to the state of Paraná, Brazil. This broad distribution and adaptation to different environments suggest that this is a species complex which needs more accurate studies for a correct separation of morphospecies. The goal of this study was to determine the variation in wing venation of different populations of *Scaura latitarsis* in two Brazilian biomes using geometric morphometry. The extraction of the right forewing was performed in 56 workers borrowed from entomological collections. The wings were mounted on slides, glued in labels and transfixed to the specimen's pin. Twenty-three of these specimens were collected in remnants of Atlantic Forest in two mountains in state of Ceará, 11 in Meruoca and 12 in Ubajara. The other 33 specimens were collected in the Amazon region: one in Acre, 14 in Amazonas, two in Para, seven in Rondônia and nine in Roraima. Photos were taken and used in the software tpsUtil and tpsDig to designate landmarks; tpsRelw for relative and partial warps; and MorphoJ to perform principal component analysis (PCA). The results showed that the Atlantic Forest's population formed a separate group from the Amazon's population, with 38.05

Keywords Stingless bees; Geometric morphometry; Bee's population

266 Taxonomic study of the genus *Mecistogaster* (Odonata: Pseudostigmatidae) in the Atlantic Forest

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The order Odonata consists of the suborders Zygoptera, Anisoptera and Anisozygoptera. Within the suborder Zygoptera, the Pseudostigmatidae family is characterized by the presence of a false pterostigma (pseudostigma). Among the species of this family, are those of genus *Mecistogaster* that contains some of the largest known odonates, especially as regards the abdomen. They have very specialized oviposition behavior, in which the larvae develop in phytotelmata (water microecosystems maintained by terrestrial plant structures) such as in water accumulated in tree holes, bamboo internodes or leaf axils of tank of bromeliads. Another feature that stands out in pseudostigmatids is that the prey is plucked from spiderwebs, unlike other families that capture the prey during flight. The pseudostigmatids are represented by 25 species and subspecies, all with Neotropical distribution. The genus *Mecistogaster* is the most diverse and is represented by twelve species, seven of which occur in Brazil. In the Atlantic Forest are known the species *M. amalia*, *M. asticta* and *M. pronoti* with restricted distribution in this area, and an Amazonian species, *M. linearis*. In this paper we aim to review the species of the genus *Mecistogaster*, with distribution in the area of Atlantic Forest, in order to increase the biogeographic and taxonomic knowledge of the species of this genus. For this, we studied 250 specimens mainly from A.B.M.Machado collection, of the Department of Zoology of UFMG, but also from the Riksmuseet, Stockholm; National Museum, RJ; Mello Leitao Museum, ES and Jesus Moure Entomological Collection, PR. Preliminary results showed until now the existence of 6 new species, which increases to 10 the number of known species of the Atlantic Forest. These data show that the biodiversity of the Atlantic Forest *Mecistogaster* is much larger than expected and about equals the biodiversity of the Amazon Rainforest (11 species). It is likely, however, that the number of Amazonian species will increase a lot when more detailed taxonomic studies of this genus are made in this region. Our results provide subsidies for a better understanding of the phylogeny and geographical distribution of *Mecistogaster* species, fundamental to the definition of the species conservation status.

Keywords Zygoptera, taxonomy, phytotelmata

267 A new genus, new Brazilian species and new combination of American Bourletiellidae (Collembola; Symphypleona)

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The diagnoses of the genera of Bourletiellidae, a largest family of Symphypleona springtails, commonly describes the morphology of unguiculus and the tibiotarsal chaetotaxy. *Deuterosminthurus* is one of the largest genera in number of species (25) of Bourletiellidae and is widely distributed in the world. Its species, however, does not form a uniform grouping on some basic morphological dates. The unguiculus with reduction of lamellae and ending in a single apical spike is apparently an apomorphy of the mainly species of *Deuterosminthurus* and, on the other hand, five others species present a different condition on this structure. Herein we transfer the species *D. tristani*, from Costa Rica, to the genus *Adisianus* based in the shape of unguiculus (reduced and short) and dorsal head and body chaetotaxy (with rough and blunt spine-like setae). The species *D. delatorrei* from Cuba, *D. separatius* from Brazil and *D. yumanensis* from United States were transferred to the new genus *Americasminthurus* gen. nov., which is distinguished from *Deuterosminthurus* by the unguiculus with subapical filament and ending in a knob and the normal shape of “Ja” seta in the prothoracic tibiotarsus. A new species of *Americasminthurus* gen. nov. is described and illustrated after specimens from State of Pauí, Brazil, which were clarified and fixed on slides for study under optical microscope. The type materials were deposited in the Invertebrate Collection of INPA, Manaus, Brazil. *Adisianus* has now four species and *Deuterosminthurus* 21 species. However, the species *D. caeruleacaudus* needs to be revised. Finally, a brief discussion of the similarities between the new genus and other genera of Bourletiellidae and some biogeographical observations are made.

Keywords Globular springtails, Neotropical Region, Taxonomy

268 On the *Hymenoepimecis* (Hymenoptera: Ichneumonidae: Pimplinae) in the Brazilian Amazon

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Hymenoepimecis are koinobiont ectoparasitoids of adults spiders of family Nephilidae, Tetragnathidae and Araneidae. There are 14 species currently recognized on the genus. There are no studies related to genus for the Brazilian Amazon biome, except *H. heteropus* for the Amazonas and Pará states. In this context, considering that the Brazilian Amazon biome is the most largest tropical forest in the world, and also it has a high biodiversity, the aim of this study is to increase the knowledge of *Hymenoepimecis* in Brazil. 179 specimens of *Hymenoepimecis* were analyzed from Brazilian biological collections of Instituto Nacional de Pesquisas da Amazônia; Museu Paraense Emílio Goeldi; Universidade Federal de Rondônia and Museu de Zoologia da Universidade de São Paulo. Its were identified three species (*H. bicolor* (14 individuals), *H. heteropus* (four individuals), *H. neotropica* (one individual)) and seven new species were discovered (*Hymenoepimecis* A sp. n. (seven individuals), *Hymenoepimecis* B sp. n. (13 individuals), *Hymenoepimecis* C sp. n. (39 individuals), *Hymenoepimecis* D sp. n. (65 individuals), *Hymenoepimecis* E sp. n. (31 individuals), *Hymenoepimecis* F sp. n. (three individuals) and *Hymenoepimecis* G sp. n. (two individuals)). The species were recorded from the states of Roraima, Amazonas, Pará, Rondônia and Acre. This study contributed to knowledge of the genus for the Amazon biome, expanding their distribution. Besides, three species were identified and seven new species were described, increasing to 21 the number of species being Brazil, the country with the largest number of registered species, even so, still exist gaps to be filled regarding these species in Brazil and in the countries of South America.

