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Einladung und Anmeldeunterlagen
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http://www.entomologentagung2007.at/registrierung.php

INHALT

Titelfoto: *Sitaris muralis* (FOERSTER, 1771) (Col.: Meloidae), s. Beitrag Seite 92
Foto: B. STEIN (Calden)

Vorwort des Präsidenten

Liebe Kolleginnen, liebe Kollegen,

Im vorliegenden Heft 2 des 20. Jahrgangs unserer DGaaE-Nachrichten erhalten Sie zahlreiche, äußerst interessante Einblicke in die im November 2005 im Schloss Salzau bei Kiel durchgeführte Tagung des Arbeitskreises „Nutzarthropoden und entomopathogene Nematoden". Ein breites Spektrum biologischer Antagonisten wird zur Nutzung in Agrarökosystemen vorgestellt und deren Beeinflussung durch die Wirkung von Pestiziden analysiert. Die Beiträge reichen von der biologischen Kontrolle von Schaderregerkalamitäten (z.B. *Cameraria ohridella*, *Cydia pomonella*, *Trialeurodes vaporariorum*, *Otiorhynchus ligustici*, *Rhagoletis cerasi*, *Frankliniella occidentalis*) durch den Einsatz entomopathogener Nematoden, Raubwanzen, Raubmilben, Bakterien und Viren im Acker-, Garten- und Gewächshausanbau bis zur Kontrolle und Ursachenforschung der Pathogenität von *Bt*-Subspecies.

Im März 2006 fand das gemeinsame Treffen der Arbeitskreise „Populationsdynamik und Epidemiologie" der DGaaE und „Epigäische Raubarthropoden" der DPG in Gießen statt. Neben der ökologischen Bedeutung von Spinnen als Insektenfresser, *Carabus*-Arten als effektive Schneckenantagonisten wurden auch Analysen zum unterschiedlichen Insektizideinsatz in subtropischen und tropischen Regionen vorgestellt und die Möglichkeit der Reduzierung diskutiert.

Abschließend möchte ich Sie auf die in diesem Heft zu findende Einladung zur Entomologentagung der DGaaE vom 26.2. bis 1.3.2007 in Innsbruck noch einmal aufmerksam machen, die gemeinsam mit der Österreichischen Entomologischen Gesellschaft (ÖEG) und der Schweizerischen Entomologischen Gesellschaft (SEG) veranstaltet wird. Die Tagungsorganisatoren vor Ort und die bestätigten Plenarredner der einzelnen Sektionen sind Garant für eine sehr erfolgreiche Tagung.

Entschließen Sie sich, liebe Kolleginnen und Kollegen, in das winterliche Ambiente Innsbrucks zu kommen und die von der Universität Innsbruck und dem Tiroler Landesmuseum Ferdinandeum bereitgestellten Möglichkeiten für eine erfolgreiche Tagung zu nutzen. Ich freue mich auf unsere Tagung und auf Sie als aktive Mitgestalter.

Ihr
Prof. Dr. Gerald Moritz (Präsident der DGaaE)

Bericht über die Tagung des DGaaE- und DPG-Arbeitskreises „ Nutzarthropoden und entomopathogene Nematoden“ vom 15. – 16. November 2005, Schloß Salzau bei Kiel

Report on the Annual Meeting of the Working Group Beneficial Arthropods and Entomopathogenic Nematodes

The 24th Annual Meeting of the Working Group Beneficial Arthropods and Entomopathogenic Nematodes of DPG and DGaaE took place in November, 15-16, 2005 at Salzau Castle near Kiel. It was perfectly organized by Professor Dr. R.-U. Ehlers and his team from the Institute for Phytopathology of Christian-Albrechts-University Kiel. In total, 44 specialists from research, extension services, biological control producers and practice attended the meeting.
During the two half days, 20 contributions were presented on the following subjects: beneficials in agro-ecosystems, side-effects of pesticides on beneficial arthropods, registration of biological pesticides, biological pest control with entomopathogenic nematodes, bacteria and viruses and biological pest control by predatory mites, bugs und *Trichogramma* species. Furthermore, new remarkable scientific videos of Kiel University on pests and corresponding antagonists were shown. The videos can be acquired by purchase. Order forms are provided on the home page of Kiel University (www.uni-kiel.de/phytomed/htm).
The time-frame allowed to discuss all contributions and the three posters without any time pressure.
The next meeting will be held in November, 14 – 15, 2006, at the Federal Biological Research Centre in Kleinmachnow.
This report was edited by Birgit Schlage, Dr. Bernd Freier and Sigrid von Norsinski (BBA Kleinmachnow).

Dr. Bernd Freier and Prof. Dr. Ralf-Udo Ehlers

Studies on arboreal predatory arthropods in mango orchards in the Central Province of Papua New Guinea

Die Häufigkeit der baumbewohnenden räuberischen Nutzarthropoden in Mango-Plantagen in der Central Province in Papua Neu Guinea

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Arboreal predatory arthropods in plantations of mango (*Mangifera indica*) were collected at two sites in the Central Province of Papua New Guinea, October to December, 2000 using the beating method.

Thirty trees (5 branches/tree) at each site were randomly selected for the collection of arboreal insects with the beating method, five times at an interval of two weeks during mango fruiting. The number of individuals caught in catches with the beating method was 2,975. The highest abundance in trees was in ants (2,260 specimens, on the average 10.63 specimens/m^2) with the weaver ant *Oecophylla smaragdina* prevailing (2,087 specimens). Another twelve genera (mainly Formicinae and Myrmicinae) had insignificant numbers. Spiders were second most found (618 specimens of 18 families = 2.9 specimens/m^2). On trees, jumping spiders (Salticidae) were most frequent (244 specimens) followed by Theridiosomatidae (121 specimens). Araneidae, Clubionidae, Linyphiidae and Thomisidae were also regularly collected. In the arboreal zone, predatory *Coleoptera* yielded 89 specimens, on average 0.84 specimens/m^2, the majority belonging to the family Coccinellidae (79 specimens). Within this family, *Telsimia* sp., which primarily feeds on eggs and nymphs of Diaspididae, was the dominant species (50 specimens). All individuals (7) of Lycidae, whose larvae are predatory, were identified as adults of *Trichalus* sp. Catches of Dermaptera, predatory Heteroptera (Reduviidae, Nabidae), Neuroptera and Mantodea were insignificant. The two sites averaged 13.6 predator specimens/m^2 on the mango trees. It is pointed out that the presence of *O. smaragdina*, though being a generalist predator, is not desired in mango orchards for different reasons. The Dolichoderine *Tapinoma* sp. has been shown to hamper the establishment of *Anicetus beneficus* (Hym., Encyrtidae) introduced as an enemy of *Ceroplastes rubens* (Hom., Coccidae) (KRULL & BASEDOW 2005).

KRULL S. M. E., T. BASEDOW: Evaluation of the biological control of the pink wax scale *Ceroplastes rubens* Maskell (Hom., Coccidae) with the introduced parasitoid *Anicetus beneficus* Ishii & Yasumatsu (Hym., Encyrtidae) in the Central province of Papua New Guinea. J. appl. Entomol. 129, 323-329, 2005.

Is it possible to control the whitefly *Trialeurodes vaporariorum* on cut gerbera by the release of *Encarsia formosa*?

Lässt sich die Weiße Fliege, Trialeurodes vaporariorum in Schnittgerbera durch Encarsia formosa kontrollieren? – Ein Gewächshausversuch

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Within the framework of a research project on biological and integrated control strategies in floriculture several cut gerbera (*Gerbera jamesonii*) companies were supervised. The most important pest on gerbera was the whitefly *Trialeurodes vaporariorum* (Westwood) (Homoptera: Aleyrodidae). The result of all control attempts using varying beneficial species were characterised by low efficiencies, high variation and missing continuity. Therefore the potential of *Encarsia formosa* Gahan (Hymenoptera: Aphelinidae) to control whiteflies on gerbera was investigated in standardised experiments.

All experiments were carried out in two separate greenhouse cabins, which were each divided into 6 experimental units by gauze tents. Each tent covered 10 potted three years old gerbera plants.

In the main growing period from April to September two experiments were conducted. Temperatures ranged from 23 ± 2°C at day and 19,5 ± 2°C at night. In the beginning Gerbera plants were infested with 50 – 100 juvenile whiteflies and several adults. At that time the efficiencies of 10 *E. formosa*/m² and 20 *Eretmocerus eremicus* Rose & Zolnerowich (Hymenoptera: Aphelinidae) were compared to the control treatment without natural enemies. Both natural enemies were released every second week. Later at the beginning of the second experiment the whitefly population was reduced to 50 juveniles per plant plus several adults. At that time *E. formsa* was tested at weekly release rates of 100 and 1.000 *E. formosa*/m² and results were compared to the control treatment without natural enemies. All treatments were replicated 4 times.

In all treatments *E. formosa* was found within two weeks after the first release, while *E. eremicus* was never recovered in the experiments. Although *E. formosa* successfully parasitised the whitefly larvae pest population densities increased rapidly. Due to enormous amounts of honeydew and growth of fungi the first experiment was terminated after six weeks.

In the second experiment the impact of *E. formosa* on whitefly population density was much stronger. Nevertheless whitefly population densities increased steadily until week eight and remained constant until the end of the experiment after twelve weeks. Population density of *E. formosa* reached the maximum in week eight.

In conclusion, it seems that a curative use of *E. formosa* as whitefly antagonist in cut gerbera is meaningless. In none of the treatments *E. formosa* was able to reduced whitefly population densities substantially. High release densities are necessary to influence at least whitefly reproduction rates. In practice the high release rates are uneconomically for commercial growers. The mechanisms for low *E. formosa* activity and failure of *E. eremicus* on whiteflies in cut gerbera are still unclear.

On the biodiversity of staphylinids in a field experiment with Bt maize

Zur Biodiversität von Kurzflügelkäfern in einem Großversuch mit Bt-Mais

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Within the project “Safety Research and Monitoring Methods on Bt-maize Growing“ of the Federal Ministry of Education and Research, the occurrence of staphylinids was investigated at Halle (on the river Saale) site. According to KORGE (1991) staphylinids show a high substrate specificity which can be used to document diversity of niches-adopted species of a site. Therefore, they are used for small-scale evaluation of habitats and represent important ecological

indicators. However, our knowledge on the ecology of staphylinids is clearly less than that on carabids. The data on ecological preference and behaviour are insufficient, especially for the group of Aleocharinae. As we know that Bt maize expresses Cry 1 Ab-Toxine also in pollen (FEARING *et al.*, 1997), an influence of pollen carrying prey on staphylinids could be possible.

Investigations were performed using pitfall traps on randomized plots of a field trial with 3 different treatments: a) *Bt* maize (MON 810) variety Novelis, b) isogenic variety and c) Nobilis + insecticide application at 07.07.2001. Each treatment was replicated on 6 plots each with one trap. The determination of staphylinids was carried out according to ASSING & SCHÜLKE (2001). The pitfall traps were emptied weekly between 17 May and 18 December, 2001. In total, 2,751 staphylinids were identified. 600 individuals out of them were classified into 29 species. The other individuals belonged to the group of Aleocharinae hardly to determine. The densities of staphylinids in both treatments with the isogenic variety Nobilis (b: 970 specimens, c: 903 specimens) were higher than in Bt-plots with the variety Novelis (c: 822 specimens).

Dominance classification showed that 8 species were frequently occurring. The status “dominant” was assigned to the species *Ocypus o. ophthalmicus* (26.8 %), *Xantholinus linearis* (20.3 %) and *Tachyporus hypnorum* (10.3 %). Diversity slightly differed between treatments (a: 18 species, b: 21 species, c: 22 species). The greatest activity of staphylinids was found at the beginning of investigations in all treatments (a: 15.3 individuals per trap, b: 18.1 individuals per trap, c: 15.9 individuals per trap). Among the identified species, only *Anotylus rugosus* and *A. insecatus* occurred sub-dominantly during the two first sampling periods. After slight activity densities in June and July, densities increased again later in the two summer sampling periods (17 July to 31 July, 2001 and 31 July to 28 August, 2001). In this period, *O. o. ophthalmicus*, a relatively large xerophilous staphylinid (15 to 23 mm) and the abundant field species *T. hypnorum* occurred frequently.

The strong variation of trapping results did not allow to determine statistically significant differences between treatments. The observed higher individual numbers in the isogenic varieties seemed to be important for the evaluation of differences between treatments. Replicates of the experiment are needed to verify or refute this tendency. The present results contribute to a monitoring of genetically modified crop growing.

ASSING, V. & M. SCHÜLKE (2001): Supplemente zur mitteleuropäischen Staphylinidenfauna (Coleoptera, Staphylinidae). II. – Ent. Bl. 97: 121-176.

KORGE, H. (1991): Liste der Kurzflügelkäfer (Coleoptera, Staphylinidae) von Berlin (West) mit Kennzeichnung der verschollenen und gefährdeten Arten (Rote Liste). – In: Auhagen, A., R. Platen, H. Sukopp (Hrsg.): Rote Listen der gefährdeten Pflanzen und Tiere in Berlin. Landschaftsentwicklung und Umweltforschung S6: 277-317.

FEARING, P.L., D. BROWN, D. VLACHAS, M. MEGHJI & L. PRIVALLE (1997): Quantitative analysis CRY 1 A (b) expression in Bt-maize plant tissues and silage a stability of expression over successive generations. – Mol. Breeding 3: 169-176.

Testing the tolerance of *Trichogramma* wasps to sulphur applications in organic apple orchards

Untersuchungen zur Schwefeltoleranz von Trichogramma im ökologischen Obstbau

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The codling moth *Cydia pomonella* can cause harvest losses of up to 70 % in apple orchards. Recent biological control methods have not had satisfying success. In organic apple orchards these methods are: mating disruption as a preventive method, the utilization of granulose virus and *Trichogramma* wasps. Regions in Southern Germany (Südbaden) have shown increasing pest pressure in the last years. Some codling moth populations were found to be less susceptible to preparations of granulose virus, and mating disruption was not effective in areas with high pest pressure. Thus, the effect of *Trichogramma* in organic farming is strongly affected by the use of sulphur preparations against diseases, mainly apple scab.The following experiments had the objective to bait ´wild´ *Trichogramma* strains in apple orchards and test their tolerance to sulphur preparations. For baiting parasitoids cardboard cards and little cages were used with sentinel eggs of the angoumois grain moth (*Sitotroga cerealella*). Baiting was done in early summer 2005 at 14 days interval. Naturally occurring *Trichogramma* could be found in apple orchards from the end of April until the middle of May. 15 baits were positive and could be transferred to strain rearing in laboratory, but *Trichogramma* was found only in non-sulphur treatments. The IOBC side-effects testing method was used with minor changes to test a commercially used strain and a ´wild´ strain of *Trichogramma cacoeciae* with sulphur in three concentrations: a) normal field dose (3 kg/400 l), b) half field dose (1.5 kg/400 l), c) 1/10 field dose (0.3 kg/400 l). The persistence of sulphur was tested 1, 5, 10 days after spraying. *Trichogramma* were always exposed to the dry spray film, they were not sprayed directly. A waiting period of 5 days at 1/10 field dose reduced parasitization by 40 % (commercially used strain) and by 56 % (´wild´ strain) compared to the control treated with water (100 %). Shorter test intervals after spraying as well as full or half of the field dose reached only 0 to 1 % parasitization. There was a non-significant tendency towards better parasitization by the ´wild´ *Trichogramma* strain. The highest parasitization rate of 70 % compared to control was found 10 days after spraying the leaves with 1/10 field dose.

