

*P. bliteus* from Botucatu no endosymbionts were detected. *G. brimblecombei* population from Mogi-Guaçu presented *Arsenophonus*, *Carsonella* and *Wolbachia*, while the parasitoid *P. bliteus* presented *Wolbachia*. Thus, this infection is characterized as horizontal, by passing from the host to the parasitoid. *Wolbachia* may influence both the feminization of males and / or increase in the reproductive capacity of the pest and parasitoid. These aspects will be studied.

### Effect of temperature on flight of *Cleruchoides noackae* (Hymenoptera: Mymaridae), parasitoid of *Eucalyptus* bronze bug

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The egg parasitoid *Cleruchoides noackae* (Hymenoptera: Mymaridae) is the main biological control agent of *Thaumastocoris peregrinus* (Hemiptera: Thaumastocoridae), an exotic pest that threatens *Eucalyptus* plantations worldwide. Was evaluate the quality of *C. noackae* in the laboratory by the flight test, at different temperatures. The ESALQ model test unit was used, consisting of a PVC cylinder with the interior covered by black cardboard. On the inner wall an entomological stick ring (0.5 cm wide) was placed to 3.5 cm from the lower to determine parasitoid walkers. To determine flying parasitoids, a Petri dish with stick was embedded in the upper part of the cylinder. A hundred eggs of *T. peregrinus* parasitized by *C. noackae* were individualized in glass tubes, fixed in the center of the test units and placed in climatic chamber at 20, 25 and 30 ± 2 °C, RH: 60 ± 10% and 24:0 photoperiod (L/D). The experimental design was completely randomized with five replicates. Data were analyzed by ANOVA and compared by Tukey test. The increase in the percentage of flying parasitoids was directly proportional to the temperature increase, varying from 29 to 74%, at 20 and 30 °C, respectively. Highest percentage of walking parasitoids (60%) was observed at 20 °C, while at 25 °C there was no difference between flying and walkers. At 30°C, 74% of the parasitoids were classified as flying and 20% as walkers. The temperature affected the *C. noackae* flight in the laboratory. It is suggested to release *C. noackae* in the field at temperatures above 20 °C.

### Lignocellulase from Basidiomycota fungi cultivated in woody biomass / Lignocelulases de fungos Basidiomycota cultivados em biomassa lenhosa

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A madeira é uma matéria-prima obtida das árvores, de constituição heterogênea e variável por ser um produto do seu metabolismo. Em virtude da sua composição química básica (celulose, hemicelulose e lignina) pode representar importante substrato para produção de enzimas por organismos xilófagos, especialmente por fungos do Filo Basidiomycota, os quais desenvolveram sistemas bioquímicos complexos capazes de converter e mineralizar a lignocelulose. Esse processo natural pode ser utilizado para fins industriais, como na produção de celulose e na conversão, de alto valor agregado, de resíduos lignocelulósicos em biorrefinarias. Foi realizado screening em meio sólido MYG modificado. Em seguida, foi avaliada a produção de enzimas celulolíticas, hemicelulolíticas e ligninolíticas por fungos de podridão branca e parda cultivados em meio mínimo líquido contendo serragem de *Swartzia psilonema* como única fonte de carbono. Foram determinadas as curvas de crescimento por quantificação da proteína intracelular. Os fungos *Trametes versicolor*/Mad 697, *Bjerkandera fumosa*/L-15918-Sp, *Gloeophyllum trabeum*/Mad 617 e *Meruliporia incrassata*/Piirto-31 apresentaram maior halo de degradação. *Trametes versicolor*/Mad 697 apresentou as maiores atividades específicas de lacases, xilanases e endoglucanases. *Bjerkandera fumosa*/L-15918-Sp apresentou maior taxa de crescimento. A maior atividade de celulases totais foi observada em *Meruliporia incrassata*/Piirto-31. Os extratos brutos fúngicos que apresentaram atividade específica representam fonte potencial de enzimas que podem ser empregadas em coquetéis destinados à despolimerização da biomassa lenhosa.