Keywords Biodiversity, parasitoid, *Polysphincta* genus-group

269 A new genus of cricket from the State of Bahia, Brazil (Orthoptera, Gryllidae)

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The phalangopsine cricket genus *Guabamima* was described from the Atlantic Forest of Brazil. In the original publication, *Guabamima saiva* (type-species) and *G. lordelloi* were described from Penedo, State of Rio de Janeiro and Mucuri, State of Bahia, respectively. Since then, three other species were added to the genus, all from the State of Minas Gerais: *G. lopesandradei*, *G. pimenteli*, and *G. zhei*. Two other genera closely related to *Guabamima* are *Mellopsis*, monotypic, with *M. doucasae* as the type-species, and *Pizacris*, with *P. zefai*, the type-species, and *P. carioca*. Both species belonging to the later genera are also from the Atlantic Forest. We now describe *Sishiniheia*, gen. n., a member of the *Guabamima* cluster, based on *S. ophthalmica*, a sample of which was obtained on the forest litter in the outskirts of Lençóis, State of Bahia, Brazil, in the Chapada Diamantina region, that is, a forested area located within the rather xeric semi-arid domain. The new genus is compared with related genera and their diagnostic features illustrated. A key for the genera is presented

Keywords Grylloidea, Phalangopsinae, new taxa

270 New records of Collembola (Arthropoda, Hexapoda) from Minas Gerais, Brazil

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Collembola is a group hexapoda widely distributed in the world in different phytogeographic domains and habitats. However, human activities can affect the abundance and richness of Collembola and consequently the loss of biodiversity. Currently there are about 8.300 species of springtails, of which 300 were registered in Brazil, and only 15 species, 14 genera and six families in the state of Minas Gerais. The objective of this study is to record the species of Collembola in the state of Minas Gerais, Brasil. The study was conducted at the “Parque Municipal do Mocambo”, located in the central area of city of Patos de Minas, in the Midwest of Minas Gerais, Brazil (18°35'00 "S; 46°30'17"W). Soil samples have been caught with a metallic probe and processed in Berlese-Tullgren funnels. Specimens were clarified in potassium dichromate (K₂Cr₂O₇) and hydrochloric acid (HCl), and mounted on glass slides in Hoyer's medium. Were identified eight species of Collembola distributed in eight genera and six families: *Pseudosinella* sp., *Lepidocyrtus dubius* (Entomobryidae), *Cyphoderus innominatus* (Paronelliidae), *Folsomides* cf. *parvulus*, *Paracerura cristinae* (Isotomidae), *Mesaphorura* sp. (Tullbergiidae), *Neotropiella meridionalis* (Neanuridae) and *Arrhopalites* gr. *harveyi* (Arrhopalitidae). All cited species are new records from Minas Gerais (except *N. meridionalis*), and *L. dubius* from Texas, USA, is a new record from Brazil. *Arrhopalites* are restricted from cave, however this study a edaphic species was recorded. The Collembola fauna in Minas Gerais will now have 17 nominal species, 19 genera and eight families, indicating that the knowledge of the distribution of the species in Brazil is still lagging.

Keywords Brazilian fauna; soil fauna; springtails

271 Occurrence of gregarine in seminal vesicles of insects

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The gregarines are a heterogeneous group of Apicomplexan parasites. There are approximately 1,600 named species, but most gregarines remain unknown. They are extracellular parasites, characterized by mature forms large and found infecting a variety of invertebrates, especially annelids, molluscs and arthropods. Although gregarines are a diverse group, its general biology and systematics remain poorly understood. In insects, these parasites are recorded especially in eggs, Malpighian tubules, fat body and digestive tract of larvae and adults. However, this is the first record of the occurrence of these parasites in seminal vesicle of insects. For this, we used adult beetles of *Tribolium castaneum* contaminated and uncontaminated. Seminal vesicles of these insects were dissected and processed following the routine methodology for light microscope and conventional transmission electron microscopy (TEM). The seminal vesicle of uncontaminated beetles has the thin epithelium and lumen completely filled with sperm. In contrast, contaminated beetles exhibit a large numbers of parasites within seminal vesicles, preferably located close to the epithelium that is composed of cubic cells. The parasites occur as isolated individuals and exhibit different morphologies, which certainly represents distinct stages of the life cycle. Based on these characteristics above, as well as molecular data, this organism is Gregarina and probably a new species since they are species-specific. In earthworms, the life cycle and infection process are already well established, however this study provides the first evidence of Gregarine parasite in seminal vesicle of insects. The life cycle of this parasite should be the goal of future studies, since protozoan in pest insects are an interesting alternative, considering the biological control.

Keywords Beetles, Apicomplexa, Biological control

272 Ultrastructure of antennal sensillae of *ascia monuste orseis* (godart) (lepidoptera: pieridae) in adult phase

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The antennae are the most important sensorial organ of insects and they are used for different behaviours, such as seeking food, environmental perception and mate finding. *Ascia monuste orseis* is a butterfly which larval phase feeds on leaves of cruciferous plants (e.g., kale). Eggs collect in the wild were taken to laboratory and reared throughout the whole development to adults. Adults were taken and antennae were removed for observation at the scanning electronic microscope (SEM) - (Centro de Microscopia Eletrônica do Sul, Universidade Federal do Rio Grande) to perform an ultrastructural morphologic characterization of the sensilla found. Three females and three males were utilized. Antennae were bonded on the holder using carbon double sided tape, and thereafter sputter-coated with gold for 200 seconds. In a first approach, four different types of sensillae were observed: sensilla squamiformia (SQ), sensilla trichoidea (ST), sensilla coeloconica (SC) and sensilla chaetica (SCh). In each segment of the ventral region of the antenna there is an elliptically shaped region containing predominantly trichoidea sensillae, which is also the most abundant. These structures are repeated throughout the flagellar region of the antenna. The functions of these sensillae in butterflies have been discussed elsewhere, for instance, SQ is related to mechanoreception, ST is related to olfactory perception of sex pheromones, SCh is chemoreceptive (general olfaction), and SC is related to temperature and humidity perception. For the first time, the antenna of *A. monuste orseis* was observed using SEM. Nevertheless, further studies on lepidoptera antennal sensillae are needed in order to understand and to related their structure with function.

Keywords Sensorial, Morphology, Insect

273 The fine structure of the heart of *Anopheles aquasalis* (Diptera Culicidae)

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The genus *Anopheles* comprises species of mosquitoes that are important vectors of diseases like malaria. In some coastal regions of Brazil, the *Anopheles aquasalis* is the main vector of the disease. On the increase of disease cases associated with global environmental problems, is configured the importance of studying the biology of this vector, including the circulatory system, searching for new strategies to control the populations of these insects. In this work, we analyzed the fine structure of the / heart (or dorsal tube) and associated pericardial cells of *A. aquasalis* through of transmission electron microscopy. Hearts were dissected and transferred into an fixative solution containing 2.5% glutaraldehyde, 0.1 M cacodylate buffer, pH 7.2. The samples were post-fixed in osmium tetroxide 1% in 0.1M sodium cacodylate buffer pH 7.2 for 2 h in the dark. They were cut and the sections were stained with uranyl acetate and lead citrate, and examined under a Zeiss EM109. Two cell types: cardiomyocytes and pericardial cells were analysed. The cardiomyocytes form the muscular structure of the heart. Within the structural features found highlights the presence of sarcomeres, responsible for the contraction of the organ, enclosed by lines Z and of nuclei in the cell periphery. The pericardial cells are located around the heart, presenting only a nucleus and the cytoplasm filled with electro-dense vesicles. It is suggested that this may reflect the role in the immune response of mosquitoes, as demonstrated in *A. albimanus*. More information on the microanatomy of the heart of *A. aquasalis* will be obtained by means of other microscopy techniques to help to understand how the circulatory system of mosquitoes works, and how it helps in the dynamics of hemolymph flow, and how pathogens circulate inside mosquito body cavity.