Sulphur had strong side-effects on *Trichogramma* and reduced their effectiveness. That might also be the main reason why sulphur spraying was of little success in apple orchards. Further investigation will focus on new wild strains, the comparison of different sulphur preparations and wetting agents to give a practically based advice to farmers. It will be tested if sulphur-tolerant strains can be selected in laboratory rearing.

The use of *Trichogramma* in organic apple plantations has to be integrated with the sulphur applications: the use of scab-resistant apple species and an early treatment of the disease with the aim to reduce these applications while *Trichogramma* is being released. The integration of the releases of *Trichogramma* wasps into a spraying plan could help to improve the control of the codling moth in organic farming by biological control methods.

Augmentation of *Cameraria ohridella* parasitoids by providing alternative host resources in spring

Förderung der Parasitoiden von Cameraria ohridella durch Bereitstellung von Alternativwirten im Frühjahr

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Parasitism rates of the first generation of *C. ohridella* (Lep., Gracillariidae) in spring are generally low, regardless of the parasitism rates found at the same locations in preceding autumn generations. The poor synchronisation between the emergence of the parasitoids after diapause and the development of the invasive host's first generation may be one important reason (GRABENWEGER, 2004). At the time when parasitoids emerge from dry leaves after diapause, no mines, not even eggs of the host are present on horse chestnut leaves. *C. ohridella* stages suitable for parasitism appear only several weeks later.

Consequently, emerging parasitoids lack hosts for several weeks in horse chestnut stands, which presumably forces them to leave the site. With the present experiment, we wanted to investigate whether these parasitoids could be promoted by the provision of alternative hosts during the critical time in spring. The measure was to prevent them from leaving the patch until the first generation of *C. ohridella* has reached a developmental stage suitable for parasitoid attack.

Horse chestnut seedlings were infested with *C. ohridella* in the greenhouse. The juvenile leafminer stages reached the optimum age for parasitism exactly at the time when parasitoids in the field emerged after diapause. Seedlings with *C. ohridella* host larvae were then exposed to parasitoid attack at one horse chestnut stand and at one control location without horse chestnuts. In addition, we surveyed for leafminers on other plants appearing in early spring. Their parasitoid complexes were compared with the complex of *C. ohridella* to evaluate their suitability as alternative hosts.

Parasitism rates on our artificially infested seedlings were significantly lower at the location without horse chestnuts than at the horse chestnut stand at one time. Several weeks later, the parasitism rate of the leafminer's first generation on the mature horse chestnut trees was significantly lower, too. Obviously, several parasitoid species emerging from dry horse chestnut leaves after diapause immediately start to search for leafminers and accept an artificial provision of hosts very well. In practice, the exposition of artificially infested horse chestnut seedlings to bridge the critical time period in spring is not feasible. However, a few

agromyzid flies are abundant on ornamental shrubs and herbs at this time and some of them seem to have a parasitoid spectrum similar to that found on the horse chestnut leafminer. These leafmining flies may serve as alternative hosts for *C. ohridella* parasitoids during the critical time period between the end of the parasitoid's diapause and the appearance of the first suitable *C. ohridella* larvae on horse chestnut trees.

The experiment was carried out under the project BerlinCam, more information may be obtained from our website:
http://www.stadtentwicklung.berlin.de/pflanzenschutz/berlin_cam/index.shtml. The project is funded by the Senate Department of Urban Development Berlin and the EU by means of the EFRE funds.

GRABENWEGER, G.: Poor control of the horse chestnut leafminer, *Cameraria ohridella* (Lepidoptera: Gracillariidae), by native European parasitoids: a synchronisation problem. J. Entomol. 101, 189-192, 2004.

Biological parameters of *Pnigalio agraules*, a parasitoid of *Cameraria ohridella*

Biologische Parameter von Pnigalio agraules, ein Parasitoid der Kastanien-miniermotte

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Among other approaches, biological control measures against *C. ohridella* (Lep., Gracillariidae) are tested under the project BerlinCam ("Possibilities to control the horse chestnut leafminer in Berlin", funded by the Senate Department of Urban Development Berlin and from the EU EFRE funds). Classical biological control is impossible since the origin of the invasive leafmining moth is unknown so far. Therefore, we emphasize the promotion of native natural enemies, especially parasitoids of the horse chestnut leafminer.

Out of 16 parasitoid species known to attack *C. ohridella* in Berlin, the parasitic wasp *Pnigalio agraules* (Chalcidoidea, Eulophidae) was chosen as a suitable candidate for biocontrol experiments. *P. agraules* is a highly abundant parasitoid of *C. ohridella* in Berlin, only excelled in abundance by another eulophid species, which was rejected because of its tendency to develop as a hyper-parasitoid. Contrary, *P. agraules* develops strictly primary, at least on *C. ohridella* larvae. The species belongs to the subfamily Eulophinae, is ectoparasitic and about 2.4 to 2.6 mm long. *P. agraules* is considered highly polyphagous, attacking many kinds of concealed hosts. There are 42 different host records so far (NOYES, 2002), including mainly *Phyllonorycter* spp. and other leafmining Lepidoptera as well as leafmining wasps (Fenusini spec.), beetles (*Rhynchaenus* spp.) and to a lesser extent flies (Agromyzidae spec.). On other hosts than *C. ohridella* it is also known to act as a hyperparasitoid on Chalcidoidea and Ichneumonoidea.

In a first step, we investigated several biological parameters of *P. agraules* under laboratory conditions, i.e. life span and time of active oviposition of adults, duration of embryonic and juvenile development, rates of host feeding and parasitism, and the sex ratio of the offspring. Experiments were conducted at two different temperatures, 15 °C and 20 °C, in environment-controlled chambers (70 % rH and 16 h daylight). All in all, about 1,500 *P. agraules* were examined under this investigation.The most suitable host stages for parasitism of *P. agraules* were the late larval stages (the last feeding larva as well as the two spinning stages of the leafminer). Younger instars were not parasitized; nevertheless they were preferably attacked by the female wasps for host feeding. Embryonic development of the parasitoids lasts a maximum of two days at 15 °C. The larval development with presumably two feeding stages and a non-feeding prepupa lasted another 12 days at the same temperature. The discrimination of the different larval stages of the parasitoid turned out to be very difficult, since ecdysis was only clearly detectable between the prepupal and the pupal stage. Adults emerged from the pupae after more than 2 weeks. All in all, the development of the parasitoid at 15 °C lasted between 29 and 31 days, males were on average two days faster than females. The development of the juvenile parasitoid as well as the adult life span was considerably shorter at 20 °C. Nevertheless, the number of eggs laid (on average 65 eggs per female) was more or less the same at both temperatures because females laid more eggs within shorter time at 20 °C.

Our preliminary results show that *P. agraules* may be a promising candidate for biological control of *C. ohridella*. Several important parameters are similar to those known from *Diglyphus isaea* parasitizing *Liriomyza bryoniae*, another eulophid wasp which is already commercially available for the control of leafmining flies. On the other hand, the polyphagy of *P. agraules* may be an important limiting factor for the use of this species as a biocontrol agent. Therefore, several additional experiments will be necessary for a reliable evaluation of the potential of *P. agraules* for *C. ohridella* control.

NOYES, J.: Interactive catalogue of world Chalcidoidea. – CD-ROM published by Taxapad, Vancouver, 2002.

Body parameters of aphid predators as bioindicators for the intensity of pesticide use

Körperparameter von Blattlausprädatoren als Bioindikatoren

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Predators of cereal aphids represent a very complex and varying community with strong relationship to target pests and are an important element of functional biodiversity. They can be used as bioindicators for different plant protection intensities, because they respond to pesticide applications either directly by toxicity or indirectly by density changes of prey. While densities and diversity parameters of aphid predators are mostly used as bioindicators, body parameters and fat body

content have not yet obtained the same interest of agro-ecologists. The aim of the investigation was to determine a) the variance of fresh weight of pupae of *Episyrphus balteatus*, fresh and dry weight and wing lengths of adult *Coccinella septempunctata* and the nutritional status (hunger) of collected adult *C. septempunctata* within the samples and b) identification of the mean differences between the samples of different field populations (8 populations of *E. balteatus*-pupae and 9 samples of adult *C. septempunctata*).

The parameters varied within a sample mostly conforming to the normal distribution with different curves for females and males. On the basis of means and variations of assessed parameters, differences (partly statistically significant) between the populations were observed. For example, the fresh weight of female *C. septempunctata* at location 8 (Altreetz, 2003, pea, after insecticide application) fluctuated between 26.8 mg and 56.3 mg (mean: 39.4 mg) and at location 15 (Dahnsdorf, 2003, oat, no insecticide application) between 42.6 mg and 90.1 mg (mean: 62.2 mg). Relating to *C. septempunctata*, different influences, especially the food uptake of larvae, are assumed to cause the considerable variation of body parameters of adults. Only slight or not significant correlation between the intensity of pesticide use and the above mentioned parameters were determined.

Potential of aphid predators and their suitability as bioindicators in Bt maize

Das Potenzial der Blattlausprädatoren und deren Eignung als Bioindikatoren an Bt-Mais

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Within the 5-year study “Ecological and phytopathological investigations in Bt maize grown in the European corn borer (*Ostrinia nubilalis*) infestation area Oderbruch region (Germany)” a data pool of aphid predators and other non-target arthropods in maize was created. Furthermore, possible effects of Bt maize on non-target arthropods have been analysed.

Different methods such as count, harvest of whole plants and pitfall trapping were used to determine the abundance of aphids and their predators in Bt maize and conventional maize. They represented the most important trophic chain in maize and be particularly suitable as bioindicators for a monitoring procedure of Bt maize growing. The date of flowering could be elaborated as the optimal date of count, harvest of whole plants and pitfall trapping because aphids and predators occur in statistically sufficient numbers at that period of vegetation.

The following aphid predators colonized the Bt maize fields: *Coccinella septempunctata,* imago, larvae; *Propylea quatuordecimpunctata,* imago, larvae; *Adalia bipunctata*, imago, larvae; *Coccinula quatuordecimpustulata,* imago, larvae; *Tytthaspis sedecimpunctata,* imago, larvae; *Hippodamia tredecimpunctata,* imago, larvae; Coccinellidae, other species, imago, larvae; *Episyrphus balteatus,* larvae; *Sphaerophoria scripta,* larvae; Syrphidae, other species, larvae; *Chrysopa carnea*,

imago, larvae; Chrysopidae, other species, imago, larvae; Hemerobiidae, imago, larvae; Dolichopoidae, Hybotidae, Empididae several species, Imago; *Aphidoletes aphidimyza*; Cecidomyiidae, larvae; Aphidiidae, imago, larvae; *Orius* spp., Anthocoridae, imago, larvae; *Nabis* spp., Nabidae, imago, larvae; *Cantharis fusca*, Cantharidae, several species, imago, larvae; *Forficula auricularia*, Forficulidae, imago, larvae; Carabidae, various species, imago, larvae; Araneae, various species, juvenile, adults; *Tachyporus hypnorum*; Staphylinidae, several species.

The predators of the most frequently occurring aphids (*Sitobion avenae, Metopolophium dirhodum* and *Rhopalosiphum padi*) in maize fields in the Oderbruch region were pooled to a predator community (FREIER *et al.*, 1997). Field studies and computer simulations have shown that the abundance of predators is a third too small for a natural regulation of aphids. Additionally, strong fungi infestation of aphids and high temperatures in summer contribute to the natural control of aphids.

The mean occurrence of aphids and their predators did not differ significantly between Bt maize and the conventional variety in the 5-year survey.

FREIER, B., H. TRILTSCH, M. MÖWES, V. RAPPAPORT (1997): Der relative Wert von Prädatoren bei der natürlichen Kontrolle von Getreideblattläusen und die Verwendung von Prädatoreinheiten. – Nachrichtenbl. Deut. Pflanzenschutzd. 49, 215-222.

Entomopathogenic nematodes (EPN) to control *Otiorhynchus ligustici* in hops

Entomopathogene Nematoden (EPN) gegen Luzernerüßler (Otiorhynchus ligustici) in Hopfen

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Alfalfa weevil (*Otiorhynchus ligustici*) is widespread in several hop producing areas. The beetles feed on emerging shoots of hop plants and thus cause additional work for raising new shoots. Chemical control is advised when more than one beetle occurs on three plants, but legislation makes the use of insecticides more and more difficult.

Furthermore, insecticides cannot prevent damage by the root feeding beetles. This was the reason for first trials with EPN to control *O. ligustici* in hops more than 15 years ago. Because of the life cycle of the beetle, which lasts two to three years, and the special cultivation practice of the permanent crop hop, the main focus was laid on methodical questions, for instance application technique, optimal time for the release of EPN and how to evaluate their efficacy. Furthermore, nematode species were tested in laboratory for suitability.

In a first attempt the nematodes were applied in May using a special soil injector to place them near to the old grubs at about 40 cm depth. But it was not possible to determine mortality this way, because digging out samples was too laborious. Therefore, red clover was planted between the hop plants because *O. ligustici* prefers egg deposition on this trap crop in April. EPN were applied by

watering in June, thus the control of even the young beetles and the estimation of effectiveness of EPN application was easier.

The first laboratory tests with several EPN species, which were conducted in cooperation with CAU-Kiel, and the field trials have shown promising results, so that in 2006 another research project will start to investigate EPN as an alternative to the chemical control of alfalfa weevil in hop.

ARNDT, M. (1990): EPN zur biologischen Bekämpfung des Luzernerüßlers in Hopfen. – Hopfen-Rundschau 12, 304-305.

ARNDT, M. (1994): Entomopathogene Nematoden gegen Luzernerüßler in Hopfen. – Phytomed. 1, 40-41.

Field application of entomopathogenic nematodes to control the cherry fruit fly, *Rhagoletis cerasi* L. (Diptera, Tephritidae): the "how and when" as key to success?

Feldeinsatz entomopathogener Nematodenzur Bekämpfung der Kirschfruchtfliege, Rhagoletis cerasi L. (Diptera, Tephritidae): das "Wie und Wann" als Schlüssel zum Erfolg?

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The cherry fruit fly, *Rhagoletis cerasi* L. (Diptera, Tephritidae), is the main insect pest on cherries in Europe. The fly causes regular infestations, especially in sweet cherry. Growers are urged by the market to produce almost completely undamaged cherries. This leads to regular application of insecticides. Dimethoate is the current product of choice, but the registration for this purpose is banned in an increasing number of European countries. Insecticide treatments have to be stopped in due time before harvest in order to avoid residues on the crop, thus leading to unreliable control in many situations. Organic cherry growers are left without any option to combat *R. cerasi* efficiently.