### Effects of parasitism by *Tetrastichus howardi* (Hymenoptera: Eulophidae) on *Oxydia vesulia* caterpillars (Lepidoptera: Geometridae)

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Adaptation of dietary habits of native lepidopteran species to eucalyptus plantations has become a treat to productivity in Brazil. Considered as a secondary pest, *Oxydia vesulia* (Lepidoptera: Geometridae) is frequently reported in *Eucalyptus* plantations and associated with outbreaks and economic damages. New methods have been tested to control several lepidopterous-pests and *Tetrastichus howardi* (Hymenoptera: Eulophidae), a pupae endoparasitoid, that has been reported as efficient for control caterpillars on major crops. Despite being a pupae parasitoid, its parasitism was tested in *O. vesulia* caterpillars. Fourth instar caterpillars were offered to the parasitoids, 10 parasitoids per larvae, with 24 hours old. After exposure larvae were kept in pots with leaves of *Eucalyptus urophylla* changed daily until the pupal stage, kept under laboratory controlled conditions (25 ± 1 °C, RH: 60 ± 10% and photophase: 12 h). *T. howardi* did not emerged from parasitized *O. vesulia* caterpillars, however positive results were found for pest control. A total of 40% of the caterpillars died before reaching the prepupal stage, other 40% reached the pupal stage and died due poor formation or problems at emergence and 20% survived. Although the parasitoid has not been able to complete its cycle in caterpillars, it shows itself as promising in controlling the pest in its most critical stage of occurrence. Studies on the potential parasitism of *T. howardi* on *O. vesulia* in the field must be developed to verify the effectiveness of this parasitoid.

### Multiplication and release of the imported natural enemy *Selitrichodes neresi* (Hymenoptera: Eulophidae) for the biological control of the wasp, *Leptocybe invasa* (Hymenoptera: Eulophidae) in *Eucalyptus* plantations in Brazil




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High productivity and short rotation have made *Eucalyptus* the most cultivated plant in the world for the production of raw material for various industrial sectors. The exotic wasp, *Leptocybe invasa* (Hymenoptera: Eulophidae) from Australia, has spread rapidly in the world. *Leptocybe invasa* was registered in

Brazil in eucalyptus nurseries in the Bahia State in 2007, which made it necessary, in 2015, to import through the Quarantine Laboratory “Costa Lima”, Embrapa Meio Ambiente de Jaguariúna, São Paulo, Brazil, the exotic control bioagent, *Selitrichodes nesei* (Hymenoptera: Eulophidae) from the University of Pretoria in Pretoria, South Africa. This introduction was requested by FCA/UNESP-Botucatu Campus (University of São Paulo State, Faculty of Agrarian Sciences) and by the PROTEF/IPEF (Programa Cooperativo em Proteção Florestal/Instituto de Pesquisas e Estudos Florestais/IPEF). Seedlings of hybrid clones of *Eucalyptus grandis* x *Eucalyptus camaldulensis* were planted in 1.7 L pots with soil sterilized with a mixture of soil-sand-manure (1:1:1) and irrigated daily to obtain the parasitoid galls. These seedlings were kept in an open nursery at FCA/UNESP and infested, naturally, by *L. invasa*. Approximately seventy days after the infestation, the plants with galls were taken to Embrapa and offered to parasitism to multiply *S. nesei* in the laboratory. The production of *S. nesei* adults was 3,020 in 2015, 8,616 in 2016/2017 and 4,700 in 2018; which were sent to UNESP and then to forestry companies associated to PROTEF for releasing in *Eucalyptus* plantations. Acknowledgments: Embrapa, CNPq, FCA/UNESP, IPEF/PROTEF, UFV

### First record of microsporidium infection in *Eucalyptus* snout beetle *Gonipterus platensis* (Coleoptera: Curculionidae)