Keywords circulatory system; fine structure; *Anopheles aquasalis*

274 Morphological description of reproductive organs of the burrower bug *Scaptocoris castanea* (Hemiptera: Cydnidae)

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Morphological data of reproductive tract in insects are useful for systematic, phylogenetic and reproductive biology studies. The aim of the present work was to describe the reproductive tract of the burrower bug *Scaptocoris castanea* (Hemiptera: Cydnidae), a pest of the plant roots in agriculture. The insects were collected on soybean crops and males (n=10) and females (n=10) dissected under stereomicroscope. The description of the reproductive tract is: Males have two testes, each with six follicles covered together by a translucent peritoneal sheath. Each testis opens in a long and narrow vas deferens associated with three accessory glands (long tubular, short tubular and globular). Both vasa deferentia open in a short ejaculatory duct connected to the aedeagus. The females have two ovaries with three ovarioles each. The distal region of the ovarioles have a short terminal filament. The ovarioles opens on the enlarged calyx followed by a long lateral oviduct that are joined in the common oviduct and vagina. Laterally to common oviduct there is a round spermathecal reservoir with a short duct. The male reproductive tract is similar to others described for Hemiptera. However, females ovarioles number is lower in comparison with other Cydnidae.

Keywords Cydnidae, reproductive system, systematics

275 Redescription of *Ischnotoma* (*Icriomastax*) *antinympa* (Diptera: Tipulidae)

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Tipuloidea comprises three families: Tipulidae, Limoniidae and Cylindrotomidae. The genus *Ischnotoma* belongs to Tipulidae and has the following diagnostic features: nasus present; antennae 12-segmented, non verticillate, or rarely with a few scattered such hairs, the antennal flagellum serrate or filiform; discal cell always present and closed, veins R3 and R4+5 curved towards each other, constricting cell R3 near mid-length; among others. *Ischnotoma* has 54 species divided into three subgenus: *I. (Ischnotoma)*, *I. (Icriomastax)* and *I. (Neotipula)*. *Ischnotoma (Icriomastax)* includes 10 species from Brazil and Argentina, and has the vein Rs commonly subequal to m-cu; squama bare or weakly haired and 9th tergite more or less fused with the 9th sternite to form a ring. The goal of this study was to re-describe *I. (Icriomastax) antinympa* that occurs in Sao Paulo, Juquiá (type locality); Rio de Janeiro, Nova Friburgo and Minas Gerais; Itamonte. Two specimens were analyzed, a male and a female (holotype), deposited in the Entomological Collection of the National Museum (MNRJ) in Rio de Janeiro and in the Zoology Museum of the University of São Paulo (MZUSP), respectively. The species is characterized by having prescutum with four conspicuous dark stripes, scutum with the central part more darkened than the sides, suture prescutum V-shaped differently in color in the female which is darker, side view of the thorax with less orange spots in male than in female, wings with a pattern of dark spots in the center of each cell, where light lines bypass each vein, cell C with clear cross veins, vein R3 curved upwards to reach the margin, petiole of cell M1 of size equivalent to m, cell M1 wider and vein M1 more sinuous in male than in female, veins M2 and M3 closer together to reach the margin in the male, vein r-m short, stigma present and vein Rs short. This was the first record of *textit I. (Icriomastax) antinympa* for the state of Rio de Janeiro. However, considering the distribution pattern found in the literature, the occurrence of this species was already close to the state. For the first time the male of *textit I. (Icriomastax) antinympa* is described.

Keywords Taxonomy; Neotropic; Morphology.

276 World Catalogue of Teratomyzidae (Diptera, Opomyzoidea)

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Teratomyzidae is a small family of Acalyptratae dipterous, which can be recognized by the following combination of characters: body color yellow to black; antenna porrect; arista pubescent; one fronto-orbital seta reclinate; postvertical seta weak; vibrissa developed; two notopleural setae; costal vein broken on Sc; R1 bare; r-m and dm-cu close. The family has a large distribution, represented on Asia, Australia, New Zealand and South America. The biology of the family is poorly known, their larvae were observed on plants of the genus *Pteridium* (Polypodiales, Dennstaedtiaceae), fact that became the Teratomyzidae known as fern flies. The aim of this study is present the world catalogue of the family. The catalogue was elaborated in alphabetic order by genus and species. To the genus level are included the following information: author, date, page number, taxonomic modifications, type species, original designation of the type species, and bibliographic citations. To the species level are included: author, date, page number, taxonomic modifications, type locality, distribution, deposition of the primary type, and bibliographic citations. Based on the information obtained in this study is concluded that the family is currently composed by 23 species disposed in the following genera: *Auster*, *Camur*, *Lips*, *Pous*, *Stepta*, *Teratomyza* and *Teratoptera*. *Teratomyza* is the most diverse genus with 17 species, being the others monotypic. The compiled information in this catalogue will be the base and incentive to future studies to the family.

Keywords Catalog, Diptera, Teratomizydae

277 The midgut ultrastructure of *Himacerus apterus* (Hemiptera: Nabidae)

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The Hemiptera *Himacerus apterus* is a carnivorous Nabidae. The midgut is an organ with endodermal origin specialized in food digestion and nutrients absorption. The detailed cytology of the midgut in insects has contributed to elucidate aspects of its physiology, behavior, evolution and ecology. Although some studies had described the midgut ultrastructure in other Hemiptera, detailed descriptions of midgut cells in other species are yet necessary. Our objective was to characterize the midgut ultrastructure of the Hemiptera *Himacerus apterus* contributing for future studies about its physiology and evolution. The midgut of this predator showed a single layered epithelium with digestive cells and some isolated regenerative cells onto a thin basal lamina and a thin muscle layer. The basal portion of the digestive cells showed short plasma membrane infoldings associated with some mitochondria. The middle cell region showed the nucleus and a richness of rough endoplasmic reticulum (RER); Golgi complexes; lipid droplets; inclusions and lysosomes. The apical cell region had many mitochondria closely to the microvilli, which were numerous and associated with a perimicrovillar membrane. The regenerative cells were scattered among the digestive cells, and its apex never reach the midgut lumen. The regenerative cells had a large nucleus and cytoplasm with RER profiles and mitochondria. These ultrastructural data suggest that the digestive cells of *H. apterus* are specialized in secretion and nutrients absorption.