New approaches seek for insectide-reduced or insecticide-free methods to control the cherry fruit fly. Recent studies have demonstrated the high capacity of entomopathogenic nematodes (*Steinernema feltiae*, *S. carpocapsae*) to infect larvae of *R. cerasi* after leaving the cherry for pupation in the soil in laboratory, semi-field and field trials. Current research explores the requirements for efficient and feasible implementation of this method in practice. A challenge is the development of an application technique which maintains quality and persistence of nematodes on the one hand and which is compatible with the grower's practice on the other hand. We tested the suitability of a tractor-mounted spray boom for treatment under the canopy area to apply the entomopathogenic nematodes in several cherry plantations. Infective juveniles (IJ) were applied at a dose of 250.000 or 500.000 IJ/m² in water (1 l/m², i. e. 10,000 l/ha). Post-treatment irrigation was done with 1 l/m². The achieved application dose was evaluated by petri-dish samples installed under the canopy during spraying. Soil samples were taken

at regular intervals to evaluate the infectivity of EPN in laboratory bioassays using the host *Galleria mellonella*. The applied dose of IJ met the expectations. Activity of EPN was satisfying directly after application, but dropped during the following weeks. But a longer persistence of nematodes in soil is desirable because drop of cherry fruit fly larvae may last several weeks, especially if trees are not completely harvested. Irrigation frequency after the application proved to be a major factor to maintain field efficacy of applied nematodes in other crop systems. In Germany, cherry plantations are usually rain-fed or drip-irrigated. As an alternative, the use of sprinkler irrigation systems which treat the whole surface under the tree canopy may help to keep soil moisture also in cherry plantations after application of nematodes without interfering too much with other activities of the grower during busy harvest time.

Labelling of plant production products regarding effects to benefical arthropods

Kennzeichnung von Pflanzenschutzmitteln hinsichtlich Wirkung auf Nützlinge

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The German Register of Authorized Plant Protection Products contains in the section "Labelling of effects on beneficial organisms" possible effects of pesticides on beneficial organisms. This is an indication to gardeners and farmers on whether a pesticide can be used under integrated or biological plant protection measures.

The BBA has made proposals on the labelling of the effect on beneficial organisms since May 1993 as part of the BBA consultation statement.

At present pesticides are labelled for selected beneficials when they are an antagonist of a pesticide's target pests. Labelling is based on one or several studies on the beneficial species submitted by the applicant or holder of the registration. Furthermore, it uses results from the ring tests of the IOBC/wprs working group "Pesticides and Beneficial Organisms" and results from literature. Evaluation considers lethal effects (mortality) and sublethal effects (fertility, food uptake, behavioural changes). Lethal and sublethal effects are the basis to classify pesticides as not harmful, slightly harmful or harmful to a beneficial species (ANONYMOUS, 1998).

Labelling referring to *Aphidius rhopalosiphi* and the predatory mite *Typhlodromus pyri* could be proposed for many pesticides because both beneficials are standard test organisms and applicants have to present results on the effect of a pesticide on both standard test organisms according to EC Directive 91/414/EEC. Many pesticides could be labelled for the green lacewing *Chrysoperla carnea*, the seven-spotted ladybird *Coccinella septempunctata*, the short-winged beetle *Aleochara bilineata*, the ground beetle *Poecilus cupreus* and representatives of *Pardosa*. In single cases labelling is possible for the chalcid wasp *Trichogramma cacoeciae* and the hoover fly *Episyrphus balteatus*. However, applicants produce

only rarely results on beneficials like *Encarsia formosa* and *Phytoseiulus persimilis* for biological control in glasshouses.

ANONYMOUS (1998): Data requirements and criteria for decision-making in the European Union and the Federal Republic of Germany for the authorization procedure of plant protection products. – Mitt. Biol. Bundesanst. Land-Forstwirtsch. Berlin-Dahlem 358: 158 pp.

Side effects of pesticides on *Aphelinus mali* and other antagonists of the woolly apple aphid

Auswirkungen von Pflanzenschutzmitteln auf die Blutlauszehrwespe Aphelinus mali und weitere Antagonisten der Blutlaus

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In past years, an increasing infestations with the woolly apple aphid *Eriosoma lanigerum* (Aphidina, Aphididae, Eriosomatinae*)* has been observed in organic as well as in integrated apple production. In order to enhance the biological control of this pest, the safe-guard of its natural antagonists, especially the parasitoid *Aphelinus mali* (Hymenoptera, Chalcidoidea, Aphelinidae), but also earwings, coccinellids and lacewings is a main objective. For this reason, investigations into the side effects of pesticides used in organic apple production were carried out and trials were started with the neonicotinoids Confidor (a.i. imidacloprid, 700 g/kg) and Calypso (a.i. thiacloprid, 480 g/l) used in integrated apple production. The tested organic pesticides were *Quassia* extract and its active ingredients quassin and neoquassin, Kumulus WG (sulphur, 800 g/kg), Funguran (756 g copperoxychloride/kg) and lime sulphur (a.i. calciumpolysulfid 80 %, sulphur 23 %). As the active ingredients of *Quassia* extracts vary depending on the origin of the *Quassia* wood, a defined extract from Trifolio-M GmbH (Lahnau, Germany) was used. The parasitoids were own-reared.

Fresh residues of quassin, neoquassin and *Quassia* extract in rates as recommended for practice (up to 18 g/ha) were harmless to the parasitoid adults. When applied via food, i.e. mixed in fructose solution, quassin and *Quassia* extract resulted in dose-dependent effects, though not exceeding 30 % at the highest rate of 18 g/ha. Neoquassin applied via food was harmless at the highest rate of 18 g/ha. Quassin and *Quassia* extracts did not harm the parasitoids during their development in the woolly apple aphid mummies and did not affect reproduction of the subsequent generation. Furthermore, *Quassia* was harmless to *Forficula auricularia* (Dermaptera, Forficulidae), *Coccinella septempunctata* (Coleoptera, Coccinellidae) and *Chrysoperla carnea* (Neuroptera, Chrysopidae) (direct spraying and oral application).

Residual contact of fresh residues of Kumulus (0.4 - 2 kg/ha) and Funguran (0.2 – 0.5 kg/ha) resulted in low mortalities (≤ 10 %) whereas lime sulphur (6 l and 15 l/ha) caused 80 % to 100 % mortality. In the field, five applications of Kumulus

(2.5 kg/ha each) and two applications of lime sulphur (15 and 20 l/ha) did not cause reductions in parasitization compared to the control.

In the lab (residual contact), even very low rates of Confidor resulted in high mortalities of *Aphelinus mali* adults, whereas Calypso, applied in rates as used in practice, caused mortalities between 10 % and 40 %. Both neonicotinoids did not affect the protected stage of the parasitoid in the woolly apple aphid mummy, when the mummies were directly sprayed. Further investigations aim to check sublethal effects and potential influence on the behavior of the parasitoid.

REBECA – a project to review regulation of BCAs

REBECA – Ein EU Projekt zur Entwicklung verbesserter Richtlinien für die Zulassung biologischer Pflanzenschutzmittel

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Biological control agents (BCAs) are sustainable and environmentally safe tools to manage pest insects, nematodes, weeds and diseases in agriculture, forestry and horticulture. However, registration procedures have been established for micro-organisms, semiochemicals and botanicals, which prevent their immediate market introduction. Registration largely follows rules developed for synthetic pesticides, thus many possibly irrelevant investigations, e. g. on the ecotoxicology, are requested. Costly risk assessment studies and long-term evaluation of dossiers keep these products off the market. The time frame for the EU evaluation of dossiers according to Directive 91/414/EEC is > 70 months compared with nearly 23 months for the same products in the USA. In contrast, macrobials (insects, mites and nematodes) are exempted from registration in most European countries and SMEs increased their turnover in macrobials from almost zero to > 100 million € within the last two decades. Due to their nature and specificity of action, BCAs should not be treated like synthetic chemicals and therefore need a different approach for risk assessment and regulation. The objective of the Action REBECA is to accelerate the regulation process for BCAs and make it more cost-effective without making compromises on the level of safety. The action will review current legislation, guidelines and guidance documents at Member State and EU level and compare them with legislation in countries where the market introduction of BCAs was more successful. Potential risks of BCAs will be reviewed and proposals are prepared on how regulation of BCAs can be balanced according to their potential hazards. Costs and benefits related to different levels of regulation will be reviewed and trade-offs evaluated. Alternative regulation strategies will be developed for low risk products. The action will bring together stakeholders from industry, science, regulation authorities, policy and environment to form a network within Europe bringing together the expertise and critical mass necessary to improve regulation procedures for BCAs. The action will provide potential experts who can assist the EC and Member States in the evaluation of risks and regulation of BCAs and identify future research tools to support the development of balanced

regulation strategies. REBECA will be launched at 01 January, 2006. Experts in the field which are interested in the action should contact the authors. Further information will be effective from 01 February, 2006 at www.rebeca.eu.

Thrips and their natural enemies

Thripse und ihre natürlichen Feinde

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The DVD documentation (duration 15 minutes) on this topic presents at first a short overview of the complete life cycle of *Frankliniella occidentalis* on *Phaseolus vulgaris* leaves that were kept on water agar. It shows at high magnification how females and nymphs feed on leaf cells and how the characteristic damage symptoms arise. Young females show a defensive response before they are mated by the smaller males. Sequences of egg deposition into leaves and hatching of the first nymphal instars are followed by sequences that show the moulting processes until the adult stage has been reached. Juveniles and adults of another thrips species, *Heliothrips haemorrhoidalis,* are then briefly presented.

The predatory behaviour of the three *Amblyseius* mites *A. cucumeris, A degenerans* and *A. swirskii* has been recorded on nymphal instars of *F. occidentalis*. Females of *A. cucumeris* and *A. swirskii* attack preferentially first instar nymphs, whereas the more robust *A. degenerans* females also successfully attack second instar nymphs in spite of their strong defensive responses. Usually several individuals of all three *Amblyseius* spp. become involved in competitive prey consumption once prey has first been caught by a single individual. In most cases captured prey is sucked out completely. The preying behaviour of the soil dwelling mite *Hypoaspis miles*, a very fierce and robust predator, was recorded on *F. occidentalis* prepupae and pupae in soil.

Out of the three predatory mites *Orius insidiosus*, *O. majusculus* and *O. laevigatus* (the adults of which are briefly shown), the latter species has been chosen to present predatory activities on *F. occidentalis* nymphs. Both juvenile and adult *O. laevigatus* locate prey more or less by coincidence. Punctured prey is not able to escape and is then sucked out by repeated regurgitations, which are typical of extra-oral digestion.

The behaviour of the predatory thrips *Franklinothrips vespiformis* was recorded with *Parthenothrips dracenae* as prey. Nymphs prefer nymphs, prepupae and pupae, whereas adults also attack adult *P. dracenae*. The attacked prey is gradually sucked out without prominent regurgitations. Adults were also seen to feed on first instar nymphs that were still enclosed in eggs protruding from the leaf surface. The mechanisms of egg deposition by a *F. vespiformis* female is shown in detail.

The DVD closes with sequences on the behaviour of the eulophid parasitoid *Thripobius semiluteus* attacking first and second nymphal instars of *H. haemorrhoidalis*. These instars bear sticky faecal droplets on the tip of their upturned abdomen and are therefore carefully approached by the parasitoid. Egg injection into

the host occurs within seconds. Parasitised nymphs are gradually transformed into black mummies from which the parasitoids finally emerge.

Leaf miners and their natural enemies

Minierfliegen und ihre natürlichen Feinde

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The behaviour of the polyphagous pea leafminer *Liriomyza huidobrensis* (Diptera: Agromyzidae) and its natural enemies *Dacnusa sibirica* (Hymenoptera: Braconidae) and *Diglyphus isaea* (Hymenoptera: Eulophidae) was recorded at 25 ± 1 °C on dwarf bean (*Phaseolus vulgaris*) leaves placed on water agar. The DVD (duration 15 minutes) shows at first how a female *L. huidobrenis* creates fan-shaped leaf punctures by means of its spatulate ovipositor. It then removes and regurgitates fluids from these punctures. Eggs are deposited into tubular leaf punctures. When ready to hatch, the L1 larva ruptures the eggshell with its mouth hook and immediately starts feeding on spongy mesophyll cells. Food uptake from these cells by continuous mouth hook raspings and the rapidly increasing mine diameters are shown at different developmental stages of the larva. About five days after hatching, the L3 larva emerges from a slit in the leaf surface. It then enters a very short prepupal stage (L4) before it pupates. Adults emerge about 10 days later during early daylight hours. Upon emergence, the dorsal anterior end of the pupal case is torn open with the aid of a balloonlike inflatable bladder at the top of the fly's head.

Females of the endoparasitoid *Dacnusa sibirica* search for hosts along leaf mines by repeated antennal drummings and shallow ovipositor probings until they have located a suitable host (usually a second instar larva) into which they deposit an egg. Oviposition lasts about one minute and does not affect the feeding activities of the attacked larva. Developing first instar larvae of the parasitoid can first be clearly detected inside the third larval stage of *L. huidobrenis*. When the parasitised larva pupates, the parasitoid develops to the adult inside the pupa. About one week later, early in the morning, adult *D. dacnusa* emerge from the anterior end of the pupae. Emergence is assisted by strong molelike mandibles.

The feeding behaviour of the ectoparasitoid *Diglyphus isaea* is remarkably different from that of *Dacnusa*. Hosts are searched by repeated ovipositor insertions into leaf mines. Detected host larvae (usually the last instar) respond with a strong defensive reaction and try to escape as soon as they have been punctured by the ovipositor for the first time. Soon afterwards, however, the larva stops moving and is then attacked again. Eggs are deposited on or close to the paralysed larva. Host feeding on paralysed larvae is very common and is initiated by prolonged deep ovipositor insertions. The DVD then shows how the rapidly growing larval instars of the parasitoid feed on the host until it is nearly completely consumed. The last instar larva then turns into a green praepupa that turns into a pupa after it has extruded its gut contents. Finally, the emergence of an adult female from a pupa within the leaf is shown.

Control of the codling moth *Cydia pomonella* with entomopatogenic nematodes

Einsatz von entomopathogenen Nematoden gegen Larven des Apfelwicklers

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The codling moth, *Cydia pomonella,* is one of the most difficult pests in apple growing. Amongst entomopathogenic nematodes, the species *Steinernema carpocapsae* has been isolated noticeably often from diapausing larvae of the codling moth. Field trials against the pest in the USA have demonstrated the potential of *S. carpocapsae* and *S. feltiae* against this pest (LACEY *et al.*, in press). Mortality of sentinel larvae was 94 % for both species when 2.5×10^9 nematodes/ha were applied in late summer (ambient temperature 16.6 °C). When applied in autumn (ambient temperature 10.3 °C), *S. feltiae* killed 90 % of the sentinel codling moth larvae, whereas *S. carpocapsae* killed only 58 %.

