

## **Predatory bugs as natural antagonists of insect pest species in poplar short rotation coppice – with particular regard to *Arma custos* FABRICIUS (1794)**

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The great red poplar leaf beetle (Coleoptera: *Chrysomela populi* L.) is deemed to be the main pest species in poplar short rotation coppice (SRC) plantations in Germany. The defensive secretion mechanism of *C. populi* larvae means they have only few known natural enemies – most of them specialists. In 2013, the occurrence and potential regulation of predatory insects in SRC was investigated within the project 'AgroForNet', funded by the German Federal Ministry of Education and Research. To determine their occurrence, insects were collected on three sites (Brandenburg: Sorno, Gründewalde, Cahnsdorf) on July 11<sup>th</sup> and on one site (Brandenburg: Sorno) on August 27<sup>th</sup> using beating trays. A total of 114 insects belonging to 17 species were collected. Of these, six species (60 individuals) were carnivorous. *Pinthaeus sanguinipes* (41 individuals) and *Arma custos* (9 individuals) were the most frequent carnivores. The potential for regulation was quantified by breeding and rearing *Arma custos*. On July 17<sup>th</sup> an egg cluster of *A. custos* was collected in Großschirma (Saxony). From July 17<sup>th</sup> to August 24<sup>th</sup> nymphs (beginning with the second instar; first instar does not feed and needs only water) were daily fed first instar larvae of *C. populi*. Breeding and rearing took place in Petri dishes (94 x 16 mm) filled with a thin film of agar-agar (cobe I) and a piece of a poplar leaf (Max 2 variety; food for *C. populi* larvae). Small tubes (3 x 1 cm) provided a supply of water retained using paper pulp. The experiment was performed at 20.0±1°C at 70-80 % relative humidity under a 16:8 (L:D) h photoperiod. The development times of the first, second, third, fourth and fifth nymphal stages (n=9) was 6 (± 0), 4 (± 0), 5.6 (± 0.7), 7.2 (± 0.83) and 11.1 (± 0.78) days, respectively. The total developmental time was 34 ± 1.73 days. The number of larvae eaten by the second to the fifth nymphal stage was 2.2 (± 0.97), 12.4 (± 1.87), 11.2 (± 2.04) and 26.4 (± 3.16), respectively. The findings indicate high predation rates by *A. custos* and suggest that the species may be a valuable part of a biological control program targeting *C. populi*. Future studies will focus on *Pinthaeus sanguinipes*, the most frequent predatory bug in SRC.

## **The occurrence of *Drosophila suzukii* (MATSUMURA) in communities of native Drosophilidae in South-Hessia and potential native parasitoids**

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The spotted wing drosophila, *Drosophila suzukii* (MATSUMURA), is a vinegar fly that is closely related to *D. melanogaster* with its origins in the Far-East. It has been accidentally introduced in North America and recently in Europe. Thereby, this species was reported first from Mediterranean countries of Europe, is rapidly

spreading towards north and east and was found in southwestern parts of Germany in 2012. Female *D. suzukii* possess a distinctive serrated ovipositor that allows them to lay eggs successfully into healthy and ripening fruits as opposed to most of drosophilids that only infest overripe, fallen or rotting fruits. Therefore this species is able to infest small and stone fruits which are grown for harvest. After oviposition the larval stages cause a high risk to various marketable crops, especially soft or thin-skinned fruits which are rapidly collapsing through larval feeding. In this study the composition and seasonal occurrence of native Drosophilidae species was explored by adult trapping in habitats which may be suitable for *D. suzukii* as a potential new invader. After detection of *D. suzukii* at nearly all trap locations in South-Hessia, the infestation of berries and the development of deposited eggs were also explored. The results revealed differences in species composition between rural and urban areas and also effects of surrounding habitat conditions. *D. suzukii* invaded most of the locations, but only late in the season from mid of August. It seems that the invasive fruit pest *D. suzukii* could occupy several ecological niches and build stable populations in South-Hessia. After successful baiting trials in the field, laboratory rearings of *D. melanogaster* and *D. subobscura* were established for future investigations. Furthermore, the occurrence and phenology of native parasitoids of Drosophilidae were monitored to estimate their potential association with *D. suzukii*. Individuals of the superfamilies Chalcidoidea, Ichneumonoidea and Cynipoidea were trapped. They included specimens of *Leptopilina heterotoma* (THOMSON) and *Asobara* (Braconidae: Alysiinae), which are known to use *Drosophilida* larvae as hosts. The knowledge of the species composition of native Drosophilidae communities and their associated parasitoids could be used for an estimation of the potential environmental and economic risk caused by *D. suzukii* and for outlining prospective biological control strategies.

### **Test method of biocontrol agents on fungus gnats (Sciaridae)**

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The test method is based on the rearing of the fungus gnat *Bradysia difformis* (FREY, 1948) in a moist coconut fiber substrate with the compost fungus *Alternaria alternata* (Fr.) KREISSLER, which is cultivated on oat flakes. *B. difformis* is an ideal test organism for growing media due to myco – and phytophagous behavior. The robust test method is suitable for studies: (1) general biological soil activity, (2) for assessing growing media on fungus gnat infestation, (3) on the effects of pesticides on fungus gnats, (4) the effect of biocontrol organisms on fungus gnats. The advantage is the homogeneous age structure of fungus gnats in the substrate. By shifting of experimental parameters over time, the different developmental stages of fungus gnats can be tested. To demonstrate the efficacy of *Bacillus thuringiensis* var. *israelensis* (*B.t.i.*) two independent tests in a climate chamber (22°C, 60 % rel.