Keywords Predator insect, Morphology, Transmission Electron Microscopy

278 A putative new type of propleural glands in ants of the genus *Strumigenys* and its phylogenetic implications

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Ants have a vast array of exocrine glands that are distributed in their entire body, being the head, legs and gaster the regions where they are generally more abundant. Thoracic glands are rarer in comparison, but often of a very conspicuous size and high importance for the colony life. For instance, the propleural plate glands of some fungus growing ants produce secretions that are linked in pathogen control of the colony. Here a new type of propleural structure in the genus *Strumigenys* of a yet unknown function, not homologous to the fungus growing ants', is described. Specimens (as many as available) of 36 species of the genus belonging to 15 species groups from MZUSP and the UFV ant collection were examined in search of unusual gland-like structures in a Leica S8 APO stereomicroscope, 10-80x magnification. Large, paired, longitudinally oriented, deeply excavated elliptical propleural cavities with a thick spongiform tissue bordering the inside of their outer margins were found in 8 out of 9 examined members of the *mandibularis* group, with the exception of *S. borgmeieri* and are hypothesized as glandular. Other 4 species of the *S. tococae* and the *precava* species group presented a propleural structure, but shallower and morphologically different, without spongiform tissues. Images were made for 3 species. The findings may suggest a close phylogenetic relationship between the *mandibularis*, the *tococae* and the *precava* groups of species, all long-mandibulate species, with a secondary lost in *S. borgmeieri*. Alternatively, independent origins are also a possibility, due to the morphological differences observed between the structures in the different groups. Live colonies were not examined and therefore a glandular nature of these structures cannot be ascertained, however their morphology indicates that this is a plausible interpretation. Future studies of live colonies and histology of the gland-like structure are crucial in confirming the hypothesis proposed here.

Keywords Exocrine glands, *Strumigenys*, phylogenetics

279 Morphology of testis and spermatozoa of *Rhagonocerus binominatus* (Coleoptera, Passalidae)

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The morphology of highly specialized cells such as the spermatozoa and their number per cysts have been useful for phylogenetic and reproductive biology studies in insects. Aspects related to the male gonads and spermatozoa in Passalidae are scarce, therefore the aim of this study was describe the morphology of the testis and spermatozoa in *Rhagonocerus binominatus* (Percheron), contributing with new information for the family. The beetles were collected in the Reserva Florestal Mata do Paraíso, Viçosa, MG, Brazil. The testis follicles were processed for light microscopy. The seminal vesicles were disrupted on histological slides and the spermatozoa stained with Giemsa or DAPI. The male gonads of *R. binominatus* are formed by a pair of testes, each with two whitish fusiform follicles. The testis follicles in mature males had an average length of 3.5 mm of which 1.0 mm correspond to protuberance in the distal end (germarium). The follicles are divided into approximately 17 longitudinal septa that radiating from the intrafollicular efferent duct. Within each septum there are germ cells at different stages of spermatogenesis. In this passalid, each cyst contains about 128 spermatozoa, which represent seven cycles of cell divisions. The spermatozoa are thread-like appearance and 275 μm length of which 27 μm correspond to nucleus and the acrosome. The general structure of the testes and the spermatozoa are similar to those of other American's Passalidae, but the spermatozoa length and number of the testicular septa change among the species, suggesting that these characters may be useful for the systematic of Passalidae.

Keywords Passalid beetle, reproduction, testes, sperm

280 Immunocytochemistry of the anterior midgut region in the stingless bee *Melipona quadrifasciata* (Hymenoptera: Meliponini)

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In insects the digestive tract is divided into foregut, midgut and hindgut. A short region of flattened cells marks the transition fore-midgut, and in stingless bees that is a differentiated gut region named cardia. The function of the cardia in stingless bees remains unknown, although it may be involved in the production of the peritrophic membrane and substances transport. The objective of this study was to identify the presence of membrane transporters and hormones in the cells of the cardia of the stingless bee *Melipona quadrifasciata*. Adult workers of different ages (nurse and foragers) of *M. quadrifasciata* were dissected and midgut subjected to immunocytochemistry for detection of water transporter aquaporin and hormone FMRF-amide. Our findings showed the presence of aquaporin in the cell surface of the cardia in foragers and nurse bees. However, these cells showed negative reaction to the hormone FMRF-amide, but some axons were identified in this region, suggesting a neuro-hormonal control of the activities of these midgut cells. In conclusion, the cardia in *M. quadrifasciata* is involved in the water transport and under neurohormones control.

Keywords Bee, Morphology, Digestive tract

281 Two new species of *Joruma* (Hemiptera, Cicadellidae, Typhlocybinae) from Viçosa, Minas Gerais, Brazil

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Predominantly neotropical, genus *Joruma* consists of 27 species, seven of which occur in Brazil, in the states of Mato Grosso and Rio de Janeiro. Two new species are described herein based on specimens collected in Mata do Paraíso, Viçosa, Minas Gerais. The specimens were obtained through a "Luiz de Queiroz" light trap and are deposited in Museu Regional de Entomologia (UFV) and Depart. de Zoologia (UFRJ). *Joruma* sp.nov.1 is characterized by: total length 3.7-3.9 mm; general color olive green; head with crown ocher with brown spots; pronotum olive and ocher, longer than crown and as wide as head; forewing with yellowish veins and apical cells brown, translucent; male subgenital plate with tapered apex; pygofer triangular, anal hook with two branches; stylus with apex acute, denticles and a long seta at preapical region; connective Y-shaped; aedeagus with dorsal H-shaped apodeme, stem short and robust with a pair of ventral lamellae; female sternite VII produced in two median lobes; pygofer with posterior margin rounded; ovipositor ahead of apical margin of pygofer; valvula I with apex acute, subapical set of teeth on ventral margin; valvulae II with ventral margin serrate, notably the right one; valvula III with apex narrow and rounded, tiny setae on apical area interspersed with higher, sparse ones. *Joruma* sp.nov.2 is characterized by: total length 3.1 mm; general color orange-yellow; pronotum slightly shorter than crown and wider than head; wings pale yellow, translucent; male subgenital plate narrow; pygofer with a long ventral process, posterior margin rounded, anal hook with two branches; connective Y-shaped; stylus with teeth and a preapical seta; aedeagus with three pairs of short process in preatrium, stem long, apex with nodules. Characteristics that distinguish the new species from congeners are the shape of apical region of stylus in *Joruma* sp.nov.1, and the atrial set of processes in aedeagus and the ventral process of pygofer in *Joruma* sp.nov.2.