In Germany, the efficacy of *S. feltiae* for controlling *C. pomonella* was tested in an apple orchard in Werder (Brandenburg) in October 2004. The autumn treatment aims at reducing the first generation of moths in the following year. To minimise spreading of moths between treated and untreated plots, a large test field with minimal drift between the plots was chosen (2 plots of 10115 m²). The main wind direction was rectangular to the apple rows and parallel to the borderline between the plots. The initial fruit damage before treatment in 2004 was around 70 % and relatively evenly distributed within the test area. After apples were harvested, nematodes (*S. feltiae*, product nemaplus) were applied at a dose of 3.75×10^9 nematodes in 4000 l water per ha with an air-blast sprayer adjusted to cover about 2/3 of the tree height and the soil below the canopy. To accelerate penetration of the nematode suspension into cracks on the stems and into the soil the wetting agent Breakthru® was used at the recommended dose (0.01 %). Treatment date was October 21st, 2004. All conventional plant protection measures were applied to both plots, and the evaluation of fruit symptoms was carried out on July 12th, 2005 when most of the first generation larvae had entered the fruits. In the centre of the treated and untreated plots, 1000 apples were assessed for larval damage from 5 selected rows (= 5000 apples per plot).

Fruit damage differed in the untreated plot between the 3 apple varieties (Jonagored 20 %, Boskoop 30 % and Pilot 36 %). In the treated plot, fruit damage was reduced by 40 % to 59 % in the rows assessed. This clearly shows the potential of *S. feltiae* in controlling codling moth larvae. Further studies will evaluate whether the same reduction in fruit symptoms can be achieved with reduced nematode doses.

LACEY, L., S. ARTHURS, T. UNRUH, H. HEDRICK (in press): Entomopathogenic nematodes for control of Codling moth (Lepidoptera: Tortricidae) in apple and pear orchards: Effect of nematode species and seasonal temperatures, adjuvants, application equipment and post-application. – Biol. Control.

Biological and molecular characterization of new isolates of *Cydia pomonella* granulovirus (CpGV)

Biologische und molekulare Charakterisierung neuer Isolate des Cydia pomonella Granulovirus (CpGV)

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The codling moth, *Cydia pomonella* (CM), is one of the most deleterious pests in apple production. *Cydia pomonella* granulovirus (CpGV) is a viral pathogen infecting CM larvae. It is registered in many European countries and is applied to more than 100,000 ha. New CpGV isolates may play an important role in the future development of viral insecticides. This study characterizes six field isolates from the Iran and two isolates from Georgia. The viruses were propagated in fifth-instar CM larvae. Viruses were purified and the DNA was characterized by DNA restriction endonuclease analyses and restriction site mapping. The restriction maps were compared to the previously identified M, E and R types. Regions with major insertions and deletions in the genome were sequenced. Although REN profiling exhibited a considerable diversity among the isolates, all of them could be assigned to the M, E, or R types. Single nucleotide polymorphisms (SNPs) were identified in the highly conserved late expression factor 8 and polyhedrin gene. These SNPs will be useful for type identification.

Quantitative determination of *Cydia pomonella* granulovirus (CpGV) using real-time PCR

Quantitative Bestimmung des Cydia pomonella Granulovirus (CpGV) mittels Real-Time PCR

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In this work, we established a method for real-time polymerase chain reaction (PCR) to perform a quantitative detection of *Cydia pomonella* granulovirus (CpGV) and to determine the quantitative error of the detection. For this, we initially optimised the DNA extraction. The extracted amounts of DNA were compared by performing a PCR. This was paralleled by optimising the methodology for real-time PCR. It appeared that SYBR Green I™ provided good reproducible results. The limit of detection of CpGV using the optimised DNA-extraction method was 12.5 occlusion bodies per PCR reaction. The quantitative error of the detection was determined with five samples extracted in parallel. Having a very low relative

standard deviation the method proved to be robust and reproducible. Real-time PCR is suitable to quantify CpGV in samples of water and soil. It is a fast and cost-saving alternative compared with hitherto used bioassays to quantify the virus in environmental samples.

Combining *Steinernema carpocapsae* and *Bacillus thuringiensis* strains for control of diamondback moth (*Plutella xylostella*)

Kombination entomopathogener Nematoden (Steinernema carpocapsae) und Bakterien (Bacillus thuringiensis) zur biologischen Bekämpfung der Kohlmotte (Plutella xylostella)

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The diamondback moth (DBM), *Plutella xylostella*, is a major pest of crucifers worldwide. The intensive use of chemical insecticides has promoted rapid development of resistance, for which reason alternative control measures are developed. *Bacillus thuringiensis* (Bt) and entomopathogenic nematodes (EPN) have shown potential to control DBM larvae. But the efficacy of *Bt* subsp. *kurstaki* (Btk) and *Bt* subsp. *aizawai* (Bta) can be reduced due to intensive spraying and subsequent resistance development. For resistance management other biocontrol agents are necessary. We therefore focused on the combined biological management for DBM in order to avoid resistance development and enhance the efficacy of the biological agents.

The interaction between different combinations was tested against early third instar of *P. xylostella* larvae: (1) Btk (Dipel) and *S. carpocapsae* (en3); (2) Bta (XenTari) and *S. carpocapsae* (en3); (3) 0.3 % Rimulgan and 0.3 % Xanthan (nematode formulation additives) and *S. carpocapsae* (en3); (4) 0.3 % Rimulgan and 0.3 % Xanthan and Bta (XenTari); (5) 0.3 % Rimulgan and 0.3 % Xanthan, *S. carpocapsae* (en3) and Bta (XenTari); (6) Btk and *Bt* subsp.*israelensis* (Bti); (7) Bta and Bti; (8) Btk and Bta; (9) Btk, Bta and Bti. The bacteria or EPN suspension was sprayed on 2 cm^2 cabbage leaf disks. The disks were put into cell wells and one larva was added to each well. Control treatments received water only. In order to calculate the interaction between the combinations, each of the component of the combination were also tested alone. The cell wells were incubated at 25 °C, 80 % RH for 48 hours. The interaction was calculated according to probit analysis (Finney) and subjected to Fisher test to detect significant differences.

All of the combinations, either sprayed one after the other or together, showed additive control results. Synergistic results were exceptional. The result may offer a powerful and reliable tool for *P. xylostella* biocontrol. Alternating applications of these combinations may allow to avoid or retard resistance of DBM populations against Bt.

Effect of polyethylene glycol on the storage survival of *Steinernema feltiae* and *Heterorhabditis bacteriophora*

Wirkung von Polyethylenglycol auf die Lagerfähigkeit von Steinernema feltia und Heterorhabditis bacteriophora

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The entomopathogenic nematodes (EPNs) *Steinernema feltiae* and *Heterorhabditis bacteriophora* are important biological control agents commercially used in horticulture. A bottleneck in nematode marketing is their short shelf life between 3 - 6 months. The quality of EPNs is reducing with the duration of storage. Whereas *S. feltiae* maintains its infectivity, *H. bacteriophora* can lose infectivity after 3 months of storage. In order to prolong shelf life and to preserve quality, the metabolism of EPN can be reduced during storage by desiccation. In the present study we evaluated the effect of polyethylene glycol (PEG) on desiccation of *S. feltiae* and *H. bacteriophora* at 25 °C. For both nematode species viability in 37 % PEG 600 was better than in 37 % PEG 300. PEG reduced the survival of *S. feltiae* from 80 % to 5 % after 130 days of storage, whereas positive effects on survival were recorded for *H. bacteriophora*, with 80 % survival after 90 days compared to 5 % in the untreated controls. Viability of *H. bacteriophora* after 1 day preconditioning at 30 % PEG and subsequent transfer to 37 % PEG was better than prolonging the pre-treatment to 2 days. The PEG treatment prolonged the infectivity of *H. bacteriophora* by 30 days.

The potential of entomopathogenic nematodes to control woodlice

Einsatz von entomopathogenen Nematoden gegen Asseln

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When occurring at high densities, woodlice cause damage in cellar storerooms on vegetables and fruits and in greenhouse cultivations especially in organic cucumber cultivation and botanical gardens. Seedlings, young and older plants are damaged. The aim of the present research was to develop strategies to control woodlice with entomopathogenic nematodes.

In laboratory tests, the woodlouse *Porcellio scaber* (Isopoda: Oniscidea) was examined for its susceptibility to the EPN species *Steinernema carpocapsae, S. feltiae* and *Heterorhabditis bacteriophora*. The nematodes *S. carpocapsae* and *H. bacteriophora* proved to be significantly more virulent than *S. feltiae*. *Steinernema carpocapsae* was used because of its superior desiccation tolerance.

Initial work had shown that the commonly used drench application of nematodes with a hand-held sprayer or a watering can was ineffective in controlling woodlice. An “attract and kill” method which ensures contact of high nematode numbers with the woodlice is desired. Different nematode concentrations, nematode carriers (quartz sand or diatomaceous earth) and bait substances (potatoes and slightly decomposed plant litter (*Carpinus betulus, Salix fragilis, Acer pseudoplatanus, Corylus avellana*)) were tested. The experiments were carried out in plastic containers (23 cm x 36 cm) which contained about 2 cm of potting compost and 30 *P. scaber*/container under simulated greenhouse conditions. Best results were obtained in the combination of quartz-sand formulation with decomposed plant litter as bait. Nearly all woodlice (96 %) died at a dose of 0.02 million *S. carpocapsae/P. scaber* (corresponding to 0.3 million *S. carpocapsae*/g formulated product) after one week (LD_{50} 1771.49 *S. carpocapsae/P. scaber*). When this composition was used in a bait station, 96 % mortality was reached at a nematode concentration of 0.04 million *S. carpocapsae/P. scaber* (0.6 million *S. carpocapsae*/g formulated product). Damage to 7-day old *Cucumis sativus* seedlings by *P. scaber* was significantly reduced (from 54 % to 25 %) by the application of the nematode product (0.6 million *S. carpocapsae*/g) whereas emerging seeds could not be protected. In cages (40 cm x 60 cm) in the botanical garden with *Tradescantia fluminensis* in pots with 90 *P. scaber*/container, damage to potted plants was significantly reduced from 100 % to 66 % after 14 days, and 41 % of woodlice were killed. When the plants were planted into potting soil without pots, no significant effect on the woodlice number or on plant damage was observed. Research is continued to determine optimum treatment time as well as optimum nematode doses per area covered by one bait lump. Moreover, the interactions between EPN and woodlice should be investigated.

To the development of a bait station with *Steinernema carpocapsae* against cockroaches

Zur Entwicklung einer Köderstation mit Steinernema carpocapsae gegen Schaben

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The development of a bait station with *Steinernema carpocapsae* against cockroaches is the aim of a co-operation project between the company e-Nema of Raisdorf and the Botanical Garden of Berlin. The most important results after two years research are presented. First species examined was the Australian cockroach *Periplaneta australasiae*, because the result of an enquiry in Germany showed that the population of this cockroach increased rapidly in botanical and zoological gardens in the last years. Cockroaches are common potential vectors of infections, particularly those living in foodstuff areas. Therefore, *Blatella germanica* was explored, too.

We suppose that the nematodes have to enter the host through the spiracles. 80 % of the cockroaches (*P. australasiae)* died when the nematodes were placed

on the side of the host body where the spiracles are. These results were supported by cage tests with bait stations. The highest mortality was reached by using bait stations where the nematodes had contact with the body side of cockroaches (mortality of 85 % and 76 %). To lure the cockroaches into the traps different baits and foods were offered. Garlic and coffee were better or as good as commercial products. However, banana was the preferred food. Contact with nematodes for two minutes was sufficient that 80 % of the cockroaches died. Mortality even increased to 95 % after 30 minutes.

The results of three investigations showed that *B. germanica* is infected more simply and faster than *P. australasiae*: 1. *S. carpocapsae* was distributed on earth in cages. 100 % of the cockroaches died after six days *(B. germanica)* or after two weeks *(P. australasiae)*. 2. All cockroaches of *B. germanica* died in cages with small Petri dishes as bait stations after 18 days (the nematodes were placed on the bottom and on the top) – however, 38 out of 50 animals died within three days. In contrast to it, only 87 % of *P. australasiae* died after 28 days. 3. When the nematodes were placed on the bottom of the bait station only, 70 % of *B. germanica* and 35 % of *P. australasiae* died after ten days.

The potential of *Bacillus thuringiensis* subsp. *israelensis* and entomopathogenic nematodes to control *Tipula paludosa*

Bekämpfungspotenzial von entomopathogenen Nematoden und Bacillus thuringiensis subsp. israelensis gegen Tipula paludosa

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Bacillus thuringiensis subsp. *israelensis* (Bti) is used in biocontrol mainly against mosquito and blackfly larvae. Laboratory bioassays and different field trials showed that it is also toxic to *T. paludosa* (Diptera: Nematocera), which is the major insect pest in grassland in north-west Europe. The LD_{50} of Bti (strain H14) was determined for the different larval instars of *T. paludosa*. For the L2 stage, the LD_{50} is 10.4 µg or 73 ITUs (International Toxic Units determined for *Aedes aegypti*); for the L3 it is 41.2 µg or 289 ITUs, and for the L4 it is 440.9 µg or 3,087 ITUs. In a laboratory assay, the efficacy of Bti against *T. paludosa* L2 was determined at 4, 8, 15 and 20 °C. At all temperatures, an efficacy of more than 90 % was reached. At 4 °C a retardation of the mortality by 48 h was observed. An efficacy of 80 % was recorded with 13 kg/ha Bti (5,700 ITUs) against L1 - L2 in September and with 20 kg/ha Bti (3,000 ITUs) against L2 - L3 in November. Against L3 - L4 in March, an efficacy of 32 % was achieved with 10 kg/ha Bti (6,000 ITUs). In addition, different nematode strains were tested in laboratory against *T. paludosa* L1 at 15 °C. A mortality of 75 % was achieved with 50 infective dauer juveniles (DJs) of *S. carpocapsae*/larva. *S. feltiae* reached 37 % efficiency. At 8 °C, *S. feltiae* had an efficiency of 26 % and *S. carpocapsae* of 6 %. In different field trials over the last three years with *S. feltiae*, nematode efficacy was disappointing with no significant differences to the untreated controls. Only a

concentration of two million DJs/m^2 achieved an efficacy of 56 %. In 2005 *S. carpocapsae* caused an efficacy of 80 % in two different field trials with 0.5 million DJ/m^2 at soil temperatures of about 13 °C.