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*Gonipterus platensis* is the main beetle pest of *Eucalyptus* plantations. This species is from Australia and it has high destructive potential. Several environmental, biological and genetic factors can influence the life cycle of the insect. The presence of intracellular pathogens as microsporidia in insect populations can cause morphological and behavioral changes, such as increase in larval mortality, delay in development, reduction in fecundity and adult longevity, and may also be associated with the failure of parasitism. However there are no records of microsporidia in populations of *G. platensis*. Thus, the objective of this work was to identify possible microsporidia in adults of *G. platensis*. The insects with aspects of microsporidiosis were collected in Botucatu, in June, 2018 in *Eucalyptus* hybrid plantations (“Urograndis”). The insects were evaluated by the molecular PCR technique with the use of specific primers to identify possible microsporidia. The purified PCR products were subjected to Sanger sequencing and the sequences obtained were compared to the GenBank database. The presence of intracellular parasites of the genus *Microsporidia* sp. was confirmed in adults of *G. platensis*. This same genus was also reported in other coleopteran species, causing several deleterious effects. Thus, the first report of the detection of this microsporidium in *G. platensis*. Further studies are needed to identify the species, as well as to know the insect-pathogen interaction, and can also be used as a strategy for biological control of *G. platensis*.

### Detection of symbiotic bacteria in *Anaphes nitens* (Hymenoptera: Mymaridae) and *Gonipterus platensis* (Coleoptera: Curculionidae) eggs

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Outbreaks of *Gonipterus platensis* (Coleoptera: Curculionidae) in *Eucalyptus* plantations have occurred in the States of São Paulo and Paraná, Brazil, in the last years, due to low parasitism rates of the egg parasitoid *Anaphes nitens* (Hymenoptera: Mymaridae). Symbiotic bacteria can act in different ways on hosts, influencing the parasitism's efficiency. However, there are no records of symbionts in *A. nitens*. This work aims to identify symbiotic bacteria in different parasitoid populations and eggs of their host. Adults of six populations of *A. nitens* (five from São Paulo and one from Espírito Santo state) and eggs from a laboratory population of *G. platensis* were evaluated by PCR using specific primers for identification of nine different genera of cellular endosymbionts. The purified PCR products were sequenced and the sequences obtained were compared to GenBank database. The bacterium *Serratia grimesii* was identified in the eggs of *G. platensis*, it was already reported in midgut of other Coleoptera. All populations of *A. nitens* had presence of cellular endosymbiont *Rickettsia bellii* and bacteria *Erwinia amylovora*, *Yersinia massiliensis* and *S. grimesii*. Bacteria *E. amylovora* and *Y. massiliensis* probably act as intestinal symbionts for the host. *S. grimesii*, found in the parasitoid and host, probably is acquired by horizontal transmission from *G. platensis*. Studies to verify the bacteria quantitative aspects and the effects on *A. nitens* biological parameters are ongoing.

### Comparison of antifungal microorganism *Streptomyces blastmyceticus* and the Fungicide Alamo® for the control of oak wilt disease by trunk injection and macro-infusion at root flare

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Disease management for oak wilt of *Quercus mongolicae* caused by *Raffaelea quercus-mongolicae* in Korea have been mainly focused on the control of insect vector (*Platypus koryoensis*) by applications of insecticide, pheromone, sticky roll trap, and fumigation of dead or dying trees and so on. For the control of the pathogen in trees, culture suspension of antifungal *Streptomyces blastmyceticus* was injected into trees by trunk (ChemJet®) or root flare (Macro-infusion) injection before or after artificial inoculation of the pathogen, and then the ratios of non-conductive area, discolored area, and re-isolation of the pathogen from the treated trees were compared for evaluating preventive or curative efficacy. Injection of *S. blastmyceticus* or the fungicide (Alamo®) showed 41.7% and 45.8% in non-conductive area(%), respectively. In addition, *S. blastmyceticus* did not show much differences between injection methods or timings in control effect, but fungicide was better in Macro-infusion at root flare or curative treatments. Re-isolation rates of the pathogen from the treated tree woods in the treatments of pathogen only, preventive and curative were 56.9%, 20.6%, and 36.1%, respectively. These results indicated that *S. blastmyceticus* showed better control efficacy for the control of oak wilt caused by *Raffaelea quercus-mongolicae* in Korea than the fungicide Alamo®, which is being widely used for the control of oak wilt caused by *Ceratocystis fagacearum* in the United States.