Keywords Auchenorrhyncha; taxonomy; neotropics

282 The salivary glands of the stinkbug predator *Podisus nigrispinus*: ultrastructure and cytochemistry characterization

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Podisus nigrispinus (Hemiptera: Pentatomidae) is a zoophytophagous insect that has a potential in biological control because its nymphs and adults prey on various insects. They insert their mouthparts and inject the contents of their salivary glands in the prey to kill them. To identify the components of the saliva of *P. nigrispinus*, we evaluated the ultrastructure and cytochemistry of the salivary glands of this insect. Adults of *P. nigrispinus* were anesthetized and the salivary glands dissected in saline solution for insects, and transferred to Zamboni's fixative solution. The samples were dehydrated in a graded ethanol series and observed under Scanning Electron Microscope. For ultrastructure test, the salivary glands were embedded in historesin JB4, sectioned at 3 μm thickness, stained with hematoxylin and eosin, and analyzed under light microscope. For cytochemistry test, the samples were transferred to glutaraldehyde in sodium cacodylate buffer, embedded in LR White resin, and ultrathin sections were examined under the Transmission Electron Microscope. The salivary system of *P. nigrispinus* has consists of a pair of principal salivary glands, which are bilobed with a short anterior and a long posterior lobe, and a pair of tubular accessory glands. The cells of both the glands are well developed with a predominance of mitochondria and rough endoplasmic reticulum and with basal plasma membrane infoldings, indicating that both the glands play a role in the transport of hemolymph substances and protein synthesis. The cytochemical tests demonstrated positive reactions for carbohydrate, protein, and acid phosphatase in the cells of both the salivary glands. The ultrastructural and cytochemical features suggested participation of the principal and accessory salivary glands in the secretion of proteinaceous and non-proteinaceous toxic substances in the saliva of this insect.

Keywords proteins; secretory cells; zoophytophagous

283 Survey and checklist of Sarcophagidae species (Diptera) from the Caatinga biome, Brazil

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The Sarcophagidae (Diptera) includes over 3,000 species and occurs in all biogeographical regions, with the highest diversity recorded in tropical and subtropical areas. Among the muscoid flies, adults of sarcophagids are distinguished by the presence of three longitudinal strips in the mesonotum. In the Neotropical region, the Caatinga biome is very peculiar in their physiogeographical characteristics, and is located exclusively within the Brazilian territory. Although it is vast, comprising 850,000 Km², is the least studied biome. This study aimed to survey the Sarcophagidae fauna from the Caatinga. Flies were collected exclusively in four conservation unit areas (CUA), all in the State of Bahia, Brazil. Forty two Van Someren modified traps were arranged in transect, and 50 m distant from each other. The traps were baited with 6 different bait combinations (poultry gizzard, beef liver and poultry gizzard, bananas and beer, faeces, fish, and chicken skin). The traps were exposed for 72h in each CUA. The collected specimens were taken to the laboratory, separated and only the males were identified using a reference collection and taxonomic keys. A total of 792 specimens were collected belonging to *Tricharaea (Sarcophagula) occidua* (N=274), *Helicobia morionella* (N=73), *Peckia (Pattonella) intermutans* (N=30), *Peckia (Sarcodexia) lambens* (N=15), *Helicobia aurescens* (N=9), *Oxysarcodexia thornax* (N=7), *Peckia (Peckia) chrysostoma* (N=1), *Peckia (Squamatodes) ingens* (N=1), *Ravinia belforti* (N=1), and *Titanogrypa (Cucullomyia) larvicida* (N=1). In addition, females and unidentified species numbered 380. The diversity of identified sarcophagids collected in the Caatinga (S=10) is much lower than that of other two Brazilian biomes: Cerrado (S=57) and the Atlantic Forest (S=20). We conclude that the collecting areas of the Caatinga do not present favorable environmental conditions for the presence of sarcophagids as the other two biomes.

Keywords Biodiversity, Muscomorpha, necrophagous flies

284 Identification and distribution of sepsidae (diptera) from the collection of museu paraense emílio goeldi (mpeg)

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Sepsidae, or black scavenger fly, is a cosmopolitan family of flies belonging to the order Diptera. There are about 38 genera and 375 species in the world but only seven genera and 26 species were described from Brazil. Sepsids are usually found around faeces of large mammals. The aim of this study was to identify the Sepsidae family in the Museum Paraense Emílio Goeldi (MPEG), one of the most important collections of Brazil. Were identified 875 specimens and five genera: *Archisepsis*, *Microsepsis*, *Meropliosepsis*, *Palaeosepsioide* and *Pseudopalaeosepsis*. *Archisepsis* was represented by 500 specimens and three species: *A. scabra*, *A. armata* and *A. excavata*. *Microsepsis* was represented by 110 specimens and three species: *M. inflexa*, *M. mitis* and *M. furcata*. The other species found were: *Meropliosepsis sexsetosa* (21 specimens); *Palaeosepsioide erythromyrma* (180 specimens) and *Pseudopalaeosepsis muricata* (63 specimens). Most of the sepsids were collected in state of Pará, indicating the need of more collections in the poorly sampled localities of Brazilian Amazon in order to expand the sepsid sample of MPEG.

Keywords Sepsidae, identification, collection

285 Unexpected muscles in salivary glands ultrastructure of *Euschistus heros* (Pentatomidae): a role in saliva secretion?

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The brown stinkbug *Euschistus heros* (Hemiptera: Pentatomidae) is an important pest of the Brazilian soybean fields. The saliva of these insects have been related as one of the most important cause for *E. heros* injuries in the soybean seeds and pods. However, very little is known about the salivary glands of *E. heros*. Thus, this study was conducted aiming describe the ultrastructure of the salivary glands of *E. heros* with Scanning Electron Microscopy, Light microscopy and Transmission Electron Microscopy. Our results show that the *E. heros*' salivary complex consists of a pair of bilobed principal salivary glands (with a short anterior and a long posterior lobes) and a pair of tubular accessory glands. A constriction between the anterior and posterior lobes characterizing the hilus, where are inserted the salivary and the accessory gland ducts. The principal gland epithelium is composed of a single layer of cells enclosing a large lumen. These cells have typical features of protein secretory cells: I - are cubic or squamous; II- have multiple secretory vesicles and well-developed nuclei. Cells of the hilus are columnar with well-developed nuclei and are surrounded by unexpected layer of muscular cells. The accessory salivary gland cells are cubic with multiple vacuoles and nuclei with condensed chromatin. The accessory salivary glands probably participate in the transport of water or secretion production. Each lobe of the principal gland has different histological characteristics, indicating that they probably produce different substances. The diversity of substances produced by the salivary glands of *E. heros* suggests that can feed on large numbers of plant species. For the first time the presence of muscles is reported in the salivary glands and their function is possibly related to the mixture of substances produced by the salivary glands and saliva volume control of *E. heros*.