Pathogenity of *Bacilluc thuringiensis* subspecies *israelensis* against larvae of *Tipula paludosa*

Ursachen der Pathogenität von Bacillus thuringiensis subsp. israelensis gegen T. paludosa

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Bacillus thuringiensis subspecies *israelensis* (Bti) produces four crystal proteins with toxic effects against Nematocera (Cry 4Aa, Cry 4Ba, Cry 11Aa and Cyt 1Aa). The Cry insecticidal proteins (ICPs) attach to specific binding sites on the brush border membrane vesicles of the insect`s midgut, whereas Cyt1Aa has no specific receptor and exhibits a cytolytic activity. All four Bti-ICPs are toxic to *Aedes aegypti*. This insect is commonly used for bioassays to assess product quality. Of all ICPs Cry11 Aa is known to be the most toxic to *A. aegypti*. The ICPs of Bti were tested against *Tipula paludosa* by using four recombinant Bti strains expressing only one of the four ICPs. Single and combined strains were compared with the standard Bti strain. The most toxic ICP against *T. paludosa* is Cyt 1Aa. *T. paludosa* is not susceptible to any of the Cry proteins when used alone. Minimal effects were observed when the two Cry ICPs were combined. Synergistic effects were recorded when either Cry 4A and/or Cry 4B were combined with Cyt 1A, but not with Cry 11. All combinations including Cyt 1A were significantly better than combinations without the toxin. The impact of the Bti spores on the pathogenicity was investigated. Gamma-radiated and untreated Bti were fed to *T. paludosa* larvae. The LC_{50} of the untreated formulation including viable spores was < 2 µg/cm^2 whereas the radiated product had a LC_{50} of 5 µg/cm^2.

Quality control of *Bacillus thuringiensis* subsp. *israelensis* products

Qualitätskontrolle für Bti Produkte

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International toxic units (ITU) currently used for quality control (QC) of *Bacillus thuringiensis* (Bti) products are defined by bioassays using mosquito larvae (*Aedes aegyptii*). As a reference material the international Bti standard IPS 82 is used. This QC method is costly, time consuming and highly variable in the results (20 %). A QC method was developed which is based on a quantification of the

insecticidal crystal proteins (ICP) using the enzyme-linked immunosorbent assay (ELISA). Monoclonal antibodies with specific binding to the different Bti ICPs (Cry4, Cry11 and Cyt1) were produced. Compared to other QC methods (bioassay, spore or cell counts) or protein quantification methods, the ELISA is fast, easy to perform and variability is very low (3 %). The method can be used to quantify ICPs in fermentation broth and final product and can thus be used as a standard QC procedure. However, the ELISA QC cannot totally substitute for bioassays. Whereas the toxicity of Bti against *A. aegyptii* (ITU) significantly correlates with the amount of the different ICPs assessed with the ELISA (correlation coefficient Cyt 1 = 0.61, Cry 11 = 0.82, Cry 4 = 0.9), no correlation is detected in another nematoceran insect, the leatherjacket *Tipula paludosa*. No correlation was found between the ITUs *A. aegyptii* and the LD_{50} against *T. paludosa,* which is due to a different mode of action of the ICPs in *T. paludosa*. While Cry11Aa is highly toxic against *Aedes aegyptii*, no effect on *T. paludosa* was detected. The toxicity mainly depends on Cyt1Aa, however, no correlation was observed between the LD_{50} of Cyt 1Aa and the amount of this ICP measured in the ELISA. As a lethal effect on *T. paludosa* is achieved by the synergistic effects of Cyt 1Aa with Cry 4 ICPs together with the impact of the spore of Bti, the ELISA quantification of single ICPs will not directly indicate quality of a Bti product for use against *T. paludosa*.

Establishment and persistence of entomopathogenic nematodes in field soils and their efficacy in controlling the maize pest *Diabrotica virgifera virgifera*

Untersuchung zur Etablierung und Persistenz entomopathogener Nematoden im Boden und ihre Effektivität bei der Bekämpfung von Diabrotica virgifera virgifera

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In laboratory screenings, different entomopathogenic nematodes (EPN) had been proven to effectively kill the larvae of the new invasive maize pest *Diabrotica v. virgifera* LeConte (Coleoptera: Chrysomelidae). As a follow-up, the establishment, persistence and control effect of *Heterorhabditis bacteriophora*, *Steinernema feltiae* and *Heterorhabditis megidis* were examined under field conditions in Hungary in 2005; and this in dependence of application timing, application method and soil types. Therefore, EPNs were applied to three maize fields, i.e. with sandy soil, clay loam, and silty clay. The EPNs were applied in April as fluid row spray during sowing, or as a powder row application during sowing or as a flat spray to the soil after sowing; or they were applied in June as fluid row core spray or as a fluid flat spray.

H. bacteriophora was the species that established and persisted best compared with *H. megidis* and *S. feltiae* (e.g. establishment in clay loam: *H. bacterio-*

phora 37.6 % infection in soil samples, *H. megidis* 25.7 %, *S. feltiae* 12.5 %). Furthermore, *H. bacteriophora* was most effective in reducing the number of emerging beetles (e. g. 81 % reduction of adult *Diabrotica* emergence after application in April). *S. feltiae* could persist best among all EPN species in sand after application in April, but otherwise persistence was lower than that of *H. bacteriophora*. The efficacy of *S. feltiae* was the lowest among all EPN species (e. g. 19 % reduction of *Diabrotica* after application in April). The persistence of *H. megidis* was low, but *H. megidis* was still more effective than *S. feltiae* (36 % reduction of *Diabrotica* after application in April).

The establishment of EPNs was generally comparable between applications in April and in June, but persistence was significantly lower after application in June than after application in April. The different application methods had little influence on the establishment and persistence of EPN in the soil. Only EPN being applied with clay powder persisted significantly less than applied with other methods. Best efficacy was achieved with either fluid application during sowing in April (81 % *Diabrotica* reduction), row core spray in June (89 %) or fluid flat spray in June (69 %). Influences of the soil types on establishment and persistence of EPNs were apparent. In general, their establishment and persistence were enhanced in soils with less clay but higher sand content. However, the reduction of economic root damage was highest in silty clay (by 24 % in silty clay; by 13 % in clay loam; by < 1 % in sand).

Considering all factors, this study suggests to curatively apply *H. bacteriophora*, against the second instar larvae of *Diabrotica*. The application as row core spray is a promising method, needing fewer amounts of EPNs without a significant reduction in persistence or efficacy and needing less amount of water than flat sprays.

Plant surfaces as a terrain for the omnivorous *Dicyphus errans* Wolff (Heteroptera, Miridae, Bryocorinae)

Pflanzenoberflächen als Terrain von Dicyphus errans Wolff (Heteroptera, Miridae, Bryocorinae)

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The bug *D. errans* is related to hairy plants. For this reason it lives in niches which are avoided by other beneficial organisms. The results of biomechanical experiments (inversion test, traction force test) on a variety of plant surfaces (smooth, hairy, waxy) confirm the strong associativity between the bug and hairy plants: females generated a higher traction force on hairy plant substrates compared to other ones. On hairy surfaces, the trichome's morphology has a direct influence on the attachment ability and traction force of this predatory mirid bug. The force correlated significantly positive with a) the length of trichomes and b) the trichome diameter. However, the density of trichomes did not influence the force performance of *D. errans*. The plant surfaces covered with crystalline waxes

prevented the successful attachment and locomotion of the mirid. Furthermore, the contamination of bug feet by the waxes was found. Similar effects were reported for many other insects. Four hypotheses of the anti-attachment mechanism of chrystalline waxes were proposed by GORB and GORB (2002): (1) roughness-hypothesis; (2) contamination-hypothesis; (3) wax-dissolving-hypothesis; (4) fluid-absorption-hypothesis. Our centrifugal force experiment on artificial surfaces with different roughnesses showed an area of critical roughness (0.3 – 1.0 µm) for the attachment of *D. errans*, which corresponds to the dimensions of wax chrystals. Thus, the results confirm the roughness-hypothesis (reduction of the real contact area by wax chrystals) and the contamination-hypothesis.

GORB, E. V., S. N. GORB (2002): Attachment ability of the beetle *Chrysolina fastuosa* on various plant surfaces. – Ent. Exp. Appl. 105: 13-28.

Which indigenous beneficial can control the cotton bollworm ? – A selection of suitable *Trichogramma*-species to control *Helicoverpa armigera* in green houses

Welche heimischen Arten bekämpfen den Altweltlichen Baumwollkapselwurm? – Auswahl geeigneter Trichogramma-Arten zur Bekämpfung von Helicoverpa armigera im Gewächshaus

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The cotton bollworm *Helicoverpa armigera* (Noctuidae) has a high potential as a serious migrating pest. A biological control with suitable species of *Trichogramma*-parasitoids is being investigated. Out of all migrating and imported lepidoperous pests *Helicoverpa armigera* was observed most often in Germany. Individuals fly to our region from the mediterranean area with warm winds mainly in august / september. Single observations show that *Helicoverpa armigera* can successfully overwinter in the pupal stage in urban areas where there is a higher temperature compared to the open field. The pest can then cause damages even in springtime and early summer. Right now the economical damage is limited to green houses with tomatoe or sweet pepper. A strong pest pressure was observed in 2003 in tabacco and corn in the region of Freiburge in South Western Germany. Further damage was reported on different kinds of cabbage and leek. In september 2005 an adult was collected by pheromone trapping four weeks after a damage in a nearby tomatoe culture occurred. Possibly that period was long enough to completely develop to a next generation. The question if migrating females of the pest are already mated is still open.

Due to climate changes *Helicoverpa armigera* might develop to an important agricultural pest in the near future. More than 60 crops can be damaged by *Helicoverpa armigera*: all vegetable crops ornamental flowers, and even wild fruit plants, several weeds and pine trees. The reproduction potential is very high with more than 1000 eggs per female and a developmental time of only 4 weeks under green house conditions. This new pest occurrs in vegetable crops that are mainly

protected by biological control methods, e. g. in tomatoe and sweet pepper. New and fairly unknown pests are often controlled by chemical insecticides because a suitable utilization of beneficial organisms has not been developed or is unknown. Then the whole system of integrated pest management with beneficals can be endangered. Recently a biological control method for *Helicoverpa armigera.* with releases of *Trichogramma*-wasps as egg parasitoids is being developed. The German Federal Environmental Foundation supports a project that aims to a) select indigenous *Trichogramma*-species for their use against *Helicoverpa armigera*, b) green house experiments to find the optimum dosage, c) optimize the monitoring of the migration of *Helicoverpa armigera*, d) to inform farmers about the new biological control method.

A selection of indigenous *Trichogramma*-species and their strains is existing. These were tested in a first set of selection experiments. Also new ´wild´ strains were baited and collected in orchards and vegetables in 2005. They are being identified on species level and will be tested in 2006. Life table experiments with eggs of *Sitotroga cerealella* were used to select strains with a high longevity at temperatures of 20 °C, 25 °C and 30 °C. About 20 strains were tested for their acceptance of eggs of the new pest *Helicoverpa armigera*. A comparison of the rate of parasitism of single females showed that *T. pretiosum*, a worldwide used beneficial against *Helicoverpa armigera* has a high acceptance. But this species is not indigenous for Germany and cannot be used. Out of four commercially produced *Trichogramma*-species *T. brassicae*, used against the European Corn Borer *Ostrinia nubilalis* and *T. evanescens* both resulted in a good parasitization of the new pest but on a lower level than *T. pretiosum*. More strains will be tested to select a suitable candidate which will also be tested in cage and green house experiments.

Bericht zum Treffen der Arbeitskreise „Populationsdynamik und Epidemiologie“ und „Epigäische Raubarthropoden“ 15.-16. März 2006 in Gießen

Der Arbeitskreis "Epigäische Raubarthropoden" der DGaaE traf sich mit dem Arbeitskreis "Populationsdynamik und Epidemiologie" der DPG zu einer gemeinsamen Tagung am 15. und 16. März 2006 am Interdisziplinären Forschungszentrum der Justus-Liebig-Universität Gießen.

Die zweitägige Veranstaltung wurde von Prof. THIES BASEDOW vor Ort organisiert. Dafür noch einmal herzlichen Dank. Am Treffen nahmen Teilnehmer aus Deutschland und der Schweiz teil, sie kamen aus verschiedenen Universitäten, der Biologischen Bundesanstalt für Landwirtschaft und Forsten (BBA), der Sächsischen Landesanstalt für Landwirtschaft sowie aus behördlichen Einrichtungen. Verschiedene Forschungsschwerpunkte wurden vorgestellt und angeregt diskutiert. So analysierte Kollege NYFFELER (Uni Basel) die ökologische Bedeutung von Spinnen als Insektenfresser in europäischen und amerikanischen Agrarräumen. Zu möglichen Effekten von Bt-Mais auf Spinnen und Insekten informierten M.

SCHORLING und C. LUDY. Sie referierten Ergebnisse aus ihren Doktorarbeiten. THIES BASEDOW konnte interessante Daten zur Zusammensetzung der Arthropodenzönosen und zur Einsatzintensität von Pflanzenschutzmitteln in tropischen und subtropischen Ländern präsentieren. Weitere Beiträge beschäftigten sich mit dem Regulationspotential von Staphylinidenlarven (D. FELSMANN, BBA) und die Familie der Carabidae wurde hinsichtlich der Nahrungsökologie(O. SCHLEIN, BBA) und des Prädationspotentials in Bezug auf Ackerschnecken betrachtet (T. KREUTER, Sächs. Landesanstalt).

Auch die Möglichkeiten der Nutzung synökologischer Studien in Überwachungs- und Förderprogrammen standen zur Diskussion. Allen Referenten sei an dieser Stelle für die gründliche Vorbereitung der Vorträge gedankt, sowie allen Teilnehmern für die erfrischenden und konstruktiven Diskussionsbeiträge. In den Abendstunden entwickelte sich in gemütlicher Runde ebenfalls ein interessanter Gedankenaustausch. Prof. BASEDOW erhielt aus der Teilnehmerrunde Dankesworte für seine langjährige, engagierte Tätigkeit als Leiter des Arbeitskreises "Epigäische Raubarthropoden", verbunden mit guten Wünschen für den baldigen, sicher aktiven Ruhestand. Das nächste Treffen der Arbeitskreise ist für 2007 geplant.

CHRISTA VOLKMAR (Halle)

Ökologische Bedeutung der Spinnen als Insektenfresser. Ein Vergleich zwischen europäischen und amerikanischen Studien.

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Arachnologische Studien, welche in europäischen und amerikanischen Agroökosystemen durchgeführt wurden, sollen miteinander verglichen werden. In den Feldkulturen von West-, Mittel- und Nordeuropa wird die Spinnenfauna von kleinen Netzbauern der Familie Linyphiidae, welche bodennah leben, hochgradig dominiert (im Gesamtdurchschnitt ca. 75% der Spinnenindividuen). Einige Linyphiidenarten, welche als Pionierarten gelten, neigen dazu, große Populationen aufzubauen; die durchschnittlichen Spinnendichten in den europäischen Feldern schwanken zwischen 10 und 600 / m^2 (mit einem Gesamtdurchschnitt von ca. 90 / m^2). Das Beutespektrum der dominanten Spinnen in europäischen Feldern besteht primär aus Collembola, Diptera und Homoptera (einschließlich zahlreicher landwirtschaftlich schädlicher Blattlausarten). Es wird vermutet, dass die Spinnen einen bremsenden Einfluss auf die Vermehrung von Blattläusen in den europäischen Kulturfeldern ausüben.