Keywords Epithelium muscle, Phytophagous Pentatomidae, salivary glands

286 New status of *Alloscopus* and *Heteromurtrella* (Collembola, Entomobryidae, Orchesellinae), with Identification key

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Orchesellinae is a subfamily of Entomobryids currently with six tribes, 13 genera and about 250 described species of springtails, which 60 are inserted in tribe Heteromurini. The status and diagnosis of generic taxa of the tribe are still ambiguous. In this work a revision of the Heteromurini is present and a new diagnosis for the tribe is proposed. *Alloscopus* and *Heteromurtrella* classified as subgenera of *Heteromurus* (Heteromurini) are reviewed and new diagnosis and generic status are proposed. The postantennal organ becomes the main feature to distinguish *Alloscopus* (present) of *Heteromurtrella* (absent) and spines on dens are now presented as a shared feature between both genera. *Alloscopus yosiius* synonymized as *Alloscopus tenuicornis* is revalidated. *Heteromurtrella mutti* a new hemiedaphic species collected with Winkler in "Reserva Ducke" in the Brazilian Amazon, is described and illustrated, including detailed dorsal chaetotaxy. Specimens were preserved in ethanol (92%), clarified with potassium dichromate (K₂Cr₂O₇) and hydrochloric acid (HCl) and fixed on slides containing semi-permanent liquid Hoyer. Holotypes and paratypes were deposited in the Invertebrate Collection of INPA, Manaus, Brazil. This is the first record of *Heteromurtrella* in Brazil. *Alloscopus* passes from 9 to 10 species and *Heteromurtrella* from 18 to 19 species. A key to the genera of Heteromurini and species of *Alloscopus* and *Heteromurtrella* are provided.

Keywords Chaetotaxy, Neotropical Region, taxonomy

287 External morphology of the premature phases of *Eacles imperialis magnifica* (Lepidoptera: Saturniidae)

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The imperial caterpillar is an insect commonly found in plants like arabica coffee, Brazilian pepper, where it feeds and lays its eggs. This study aimed describe morphologically premature phases of *Eacles imperialis magnifica*. Using a scanning electron microscope their eggs was observed and the caterpillar were collected on Brazilian pepper plants and they were taken to the laboratory, and maintained at ambient temperature and fed daily with Brazilian pepper leaves. The egg is oval and one of its bases is flat. When fertilized they are green, while unfertilized are yellowish. It was observed numerous pores, and several protrusions in "C" shape on the chorion. Regarding caterpillars, their color varies with their diet. They had approximately 10 cm long, with a light green color, darkening on late instar, characterizing the formation of the pre-pupa. They have a beige head with two central vertical brown stripes, violet tubers along the body of which two pairs are in the dorsolateral area of the 3rd and 4th segments. They have a long dorsal process in the central upper face of the 12th segment, and short dorsal processes in pairs from the 5th to 12th segments. At a lateral level, except for the 1st, 3rd, 4th, 13th and 14th segments they have a pair of reddish spiracles surrounded by a clear edge. They have three types of appendages, a set of 3 pairs located from 2nd to 4th segments, light-coloured and with a nail at the end. From 7th to 10th segment are found dark colored appendages with a red band at the end. In the last segment they have a rough leathery structure, which consists of three brown parts flanked by yellow lines and white mottled. Throughout the body, they have no stinging white bristles circa 1.5 cm long. The pupa is obtecta, with a caramel color right after the ecdysis becoming a redish brown just after the sclerotization. It has a long and bifurcated cremaster and structure consisting of a lifting rod-shaped on the antero-dorsal region.

Keywords Morphology, Lepidoptera, Insect

288 Two new *Acrogonia* species from the State of Mato Grosso (Hemiptera: Cicadellidae: Cicadellinae: Proconiini)

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The subfamily Cicadellinae is composed of leafhoppers that feed on the xylem of vascular plants. The tribe Proconiini, which includes the genus studied here, is restricted to the New World and comprises about 60 genera and 350 species. *Acrogonia* (type species: *A. ignota*) has a wide distribution, with records from Mexico to Paraguay. Currently, 24 species are recognized, including vectors of the bacterium *Xylella fastidiosa*, which causes the Citrus Variegated Chlorosis (CVC). In this study, two new *Acrogonia* species are presented, both from the State of Mato Grosso. The specimens examined belong to the Depart. de Entomologia, Museu Nacional (UFRJ) and Depart. de Zoologia, Setor de Ciências Biológicas (UFPR). The male and female genitalia were prepared in 10% KOH and dissected for the study of their structures. The dissected parts were described, illustrated and photographed. The first new species can be recognized by the following features: (1) aedeagus strongly angled, directed dorsally and (2) with a pair of elongate basal processes; (3) connective, in lateral view, with median keel (new feature to the genus). The second new species can be distinguished by: (1) aedeagus elongate, bifid and (2) with pair of apical processes; (3) subgenital plates with incomplete median cleft (new feature to the genus). The first species shares similarities with *A. virescens* in the aedeagus. Both have angled aedeagus directed dorsally, but in *A. virescens* the basiventral portion of the aedeagal shaft is not broad. The second new species shares similarities with *A. terminalis* and *A. flaveoloides* in the aedeagus. The three species have the aedeagus elongate and bifid, but in the new species the shaft is not slender and bears a pair of apical processes. Our studies will continue with the preparation of a taxonomic revision and phylogenetic analysis of the genus.

Keywords Auchenorrhyncha, leafhopper, taxonomy

289 Distribution and redescription of *Cratomorphus cossyphinus* (Coleoptera: Lampyridae), with sexual dimorphism

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Cratomorphus has 29 species ranging from 1-5cm. The genus differs from other lampyrid by: pronotum with two anterior vitreous spots; head concave between the eyes, which are 2/3 as wide as head; abdomen with tergites laterally projected. The study aimed to define *C. cossyphinus* based on material found in the following institutions: DZRJ, Universidade Federal do Rio de Janeiro; MZSP, Museu de Zoologia de São Paulo; CEMT, Universidade Federal do Mato Grosso and the holotype in ZSM, Zoologische Staatssammlung. The species has the biggest distribution in neotropical lampyrid, with new records for Brazil: Amazonas, Bahia, Ceará, Distrito Federal, Mato Grosso, Pará, Rio de Janeiro and São Paulo; and also to Suriname: Distrito Marowijne. Based on the study of the holotype, we propose a new description for the species with both males and females. Males: antennomere III 1,5x longer than pedicel; sternum VI with lantern tripartite; sternum VIII with posterior margin bearing two parasagittal indentations, and a central region emarginate; pygidium with posterior margin with bearing parasagittal indentations and a central region rounded; phallobase asymmetric; parameres symmetric and apically acute; phallus with a dorsal plate basally fused, projected dorsolaterally toward apex; ventral plate with lateral margin sinuose, strongly sclerotized. Females: antennomere III 2x longer than pedicel; sternum VI with lantern entire; sternum VIII with posterior margin strongly forked and a central region emarginate; pygidium with posterior margin and a central region rounded; genitalia with two spermathecas and a large and rounded spermatophore-digesting gland; ovipositor with baculus sclerotized, coxites membranous, styli apically sclerotized and bristled outwards on the lateral margins. In the first step towards a generic review, we provided characters for species delimitation, some of them sexually dimorphic and related to the reproductive biology of the species.

Keywords Taxonomy; Genitalia; Biogeography

290 A taxonomic study of the genus *Phytobia* (Diptera, Agromyzidae) from Brazil

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Phytobia has approximately 70 species known in the world, with 20 in the Neotropical region and only four in Brazil. The species have medium to large size and are characterized by lunule large, high and often silvery, calyptral fringe black, body color black, sometimes with yellow patches (most Neotropical species), wing sometimes pitted or infuscate. The species of this genus have great economic importance as leafminers on a variety of vegetables of human interest. In Nearctic and Palearctic regions the species feed on Rosaceae, Betulaceae, Salicaceae botanical families. Studies on the diversity, taxonomy and distribution of the *Phytobia* species in Brazil are almost inexistent. The present study reveals the diversity of the genus *Phytobia* in three Brazilian states. The collections were realized in Mato Grosso, Mato Grosso do Sul and Rondônia. The specimens were captured using Malaise traps and were preserved in alcohol 98%. All specimens were mounted in entomological pins and deposited in the collection of Museu Nacional, Universidade Federal do Rio de Janeiro (MNRJ) and Museu do Zoologia da Universidade de São Paulo (MZUSP). For dissection, male and female terminalia were clarified in potassium hydroxide 10% for 48 hours, immersed in glycerin on blades, under stereomicroscope and drawn using a camera lucida. Sixteen species were identified: one known and 15 new to science. Other species were found, but they could not be identified because they are represented only by females. The species previously known is *Phytobia kallima* from Panama, and is recorded for the first time from Mato Grosso and Brazil. This genus was found in all studied areas, being the first record of *Phytobia* in Mato Grosso do Sul and Rondônia. All new species are described and illustrated. This study increases five times the diversity previously known to Brazil indicating that diversity is much bigger than what we know.

Keywords Agromyzidae, Brazil, New species

291 Collection and diversity of social wasps in an urban fragment

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Social Vespidae are impacting on communities and food webs making it necessary to study their ecological traits and adaptation to urban environments. The objectives were to compare the community composition and efficiency of social wasps collection methods in three transects (T1, T2 and T3) in an urban fragment of Atlantic rain forest at Lajinha city park, Juiz de Fora, State of Minas Gerais, Brazil. Social wasps were captured in field surveys of three days, every month, for 12 months and with attractive traps using guava and passion fruit juices in three transects, for five days, in the same period. The social wasps diversity index was higher via field surveys ($H' = 2.44$) than for attractive trap with passion fruit juice ($H' = 1.21$) and guava juice ($H' = 0.99$) showing different efficiency in the collection methods. The social wasps diversity index was higher in the first transect ($H' = 1.12$) than in the second ($H' = 1.04$) and in the third ($H' = 0.92$). The dominance index of *Mischocyttarus* sp., reflected in the diversity of transects. The fragmentation and urbanization reduce the diversity of social wasps, impacting the occupation of anthropogenic environments by *Mischocyttarus* sp.

Keywords Attractive trap; social Hymenoptera; inventory

292 Entomopathogenic Fungi Effect On Imature Adult *Musca domestica* L. (Diptera, Muscidae)

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The need for reducing both health and environment impacts has motivated alternative strategies studies on pest control including the use of fungi with proved insecticide action. The present study aimed to evaluate the efficiency of entomopathogenic fungi on the control of *M.domestica* L. Insects were captured in the Campus José Ribeiro Filho of the Universidade Federal de Rondônia, Porto Velho, RO, then used as colony matrix for the bioassays. The isolated fungi were obtained from the Invertebrate Fungi Collection - Embrapa – Cenargen and then used on pathogenicity tests in the Biological Control Laboratory – Embrapa Rondônia. Two bioassays were performed on adults and larvae *M. domestica* in a four treatment randomized design with *Beauveria bassiana* (CG 1059 e CG 1067), *Isaria fumosorosea* (CG 260) and a control, five repetitions with 10 insects on each phase. None of those had previous reported use on *M. domestica*, being this present the first evaluating study on the species. Insects were immersed in 1ml suspension with 1×10^7 conidia/ml concentration for a 1 minute hand shake and then kept into a B.O.D. incubator camera ($26 \pm 2^\circ\text{C}$, 12 hour photophase). Evaluations occurred daily over a 7 days period. No significant difference on larvae mortality occurred between CG 1059 (26%), CG 1067 (20%) and CG 260 (14%). Adult mortality differed significantly between CG1067 (26%), CG260 (16%) and CG 1059 (4%), although mortality rates were low. We consider both CG 1059, CG 260 e CG 1067 presented low efficiency on immature and adult *M. domestica* control.

Keywords Control, Pests, Fungi

293 Dengue incidence in the municipality of Santo Antônio de Jesus compared the state epidemiological scenario

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Dengue transmitted by insect vector *Aedes aegyptis* is greater public health problem in the world. It is a systemic viral disease that occurs in tropical and subtropical regions. Dengue virus belongs to the *Flavivirus* genus of the family Flaviviridae, which includes four immunological types: DEN-1, DEN-2, DEN-3 and DEN-4. In America, the *A. Aegypti* is the only transmitter of these viruses with epidemiological significance. In this study it was analyzed the annual incidence of dengue cases in Bahia and highlighted the Santo Antonio de Jesus in the period from 2010 to 2013. For the incidence coefficient calculation the population used was based on the 2010 Census. The incidence rates were calculated using the number of reported cases in relation to a population of 100.000 inhabitants. In the state of Bahia, the incidence in 2010 was 324.1; in 2011, 282.6; in 2012, 342.0; and in 2013, 406.2. For Santo Antônio de Jesus the incidence rate in 2010 was 63.73; in 2011, 50.5; in 2012, 206.59; and in 2013, 459.34. It is noticed that the incidence of dengue in the municipality of Santo Antônio de Jesus followed the State trend during the study period, checking a significant increase of cases registered in the years of 2012 and 2013, reaching even greater proportions if no control measure is executed. The indicator of the risk of dengue transmission is of paramount importance to the strategy of control. It is therefore necessary collective action for the prevention of disease, as it increases the impact on affected communities ensuring a successful outcome in the fight against insect vector campaigns.

Keywords Epidemiology; Public Health; Entomology surveillance

294 Frequency and distribution of *Aedes* spp at Federal Institute of Education, of Amazonas, Manaus/AM, Brazil

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The mosquitoes *Aedes aegypti* and *Aedes albopictus* are the vectors of Dengue, Urban Yellow Fever and Chikungunya and ZikaV Fever. Currently, the only way to combat these diseases is through the insect vector control, since there is no vaccine available. These vectors are considered cosmopolitan mosquitoes of African and Asian origin, respectively, who had increased their dispersal to other parts of the world. These species were introduced in Brazil in the colonial period due to the slave trade. The aim of this study was the monitoring of the population of mosquitoes *A. aegypti* and *A. albopictus* (Diptera, Culicidae) at Federal Institute of Education, Science and Technology of the Amazonas (IFAM) through oviposition traps. Two hundred Ovitrap traps were installed to collect eggs of the vectors; distributed in four major areas of the Campus for evaluation by sectors. The collected eggs were sent to Applied Entomology Laboratory of the University Nilton Lins to perform the quantification of eggs and differentiation of larvae after hatching. The results were evaluated using the data provided by Positivity Index of Ovitrap (PIO) and the Eggs Density Index (EDI). It was found that the mosquito *Aedes* spp was present in the four areas evaluated at IFAM, with 73% PIO, and the quantity of eggs collected (9106) represented an EDI 62.37%. Among the four sectors IFAM evaluated, it was observed that areas I and III showed higher Trap positivity index, as well as larger quantities of eggs laid in traps, with 2569 and 3634 eggs, respectively. The area III stood out with straws with 454 and 404 eggs deposited revealing a major concern, since this sector there is a large flow of people, who would be likely to bite vectors, increasing thus the risk of some sort of arbovirus if there is virus circulation.