In den US-Feldern sind netzlos jagende Spinnen aus den Familien Salticidae, Oxyopidae, Thomisidae, Clubionidae und Lycosidae stärker vertreten (im Gesamtdurchschnitt >60% der Spinnenindividuen) als in Europa. Das Beutespektrum der Spinnen in den US-Studien ist wesentlich breiter und umfasst v.a. die Ordnungen Heteroptera, Homoptera, Coleoptera, Diptera, Hymenoptera, Lepidoptera und Araneae (einschließlich landwirtschaftlicher Schädlinge aus den Ordnungen Lepidoptera, Heteroptera, Coleoptera und Homoptera). Allerdings sind in den US-Feldern den insektivoren Aktivitäten der Spinnen dadurch Grenzen gesetzt, dass die Spinnen-

dichte hier um ein bis zwei Zehnerpotenzen niedriger liegt (Gesamtdurchschnitt ca. 2 / m^2) als in Europa. Vermutlich käme den Spinnen in US-Feldern in den meisten Fällen nur dann eine größere ökologische Bedeutung zu, wenn die Spinnendichte durch Habitatmanipulation künstlich erhöht werden könnte. Experimente dieser Art waren in Tennessee, Kentucky und Ohio bereits durchgeführt worden, wobei es gelang, die Spinnendichte künstlich auf das Dichte-Niveau der europäischen Felder anzuheben.

Die hier berichteten interkontinentalen Unterschiede dürften größtenteils klimatisch bedingt sein; die Daten aus USA stammen vorwiegend aus den Südstaaten (subtropisches oder mediterranes Klima) mit wesentlich höheren Jahresdurchschnittstemperaturen im Vergleich zu den Untersuchungsgebieten in West-, Mittel- und Nordeuropa (nördlich-gemäßigtes Klima). Aus den nördlichen Gebieten der USA und aus den mediterranen Gebieten Südeuropas fehlen arachnologische Untersuchungen in Agroökosystemen bisher noch weitgehend. Es herrscht hier noch großer Forschungsbedarf.

Laufkäfer der Gattung *Carabus* spp. als effektive Schneckenantagonisten auf dauerhaft pfluglos bearbeiteten Ackerflächen im Sachsen

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Bodenbürtige Schädlinge (z.B. Ackerschnecken) gelten im pfluglosen Ackerbau als problematisch, da sie durch die veränderten Bedingungen in der Oberkrume und an der Bodenoberfläche gefördert werden. Mehrjährige Untersuchungen auf sächsischen Lößstandorten weisen andererseits darauf hin, dass eine konsequent konservierende Bodenbearbeitung auch zur Förderung regulativ wirkender Raubarthropoden (z.B. aus den Familien der Lycosidae und Carabidae) geführt hat. Erhebungen auf zwei Schlägen im sächsischen Lößgürtel ergaben z.B. hochsignifikant größere Aktivitätsdichten der Spezies *Carabus auratus* und *C. cancellatus* auf allen Mulch- und Direktsaatflächen im Vergleich zu den Pflugvarianten. Auch *C. coriaceus* kommt regional als feldbesiedelnde Art vor und kann durch reduzierte Bodenbearbeitung gefördert werden.

Carabus-Arten gelten als wirksame Antagonisten potenzieller Schädlinge im Ackerbau. Der Verzehr von Schnecken der Art *Deroceras reticulata* durch alle genannten Spezies dieser Gattung konnte in Fütterungsversuchen nachgewiesen werden. Unter der Voraussetzung sehr hoher Aktivitätsdichten, wie sie seit 2002 bei reduzierter Bodenbearbeitung insbesondere für den Goldlaufkäfer (*C. auratus*) nachgewiesen werden, findet offensichtlich eine effektive Regulation der Ackerschnecken statt. So traten auf allen Schlägen mit nachweislich starken *Carabus*-Populationen bislang keine Schneckenprobleme auf. Dies gilt auch für typische Befallsjahre (z.B. für das Jahr 2005).

Zur Prüfung dieser hypothetischen Zusammenhänge erfolgt derzeit ein Versuchsprogramm im mittelsächsischen Lößhügelland (Praxisschlag mit Pflug-, Mulch- und Direktsaatvariante; Fruchtfolge: ZR-WW-WW). Untersucht werden die

Aktivitätsdichtedynamik von *C. auratus* (Einsatz von Barberfallen) und der Schneckenbesatz (Einsatz von Köderfallen) bei variierter Bodenbearbeitung sowie die Quantität des Schneckenfraßes bei gegebenen *Deroceras*- und *Carabus*-Abundanzen (Einschluss-/ Ausschlussversuche mit m²-Rahmen).

Im Jahr 2005 blieben, trotz günstiger Witterungsbedingungen, die vorhandenen Populationen der Genetzten Ackerschnecke (*D. reticulata*) bis zum Abklingen der Aktivität der Goldlaufkäfer in allen Bearbeitungsvarianten auf einem sehr niedrigen Dichteniveau. Während die Ursache dafür auf der Pflugvariante (mit geringen *Carabus*-Aktivitätsdichten) vor allem im Pflügen und der nachfolgenden Saatbettbereitung für die Rübenaussaat begründet sein kann, müssen auf den konservierend bearbeiteten Varianten und insbesondere auf der Direktsaatfläche andere Gründe für das Ausbleiben einer stärkeren Vermehrung der Genetzten Ackerschnecke vorgelegen haben. Für starke regulative Effekte des dort in hohen Aktivitätsdichten nachgewiesenen Goldlaufkäfers sprechen vor allem die negativen Korrelationen zwischen den Jahreskurven der Schneckenaktivität und den Aktivitätsdichtekurven der Käfer. Eigentlich lässt die Phänologie beider Arten zumindest bis in den Sommer hinein eher eine sehr ähnliche Populationsentwicklung erwarten. Nach dem typischen sommerlichen Abklingen der Goldlaufkäfer-Aktivität kam es zu einer deutlichen Zunahme der Schnecken auf den pfluglos bearbeiteten Parzellen. Diese verlief aber im Vergleich zu pfluglos bearbeiteten Flächen, auf denen 2005 keine oder kaum *Carabus*-Individuen nachzuweisen waren, vergleichsweise moderat.

In Einschluss-/ Ausschlussversuchen mit m²-Rahmen wird eine Quantifizierung der Fraßleistung von *Carabus* spp. angestrebt. Erste Versuche dazu erfolgten im August und September 2005. Dabei wurden auf der Direktsaatfläche des Versuchsfeldes insgesamt 18 Rahmen mit jeweils 40 Individuen der Genetzten Ackerschnecke bestückt. In der Hälfte der Rahmen wurden im August 2005 jeweils vier Individuen der Art *C. auratus* und im September 2005 jeweils drei adulte Individuen der Art *C. coriaceus* ausgesetzt. Die andere Hälfte der Rahmen blieb frei von *Carabus*-Imagines. Nach drei Wochen erfolgte das Absammeln und Auszählen der noch vorhandenen Schnecken. In beiden Zeiträumen führte die Anwesenheit der Laufkäfer zu einer signifikanten Abnahme von *D. reticulatum* (um ca. 50 % im August, um ca. 30 % im September) im Vergleich zur Variante ohne *Carabus*-Besatz. Weitere Versuche sind geplant, um diese ersten Resultate zu unterlegen und um den regulativen Effekt bei geringeren Abundanzen zu testen.

Die bisherigen Ergebnisse sprechen für die Förderung konsequent pflugloser Bearbeitungsstrategien. Periodische Rückgriffe auf den Pflug wirken sich nicht nur auf die großen Raubarthropoden, sondern auf fast alle positiven Effekte der konservierenden Bodenbearbeitung (Schutz vor Bodenerosion, Förderung des Bodenlebens, Erhöhung des Puffervermögen, Humusakkumulation, Stabilisierung des Wasserhaushalts) generell ungünstig aus. Um das Pflügen aus Pflanzenschutzgründen bei ansonsten pflugloser Bearbeitung zu vermeiden, muss das vorhandene Regulationspotenzial der betreffenden Flächen optimal gefördert und ausgeschöpft werden.

Die Anzahl Insektizidbehandlungen pro Jahr in verschiedenen Kulturen und Regionen der Subtropen und Tropen, die Ursachen für die Unterschiede und die Möglichkeiten der Reduzierung

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Die Insektizid-Spritzungen wurden durch den Autor und Ko-Autoren zwischen 1992 und 2004 ermittelt, in neun tropischen und subtropischen Arealen und in sieben unterschiedlichen Kulturen (Baumwolle, Auberginen und Mais wurden in zwei verschiedenen Arealen).

Areal	**Kultur**	**Anzahl Insektizid-Spritzungen pro Jahr**	**Quelle**
Philippinen (Luzon)	Kohl	1-40	BASEDOW 1993
Panama, Hochland (Cerro Punta)	Kartoffeln und Mohrrüben	11-22	SONDER et al. 1997
Ägypten, El Fayoum	Baumwolle	0-2	BOGUSLAWSKI & BASEDOW 2001
Indien (Punjab)	Baumwolle	9-15	AGGARWAL et al. 2006
Sudan (Khartoum und Mad Wedani)	Auberginen	8-14	BASEDOW et al. 2004
Indonesien (Süd-Sumatra)	Auberginen	7	BASEDOW et al. 2005
Panama, Tiefland (Azuero)	Tomaten	3-4	BASEDOW & BERNAL-VEGA 2001
Äthiopien	Mais	0	BASEDOW et al. 2004
	Gelagerter Mais	70 % der Lager	TADESSE & BASEDOW 2004
Papua New Guinea, Tiefland bei Port Moresby	Mais (verunkrautet)	0	BASEDOW & KRULL 2005

Unterschiede: Auf den Philippinen war die Nähe zum Markt entscheidend (je näher an Zentren, desto mehr wurde gespritzt und wurden Wartezeiten nicht eingehalten) (Rückstandsanalysen werden nicht durchgeführt). Im Hochland von Panama war die Ausbildung der Landwirte maßgebend: Ausgebildete Landwirte spritzten weniger (SONDER et al. 1997). In Baumwolle war in Ägypten der Einfluss des Öko-Landbaues wichtig. In Indien begünstigte die hohe Analphabeten-Rate der Landwirte (>80 %; AGGARWAL et al. 2006) eine hohe Anzahl Insektizid-Spritzungen. Auberginen scheinen überall wöchentlich / 14-täglich gepritzt zu wer-

den. In Äthiopien war wiederum das Analphabetentum (> 40 % der Landwirte; TADESSE & BASEDOW 2004) von Nachteil. Mais auf dem Feld wurde durch Wachen gegen Affen geschützt, aber im Lager wurden Insektizide angewendet, z.T. DDT (16 %). In Tomaten in Panama, machte die Übertragung von Vergilbungsviren durch *Bemisia tabaci* Insektizid-Einsätze nötig (BASEDOW et al. 2002).

Möglichkeiten, den Insektizid-Einsatz zu reduzieren: Einmal ist es wichtig, die Landwirte zu schulen (Panama, Indien, Äthiopien), in Lesen/Schreiben und in IPM. In Indien zeigten sich die ersten Erfolge (AGGARWAL et al. 2006). Auf den Philippinen führte klassische Biologische Bekämpfung zu einer Reduktion (AMEND & BASEDOW 1997). In Ägypten war die Pheromon-Verwirrungstechnik gegen *Pectinophora gossypiella* erfolgreich (BOGUSLAWSKI & BASEDOW 2001).

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Die Zusammensetzung der epigäischen Raubarthropoden auf Agrarflächen subtropischer und tropischer Gebiete, verglichen mit einem Gebiet gemäßigten Klimas

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Die Untersuchungen fanden 1985 bis 2001 statt auf Feldern ohne oder mit maximal zwei Insektizidbehandlngen pro Jahr, in Deutschland und in je zwei Gebieten in Südost-Asien und Nordost-Afrika. Mit Aufschwemmungen (BASEDOW et al. 1988) ermittelte Individuen-Zahlen pro m² werden in der Tabelle aufgeführt.

Während Carabidae und Staphylinidae in Deutschland bedeutend auftraten, waren Ameisen dort nicht auf Ackerflächen vertreten. In Richtung Süden verringerte sich die Bedeutung der Raubkäfer und die Häufigkeit der Ameisen nahm zu, während zusätzlich räuberische Gryllidae vorkamen. Spinnen waren überall häufig. Die Befunde für die Nord-Hemisphere werden für die USA bestätigt (DRITCHILO & WANNER 1980). Die Prädatoren-Anzahl/m² lag auf Lehmböden ohne starke Bewässerung zwischen 34 und 51. Auf bewässerten Tonböden in Ägypten lagen die Werte aber bei 107-123. Dies ist schwer zu erklären.

Areal	Kultur	Anzahl Insektizid-behandlungen	Anz./m² (100 %) aller epigäischen Räuber	%						Quelle
				Carabidae	Staphylinidae	Araneae	Formicidae	Gryllidae	Forficulidae	
Bei Frankfurt/Main, 1985-89	Futterrüben (Öko)	0	51,3	44.9	23.1	32.0	0	0	+	BASEDOW et al. 1991
Luzon (Philippinen), Banaue, 1992	Kohl	1	47.8	14.0	5.0	41.6	14.9	8.1	29.0	BASEDOW 1993
Ägypten, El Fayoum, 1998/99	Baumwolle (Öko)	0	107.3	11.2	0	50.3	15.8	22.7	+	BASEDOW et al. 2004
	Baumwolle	2	122.8	9.8	0	45.6	24.4	20.2	+	
Äthiopien (Bako), 2000	Mais	0	43.5	10.3	0	16.1	57.5	16.1	+	BASEDOW et al. 2004
PNG, nahe Pt. Moresby, 2001	Mais	0	34.0	0	1.0	32.3	65.2	1.5	+	BASEDOW & KRULL 2005

+ Das Vorhandensein von Forficuliden wurde aus gleichzeitigen Bodenfallenfängen erschlossen

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Risiko-Abschätzung von genetisch veränderten Organismen: Effekte von *Bt*-Mais auf Spinnen

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Genetisch veränderter insektenresistenter *Bt* Mais Event 176 exprimiert das Protein Cry1Ab des Bodenbakteriums *Bacillus thuringiensis*. Obwohl das Protein

Cry1Ab als spezifisch gegen schädliche Schmetterlinge beschrieben wird, gibt es Hinweise auf negative Effekte von Cry1Ab auf Nichtzielorganismen. Spinnen spielen eine wichtige Rolle in der biologischen Schädlingsbekämpfung in Agrarökosystemen. Dem Protein Cry1Ab sind sie über verschiedene Wege ausgesetzt: Spinnen können durch das regelmäßige „Recycling" von Spinnennetzen inklusive der daran anhaftenden Partikel mit *Bt* Maispollen in Kontakt kommen. Des Weiteren können Spinnen über herbivore oder *Bt* Maispollen-sammelnde Beute mit dem Cry1Ab Protein in Berührung kommen. In dieser Studie wurde das Risiko für pflanzenbewohnende Spinnen, das von *Bt* Mais ausgehen könnte, durch die Untersuchung der verschiedenen Expositionswege und des tatsächlichen Effekts von *Bt* Mais auf Spinnen auf der Labor- sowie der Feldmaßstabsebene abgeschätzt.