Keywords Monitoring, Dengue, *Aedes* spp

295 Population dynamics of Cicadellidae and Delphacidae (Hemiptera) in an urban environment of Rio de Janeiro

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The urban insect fauna is quite diverse, sampling members of Diptera, Lepidoptera, Hymenoptera, Hemiptera, Blattodea, Orthoptera, and Zygentoma orders, occurring, basically, in all substrates. Insects have a great adaptive capacity, as they can inhabit almost every location, such as residences, factories, or sewage. Afforestation and urban lighting can have direct influence on the number of species as a whole, in addition, the climate of Rio de Janeiro city favors the occurrence of such insects, primarily because of its rainfall volume and high temperatures. The metropolitan region has, predominantly, a semi-humid tropical climate, with heavy rainfall in the summer, when temperatures can easily reach forty degrees Celsius. In contrast, the weather is much more mild and dry in the winter. The average temperature during the year ranges from twenty-two to twenty-four degrees Celsius and rainfall tends to be in between 1,000 to 1,500 millimeters annually. Population dynamics of auchenorrhynchous insects of the Cicadellidae and Delphacidae families were studied using monthly quantitative samples, carried out from May 2014 to April 2015 in a residential building of the northern zone of Rio de Janeiro, and the meteorological data (obtained from INMET) through Spearman Correlation. The organisms were collected in a chandelier, illuminated by two fifteen watts white-fluorescent lamps. The abundance in different climatic seasons (dry and rainy) were compared through the Mann-Whittney Test. The peaks of Cicadellidae population were observed in April and June (22 and 21 specimens, respectively). Evaporation, cloud cover, precipitation, and relative humidity were significantly correlated to the population data. The highest abundance values were obtained in rainy seasons. For Delphacidae, the highest values were observed in February and March (three specimens). There was no significant difference between the values of abundance in the climatic seasons.

Keywords Auchenorrhyncha; fluctuations; Brazil

296 Floral visitors of *Plumeria pudica* (apocynacea) in Ponta Negra, Natal/RN

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A considerable number of none native species have found their way around the globe as ornamental plants. One effect of the change in habitat of these plants is a change in the insects that visits them, resulting in different plant-insect interactions that might affect how the plant develops and reproduces. This work seeks to identify the floral visitors of *Plumeria pudica* in Natal, RN, Brazil, and discuss the possible interactions of the insects that visit them. Frangipanis have a very specific morphology to be pollinized by hawk moths (Sphingidae), furthermore this species does not produce an aroma which makes it more difficult to attract pollinizers and other insects. The data were collected during the months of October and November of 2014, in an urban park called Henrique Carloni located in the Ponta Negra neighborhood. Some specimens of each visitor was photographed and collected manually, and later identified. There was a predominant number of Hymenoptera found, especially of the Formicidae family. In total, 21 families were identified. However none had the morphological adaptations to be a successful pollinizer of *P. pudica*, and so they were classified as occasional visitors, predators, foragers, non-effective pollinators, parasites and pests.

Keywords Ornamental plants, plant-insect interaction, White frangipani

297 Epigeal ants diversity in urban parks at Metropolitan Area of São Paulo, Brazil

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Urban parks are green spaces in cities important to the life quality of the population and they also represent a refuge for many animal species. In this study, it was evaluated the diversity and composition of ants in different sites in three urban parks located at Metropolitan Area of São Paulo. The specimens were collected with pitfall trap which were distributed along linear transects. Overall, 46 ant species were collected; Myrmicinae was the subfamily with the highest number of species in all parks. *Pheidole* was the richest genus and *Solenopsis saevissima*, *Pheidole obscurithorax* and *Pheidole sp.21* were the most frequent species. Eleven species occurred strictly in places where the access is restricted and thirteen species in places with free access thus the parks do not differ from each other in richness. The generalist guild was the richest, especially in visited places. About 59% of all collected species have bioindicator potential (Indicator Value of species). *Brachymyrmex heeri* is an indicator for no-visited places; *Pheidole aberrans*, *Solenopsis sp.2*, *Solenopsis sp.3* and *Wasmannia auropunctata* for both locations. Two tramp ant species were registered: *Cardiocondyla wroughtonii* was more frequent in places where the population has access and *Wasmannia auropunctata* did not have preference for location.

Keywords Formicidae Urban Entomology, Bioindicator

298 Records of Auchenorrhyncha (Hemiptera) collected in urban areas in Quatis, Rio de Janeiro

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Auchenorrhyncha represents a diverse group of phytophagous Hemipterans in which several species may cause a significant agricultural damage. Although little is known about its ecological aspects, their high population value ensures them an important presence in many ecosystems. As primary consumers, they respond directly to eventual landscape changes, which becomes a good indicator for the degree of changes in the forest areas. Based on samplings performed over 2015, the preliminary inventory of Auchenorrhyncha occurrent in urbanized sections of Quatis (South mesoregion of Rio de Janeiro) are presented. Quatis is a city in Rio de Janeiro state, located 145 km from the capital, with an estimated population of around 13,500 inhabitants. Situated at an average altitude of 415 meters, the city has a highland tropical climate with an annual average temperature of 15°C to 23°C, and precipitation of approximately 1,700 mm. The predominant biome is the Atlantic Forest. The sampling occurred at daytime, with the use of entomological sweep nets. The studied material is deposited at Coleção Entomológica Professor José Alfredo Pinheiro Dutra, Depart. de Zoologia, Universidade Federal do Rio de Janeiro. To date, we identified 36 species belonging to the genera *Agallia*, *Agalliana*, *Amplicephalus*, *Balclutha*, *Bucephalagonia*, *Chlorotettix*, *Ciminius*, *Copididonus*, *Curtara*, *Empoasca*, *Exitianus*, *Ferrariana*, *Graminella*, *Hortensia*, *Macugonalia*, *Oragua*, *Planicephalus*, *Plesiommata*, *Protalebrella*, *Reticana*, *Sibovia*, *Stirellus*, *Unerus*, *Versigonalia*, *Xestocephalus*, *Xyphon* (Cicadellidae), cf. *Guayaquila* (Membracidae), *Caenodelphax*, *Delphacodes*, cf. *Sogatella*, *Syndelphax*, cf. *Tagosodes*, cf. *Toya* (Delphacidae). All the records are new occurrences, since there is no insect species officially registered in this city.

Keywords Biodiversity; leafhoppers; planthoppers

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