Die Ergebnisse dieser Studie zeigen, dass die pflanzenbewohnende Spinnengemeinschaft in Maisfeldern und angrenzenden Feldrändern potentiell *Bt* Maispollen und *Bt*-kontaminierter Beute ausgesetzt ist. Ein direkter letaler Effekt von *Bt* Mais auf Spinnen wurde jedoch weder im Labor noch im Feld nachgewiesen. Somit kann kein hohes Risiko für Spinnen ausgehend von *Bt* Mais auf der Basis dieser Untersuchungen nachgewiesen werden. Um jedoch allgemeine Aussagen machen zu können, sind weitere Untersuchungen auf unterschiedlichen zeitlichen und räumlichen Ebenen sowie Studien zu möglichen subletalen und Langzeiteffekten von *Bt* Mais auf Spinnen notwendig.

Synökologische Studien auf Ackerstandorten im Bundesland Sachsen-Anhalt und Möglichkeiten ihrer Nutzung in Überwachungs- und Förderprogrammen

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In einem freilandökologischen Versuchsansatz wurden von 1992 bis 1998 die Laufkäfer-, Kurzflügelkäfer- und Webspinnenzönosen unter synökologischen und methodischen Fragestellungen in Peißen, Barnstädt, Frose, Schadeleben und Winterfeld untersucht.

Im Mittelpunkt standen Analysen zur Zusammensetzung und Dynamik der Fauna epigäischer Arthropodengruppen in den unterschiedlichen Kulturlandschaften. Auf der Basis der Ergebnisse dieser Studien wurden Möglichkeiten und Grenzen einer Nutzung von Webspinnen und räuberischen Käfern als Bioindikatoren aufgezeigt und diskutiert. Dabei galt es zu prüfen, welche Kriterien zur agrarökologischen Bewertung der untersuchten Kulturflächen geeignet sind. Es wurden Möglichkeiten aufgezeigt, wie sich auf Ackerflächen die verschiedenen Qualitätskriterien für ökologische Nachhaltigkeit und biologische Vielfalt objektiv bewerten lassen.

Die Zönosengruppen der Araneae und Carabidae stellen aus folgenden Gründen geeignete Indikatoren für die Beurteilung ökologischer Leistungen der

Landwirtschaft dar: Webspinnen ermöglichen durch kontinuierliche Aktivitätsdichten und ein beständiges Dominanzspektrum eine vergleichsweise objektive Beurteilung einzelner Belastungsgrößen (z.B. Insektizidbehandlungen). Auch vom Auftreten zahlreicher Laufkäferarten kann zielgerichtet auf bestimmte indikatorische Parameter geschlossen werden. Bei Kurzflügelkäfern werden dagegen sowohl das Artenspektrum als auch die Aktivitätsdichte stärker durch andere Umweltfaktoren, darunter vor allem durch die Substratabhängigkeit geprägt.

Die Parameter Aktivitätsdichte, Artenzahlen, „Rote-Liste"-Arten sowie die Anzahl sub- bis eudominanter Spezies scheinen geeignet, die Zönose epigäischer Raubarthropoden nachhaltig zu beurteilen.

Eine methodische Vereinfachung sollte sich unter Gewährleistung einer möglichst langen Standzeit der Fallen auf die Reduzierung der Fallenanzahl beziehen. Vier Fanggefäße scheinen bei 10 cm Fallendurchmesser und einer Fangdauer von drei Monaten (Mai bis Juli) ein vertretbares Minimum darzustellen.

Im Hinblick auf flächendeckende Bewertungs- und Förderkonzepte ergeben sich folgende Schlussfolgerungen:

- Die Bewertung acker- und pflanzenbaulicher Maßnahmen hinsichtlich ihrer Auswirkungen auf die biologische Vielfalt ausschließlich anhand des Indikators „Epigäische Raubarthropoden" ist nicht möglich.
- Für eine objektive Bewertung ökologischer Leistungen sollten Webspinnen- und Laufkäferzönosen als Bestandteil eines ganzen Komplexes von Agrarumweltindikatoren genutzt werden, um die typischen Acker- und Pflanzenbausysteme in unseren Naturräumen hinsichtlich ihrer Nachhaltigkeit bzw. ihrer Auswirkungen auf die agrarische Biodiversität zu prüfen.
- Eine Förderung letztgenannter Kriterien würde sich folglich nicht auf einzelne Bioindikatoren oder Indikatorgruppen stützen, sondern auf die Einhaltung bestimmter acker- und pflanzenbaulicher Standards, die zuvor entsprechend bewertet worden sind.

Dieses Verfahren entspräche sowohl dem komplexen Charakter der einzuschätzenden Ökosysteme als auch den juristischen und administrativen Anforderungen an eine praktikable Bewertung und Vergütung ökologischer Leistungen auf Ackerflächen.

AUS MITGLIEDERKREISEN

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APEL, DR. KARL-HEINZ, Eberswalde * 8.03.1951 † 29.04.2006
HÖPFNER, StD. HEINZ, Berlin * 28.10.1931 † 7.03.2006
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Wir werden unseren verstorbenen Mitgliedern ein ehrendes Andenken bewahren.

Dr. Karl-Heinz Apel

1951 – 2006

Unerwartet verstarb am 29.04.2006 der langjährige Mitarbeiter der Landesforstanstalt Eberswalde Dr. rer. nat. KARL-HEINZ APEL. Mit ihm verliert die Forstwissenschaft einen ihrer klügsten und kreativsten Köpfe auf dem Gebiet der Forstentomologie und Waldökologie sowie einen kompetenten Berater für die Forstpraxis. KARL-HEINZ APEL wurde 1951 in Kaarßen an der Elbe geboren. Nach dem Abitur studierte er an der Humboldt-Universität zu Berlin Biologie und begann gleich nach Studienabschluss 1973 eine Tätigkeit als Wissenschaftler in der Abteilung Waldschutz am Institut für Forstwissenschaften in Eberswalde und prägte somit über 3 Jahrzehnte das forstentomologische Versuchswesen.

Dass seine Arbeitsaufgaben hier vorwiegend auf insektenkundlichem Gebiet lagen, war sowohl für ihn, den begeisterten Entomologen, für die Forstwirtschaft und für den Wald im gesamten Nordostdeutschen Tiefland ein Glücksfall. Neben seiner Faszination für Insekten, kennzeichnete bereits seit den frühen 80er Jahren die Einbeziehung der digitalen Informationstechnik in die waldökologische Forschung seine Arbeit. Dies führte dazu, dass Brandenburg heute ein modernes, computergestützten Überwachungssystem für den Waldschutz hat. Wegen seines sicheren Gespürs für die Lebensräume von Käfern war seine Hilfe auch in internationalen Forschungsprojekten gefragt, die ihn bis nach Australien und in die

USA führten. Viele Jahre vermittelte er seine Kenntnisse auf sehr anschauliche und locker humorvolle Weise an die Forststudenten der FH Eberswalde.

KARL-HEINZ APEL begeisterte seine Freunde und Kollegen oft mit seiner Phantasie beim Drechseln, seinem großen Hobby. Er schuf u.a. auch sehr detailgetreue Modelle von Insekten wie Ameisen verschiedenster Gattungen.

KARL-HEINZ APEL hinterlässt seine Ehefrau und drei erwachsene Söhne. Für seine Kollegen bleiben unzählige gute Ideen. Wir werden sein Andenken in Ehren halten und uns in seinem Sinne um die Umsetzung seiner Vorhaben bemühen.

Dr. Katrin Möller
Landesforstanstalt Eberswalde, Hauptstelle für Waldschutz

Ehrungen

Leading Scientists of the World: Prof.Dr. H. Levinson und Dr. A. Levinson

Prof. Dr. HERMANN LEVINSON und Dr. ANNA LEVINSON arbeiten seit 1971 am MPI für Verhaltensphysiologie (heute: MPI für Ornithologie) in Seewiesen über Sinnes- und Ernährungsphysiologie schädlicher Insekten- und Milbenarten sowie über die Wirkungsweise von Kairomonen und Pheromonen. In den letzten 15 Jahren widmen sie sich kulturgeschichtlichen Aspekten der Entomologie, insbesondere dem Zusammenhang zwischen Entomologie und antiken Religionen, über die sie auch bereits mehrfach in den DGaaE-Nachrichten berichtet haben.

Für ihre Verdienste in der Ökophysiologie und kulturellen Zoologie wurden sie Anfang des Jahres vom *International Biographical Centre* (Cambridge, England) in den Kreis der "Leading Scientists of the World" aufgenommen.

Die DGaaE beglückwünscht die so Geehrten zu dieser hohen Auszeichnung und wünscht ihnen weiterhin viel Erfolg bei ihren biologischen und kulturellen Forschungen.

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TERMINE VON TAGUNGEN

2.06.-4.06.2006: 13th Congress on Alternatives to Animal Testing, Linz (Austria). – www.zet.or.at/kongress/linz2006

16.06.-18.06.2006: 23. Tagung des Arbeitskreises Diptera, Stedten Nähe Halle/ Saale. – www.ak-diptera.de/einladung/einladung2006.php – Anmeldeformular: www.ak-diptera.de/einladung/Anmeldeformular2006.pdf

2.07.-7.07.2006: 12. Internationale Sommerakademie der DBU „Bionik und Nachhaltigkeit – Lernen von der Natur“, St. Marienthal, Ostritz. – Sabine Lohaus, Tel. 0541/9633-951, e-mail: s.lohaus@dbu.de

25.08.-27.08.2006: 13. Auchenorrhyncha-Treffen des Arbeitskreises Zikaden der DGaaE, Basel (Schweiz). – Roland.Muehlethaler@unibas.ch

6.09.-8.09.2006: 1. Ebernburger mikrobiologisch-entomologische Gesprächsrunde des DGaaE-Arbeitskreises „Mikrobiologie“, Ebernburg (Bad Münster am Stein). – Prof.Dr. H. König, Institut für Mikrobiologie und Weinforschung, Becherweg 15, 55128 Mainz, Tel 06131/3924634, e-mail: hkoenig@uni-mainz.de

16.09.-20.09.2006: 99. Jahresversammlung der Deutschen Zoologischen Gesellschaft, Münster. – Weitere Informationen und vorläufiges Programm: http://www.uni-muenster.de/Biologie.Zoophysiologie/%20DZG2006/index.html

17.09.-22.09.2006: 8th European Congress of Entomology, Izmir (Turkey). – Prof.Dr. Seniz Kismali, Ege University, Agriculture Faculty, Dept. of Plant Protection, Bornova 35100 Izmir, Turkey, e-mail: kismali@ziraat.ege.edu.tr, www.ece2006.org

The congress will address every aspect of current developments and research in basic and applied entomology. New scientific advances in entomology will be discussed in detail during oral and poster sessions. The participation of internationally renowned

scientists will ensure a high quality meeting. Sections: Morphology; Systematics; and Zoogeography; Phylogeny and Biodiversity; Physiology and Endocrinology; Moleculer and Cell Biology; Biochemistry; Genetics and Developmental Biology; Neurophysiology and Ethology; Ecology; Toxicology and Pathology; Apiculture and Sericulture; Agricultural Entomology; Forest Entomology; Urban and Medical Entomology; Teaching Entomology.

25.09.-28.09.2006: 55. Deutsche Pflanzenschutztagung, Göttingen. – http://www.pflanzenschutztagung.de, e-mail: pflanzenschutztagung@bba.de

27.09.-29.09.2006: 4th European Conference on Biological Invasions, Wien (Österreich). – http://www.umweltbundesamt.at/neobiota

6.10.-8.10.2006: 7. Hymenopterologen-Tagung, Stuttgart. – Dr. Till Osten, Staatliches Museum für Naturkunde, Rosenstein 1, 70191 Stuttgart, Fax: 0711/8936-100, e-mail: osten.smns@naturkundemuseum-bw.de

11.10.-13.10.2006: Deutscher Tropentag 2006 'Prosperity and Poverty in a Globalized World – Challenges for Agricultural Research', Universität Bonn. – Nähere Informationen: http://www.tropentag.de/conference/call_dtt2006.pdf und http://www.tropentag.de

14.10.2006: Fachgespräch der Österreichischen Entomologischen Gesellschaft „Entomologie und Limnologie: Allgemeine und angewandte Aspekte – biologische und logistische Facetten.“ Illmitz (Burgenland: Österreich). – www.biologiezentrum.at/oeg/, Dr. Elisabeth Geiser, E-Mail: elisabethgeiser@hotmail.com

20.10.-22.10.2006: 3. Bonner Paläoentomologen-Treffen, Bonn (Institut für Paläontologie der Universität). – Informationen und Anmeldung: Prof. Dr. Jes Rust, Universität Bonn, Institut für Paläontologie, Nussallee 8, 53115 Bonn, Tel 0228 / 73-4842 (73-3103 Sekretariat), Fax 0228 / 73-3509, e-mail: jrust@uni-bonn.de; Prof. Dr. Wilfried Wichard, Universität zu Köln, Institut für Biologie und ihre Didaktik, Gronewaldstr. 2, 50931 Köln, Tel 0221 / 470-4654 (470-4660 Sekretariat), Fax 0221 / 470-5963, e-mail: Wichard@uni-koeln.de.
Wir bitten um baldige Rück- bzw. Anmeldung (wenn möglich per E-mail) sowie um Vorschläge für Themen, die im Rahmen allgemeiner Diskussionen behandelt werden sollten, damit gegebenenfalls kompetente Redner eingeladen bzw. Vorträge vorbereitet werden können. Bitte informieren Sie auch weitere interessierte Kolleginnen und Kollegen über dieses Treffen.

23.10.-24.10.2006: ABIM - Lucerne 06. Inaugural Annual Biocontrol Industry Meeting, Lucerne, Switzerland. – www.abim-lucerne.ch
ABIM-Lucerne invites producers, distributors, researchers, consultants and users, environmentalists, opinion leaders, regulators and academia.

5.11.-8.11.2006: 22nd Conference of the International IOBC Working Group of Ostrinia and other Maize Pests (IWGO), Wien. – conference@iwgo.org, Dr. Uli Kuhlmann, CABI Bioscience Switzerland Centre, Rue des Grillons 1, 2800 Delémont (Switzerland), Tel +41-32-4214882, e-mail: U.Kuhlmann@cabi.org, www.iwgo.org/conference/Vienna_2006/

18.11.2006: Herbsttagung des Thüringer Entomologenverbandes (88.Tagung). Generalthema: "Entomofauna von Mittelgebirgen" Erfurt (Fachhochschule: FB Landschaftsarchitektur). – Matthias Hartmann, Naturkundemuseum Erfurt, Große Arche 14, Tel 0361/6555682, e-mail: matthias.hartmann@erfurt.de, http://www.thueringer-entomologenverband.de

25.11.-26.11.2006: 48. Phylogenetischen Symposium, Dresden. – Nähere Informationen in Kürze unter http://www.snsd.de/phylsym/

25.11.-26.11.2006: 19. Westdeutscher Entomologentag, Aquazoo – Löbbecke Museum Düsseldorf. – Anmeldung von Kurzvorträgen und Kontakt: Dr. Norbert Lenz, Aquazoo - Löbbecke Museum, Kaiserswerther Str. 380, 40200 Düsseldorf, Tel 0211/89-96153, Fax 0211/89-94493, E-Mail: norbert.dr_lenz @stadt.duesseldorf.de.

Hauptvorträge: Prof. Dr. Hartmut Roweck (Ökologie-Zentrum Kiel): "Möglichkeiten und Grenzen der Bioindikation mit Hilfe stenöker Kleinschmetterlinge"; Prof. Dr. Urs Wyss (Entofilm, Kiel): "Faszination Insekten-Mikrokosmos: Kurzfilme über das Verhalten ausgewählter Pflanzenschädlinge und ihrer natürlichen Gegenspieler"; Prof. Dr. Konrad Dettner (Universität Bayreuth): "Chemische Abwehr bei Insekten".

2007

26.02.-1.03.2007: Entomologentagung der DGaaE (zusammen mit der Österreichischen und der Schweizerischen entomologischen Gesellschaft), Innsbruck (Österreich). – www.entomologentagung2007.at

28.04.2007: Frühjahrstagung des Thüringer Entomologenverbandes (89.Tagung), Bad Frankenhausen. – Matthias Hartmann, Naturkundemuseum Erfurt, Große Arche 14, Tel 0361/6555682, http://www.thueringer-entomologenverband.de

7.09.-9.09.2007: 14. Mitteleuropäische Zikadentagung, Ivrea, (Italien). – Alberto Alma and Peter John Mazzoglio

8.09.-12.09.2007: 15. Europäischer Kongress für Lepidopterologie (SEL), Erkner bei Berlin. – Dr. W. Mey, Museum für Naturkunde, Humboldt-Universität, Invalidenstr. 43, 10115 Berlin, Tel (+49)-030-2093-8500, Fax (+49)-030-2093-8528, Wolfram.mey@museum.hu-berlin.de

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Förderpreis der Münchner Entomologischen Gesellschaft 2007

Durch die großzügige Stiftung eines Mitglieds der Münchner Entomologischen Gesellschaft kann für das Jahr 2007 wiederum ein mit 500,-- EUR dotierter Förderpreis für junge Entomologen von der MEG vergeben werden. Gefördert werden mit diesem Preis begeisterte Frauen oder Männer, die sich intensiv mit dem Sammeln und Erforschen von Insekten beschäftigen und nicht hauptamtlich als Entomologen angestellt sind. Die Preisträgerin oder der Preisträger soll am Tag der Preisüberreichung, am 10. März 2007, in einem kurzen Vortrag ihren / seinen entomologischen Arbeitsbereich vorstellen.

Bewerben Sie sich mit den dafür üblichen Unterlagen für den "Förderpreis der MEG 2007" bis zum **1. November 2006** bei der Münchner Entomologischen Gesellschaft, Münchhausenstraße 21, D-81247 München. Jede Person kann eine Kandidatin oder einen Kandidaten für den Preis vorschlagen. Auskunft erhalten Sie zusätzlich unter

E-Mail: megmail@zsm.mwn.de oder http://www.zsm.mwn.de/meg

AUFRUF ZUR MITARBEIT

Der Schmalflüglige Pelzbienenölkäfer *Sitaris muralis* – eine in Deutschland sich ausbreitende Käferart?

Der Schmalflüglige Pelzbienenölkäfer *Sitaris muralis* (Abb. auf der Titelseite) ist im Gegensatz zu seinen Verwandten, den auffälligen Maiwürmern der Gattung *Meloe* oder der schillernden Spanischen Fliege *Lytta vesicatoria,* mit 7 bis 15 mm eine relativ kleine, unauffällige und wenig bekannte Ölkäfer-Art.

So unscheinbar der Käfer auch sein mag, seine Reproduktionsstrategie ist hingegen sehr komplex. Denn die Larven von *S. muralis* entwickeln sich parasitisch in den Nestern von mauer- und erdnistenden Pelzbienen, in die sie sich phoretisch eintragen lassen und wo sie sich von deren eingetragenen Vorräten ernähren. Geeignete Nistmöglichkeiten finden die Pelzbienen vor allem im urbanen Bereich in alten, unverputzten Fachwerk- und Ziegelwänden sowie regengeschützten, wenig oder unbewachsenen und sonnenexponierten Stellen an Hauswänden oder unter Balkonen. Aber auch Kleinstbiotope wie offene Mauerritzen, Fugen, Stopper von Rolläden sowie Wildbienennisthilfen stellen geeignete Sekundärlebensräume dar. Wenige Tage nach dem Schlupf der Imagines zwischen Ende Juli und Anfang September findet die einmalige Eiablage statt. Die Gelege werden in der unmittelbaren Nähe der Wirtsbienennester an festes Substrat geheftet. Bald danach sterben die Weibchen. Nach dem Schlupf wenige Wochen später verbleiben die Larven anschließend nahezu reglos unter den leeren Eihüllen, ehe sie sich im folgenden Frühjahr im Bereich der Nester verteilen und an die zuerst ausfliegenden männlichen Bienen klammern. Bei der Kopula wechseln sie auf die weiblichen Bienen und lassen sich in die neuen Brutkammern eintragen.

Früher wurden Pelzbienen und ihr Parasit *S. muralis* regelmäßig auch in halbnatürlichen Lebensräumen wie Hohlwegen und Lößwänden gefunden. Diese sind jedoch zu einem großen Teil aus unserer Kulturlandschaft verschwunden, so dass Fundmeldungen aus diesen Biotopen mittlerweile selten sind.

S. muralis war bis vor wenigen Jahren ausschließlich aus dem Rheintal bzw. der Rheinebene Baden-Württembergs, Rheinland-Pfalz und Hessens bekannt. Zudem liegen historische Funde aus Hamburg und Sachsen-Anhalt vor. Zu Beginn der 90er Jahre wurde der Käfer auch aus Kleve in Nordrhein-Westfalen sowie anschließend aus Brühl und Bonn und weiteren Stellen am Niederrhein gemeldet. 2001 wurde die Art an der Mosel in Neumagen-Drohn sowie 2002 und 2004 im Neckartal bei Schwaigern gefunden. Im vergangenen Jahr gelang ihr Nachweis auch aus Niedersachen in Wathlingen bei Celle.

Diese Ergebnisse legen nahe, dass sich *S. muralis* zum einen entlang des Rheins Richtung Norden, zum anderen in Rhein-fernere Gebiete (Neumagen-Drohn, Schwaigern, Wathlingen) ausbreitet. Um die Ver- und ggf. Ausbreitung von *S. muralis* jedoch besser beurteilen zu können, sollen möglichst viele Fundmeldungen aus Deutschland sowie den angrenzenden Benelux-Ländern zusammengetragen werden. Daher werden alle naturkundlich Interessierten aufgerufen entsprechende Beobachtungen und Funde mitzuteilen. Als sichere Belege sind

Fotos, aber auch Belegtiere willkommen. Portokosten können erstattet werden. Eine Übersicht aller bisher verfügbaren Nachweise in Deutschland und den angrenzenden Ländern findet sich bei LÜCKMANN (im Druck).

Literatur

LÜCKMANN, J. (im Druck). *Sitaris muralis* (FOERSTER, 1771) – neu für Niedersachen (Coleoptera, Meloidae) sowie Stand der aktuellen Verbreitung der Art in Deutschland. – Entomologische Zeitschrift.

Kontaktadresse
Dr. JOHANNES LÜCKMANN, Leo-Grewenig-Straße 3, D-64625 Bensheim,
E-Mail: jlueckmann@t-online.de

Förderpreis der Ingrid Weiss / Horst Wiehe Stiftung

Die Deutsche Gesellschaft für allgemeine und angewandte Entomologie (DGaaE) verleiht anlässlich der Entomologentagung 2007 in Innsbruck den

Förderpreis der Ingrid Weiss / Horst Wiehe Stiftung
(dotiert mit einem Preisgeld)

Der Förderpreis der Ingrid Weiss / Horst Wiehe Stiftung wird für eine herausragende Arbeit über ein ausschließlich entomologisches Thema vergeben, wobei nur Arbeiten junger Wissenschaftlerinnen und Wissenschaftler (z.B. Dissertation) bis zur erfolgten Habilitation berücksichtigt werden können (siehe Stiftungssatzung unter: http://www.dgaae.de/html/veranst/wwsatzun.html).

Bitte machen Sie von Ihrem Vorschlagsrecht Gebrauch und benennen Sie bis zum

1. Juli 2006

dem Präsidenten der DGaaE, Herrn Prof. Dr. GERALD BERND MORITZ, Universität Halle-Wittenberg, Institut für Zoologie, Entwicklungsbiologie, Domplatz 4, 06108 Halle / Saale, Kandidatinnen und Kandidaten für den Preis. Ihrem begründeten Vorschlag müssen je zwei Belegexemplare der Preis-Arbeit(en) beigelegt sein. Selbstbewerbungen sind möglich. Der Preisträger / die Preisträgerin berichtet in einem Vortrag während der Entomologentagung 2007 über die ausgezeichnete Arbeit.

VERMISCHTES

Global Horticulture Initiative (GHI) gegründet

Unter Federführung des World Vegetable Center (AVRDC) wurde mit internationaler Beteiligung am 23.3.2006 in Montpellier eine Global Horticulture Initiative (GHI) gegründet. Ziel ist die Verringerung von Armut und Fehlernährung insbesondere in Entwicklungsländern durch anwendungsorientierte Forschung im Gemüse- und Obstbau. Es handelt sich nicht um eine neue Organisation, sondern um ein Netzwerk zur verbesserten Forschungskoordination und gezielten Nutzung der Forschungsergebnisse. Partner sind bisher die International Society for Horticultural Science (ISHS) und das Centre de cooperération internationale en recherche agronomique pour le développement (CIRAD). Weitere Partner werden gesucht.

Insbesondere im Gartenbau liegt ein enormes, bislang nur unzureichend genutztes Potenzial für die Verbesserung der Ernährung und der Einkommenssicherung in Entwicklungsländern. Durch Export bieten sich zudem neue Möglichkeiten, an wachsenden Märkten teilzuhaben. Damit auch Kleinbauern von den Forschungsergebnissen profitieren können, sollen speziell auf sie zugeschnittene Programme und Maßnahmen umgesetzt werden. Aus- und Weiterbildung gehört zu den Aktivitäten in allen Tätigkeitsfeldern.

Die Tätigkeitsfelder der Initiative werden sein:

– Wissensmanagement
– Erhaltung und Nutzung von genetischen Ressourcen
– Entwicklung und Einführung neuer Sorten
– Entwicklung umweltverträglicher und ökonomisch stabiler Produktionssysteme
– Unterstützung von Kleinbauern beim Zugang zu Märkten
– Verbesserungen im Nacherntebereich (Verarbeitung, Vermarktung)
– Analyse von Ernährungsfragen und Potenzial für die Vermarktung von Nischenprodukten.

Prioritäre Kulturpflanzen sind neben den Hauptgemüsekulturen tropische und subtropische Früchte und traditionelle Gartenbaukulturen. Der geographische Fokus liegt zunächst in Afrika und Südasien. Eine Ausweitung der Initiative auf Zentralasien, Südostasien und Lateinamerika ist für einen späteren Zeitpunkt vorgesehen.

Als Mindestbudget sind 5 Mio. US$ pro Jahr über einen Zeitraum von fünf Jahren geplant. Um alle geplanten Aktivitäten durchführen zu können sind 50 Mio. US$ erforderlich. Etwa die Hälfte der Mittel für Forschung, Beratung, Kommunikation und Information sollen auf der Basis von Ausschreibungen vergeben werden.

Die GTZ Beratungsgruppe Entwicklungsorientierte Agrarforschung (BEAF) prüft z.Zt. im Auftrag des Ministeriums für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ), wie ein finanzieller deutscher Beitrag zu der Initiative geleistet werden kann. Eine Beteilung deutscher Forschungsinstitute, NRO und des Privatsektors an den Aktivitäten der Initiative ist willkommen. Atsaf

Weitere Informationen: www.globalhort.org oder per E-Mail: beaf-bonn@gtz.de

AUSSCHREIBUNG

Assistant / Postdoc Position in Biogeography

University of Basel, Switzerland

Departement of Environmental Sciences, Institute of Conservation and Environmental Protection, Section of Biogeography, Head: Prof. Dr. Peter Nagel.

The position is non-tenure at 75% employment. It is initially for three years and is limited to a maximum of six years. Start as soon as possible, latest at winter term 2006-2007.

The successful candidate will ...

develop his/her own research profile, preferably in zoogeography; complement the institute's research areas; have the opportunity of habilitation or equivalent academic qualification; publish regularly in renowned international journals; take over tasks in teaching and academic administration; apply for and coordinate Africa-related projects; and (co-)supervise MSc and doctoral theses.

Applicants have ...

a PhD in biogeography, ecology, conservation, taxonomy or related fields of geo- and biosciences; a sound background in zoology and advanced statistics; and are experienced to work in the tropics, preferably in Africa.

The application (in German or English) consists of the standard materials, including ...

a CV, description of previous and planned research, information on field and laboratory experience, two letters of recommendation, copies of up to three publications (published or in press), and indication of the earliest date to take up the position.

Application deadline: July 14, 2006

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Phone (direct line) +41-(0)61-2670802
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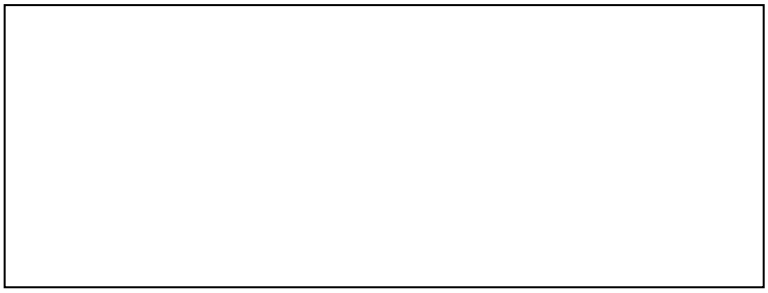
Please send your application as soon as possible to:

Prof. Dr. Peter Nagel
Universität Basel
Natur-, Landschafts- und Umweltschutz (NLU) / Biogeographie
St. Johanns-Vorstadt 10
CH-4056 Basel, Switzerland



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Bei der Überweisung der Mitgliedsbeiträge aus dem Ausland auf die deutschen Konten ist dafür Sorge zu tragen, daß der DGaaE keine Gebühren berechnet werden.

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