Baculoviruses

Researchers at the University of Connecticut Health Center in Framlington have identified a family of toxins in the venom of a funnel-web spider and are now engineering the gene for one of these toxins into baculoviruses. When the modified baculovirus infects an insect it will start to produce the toxin killing it faster than wild viruses but because the host dies quickly, before much of the virus can replicate, the modified virus should not persist in the environment. This engineering of toxin genes into viruses is considered preferable to adding them to plants such as Bt maize, since only the pest insects will be killed and beneficial insects left unharmed. There are fears, however, that the viruses could pass to other species and that the toxin gene could be transferred to other viruses and thus a rigorous risk assessment needs to be carried out. For a review article on baculoviruses see K. Hoover *et al.* "The potential for recombinant baculoviruses" (*Pesticide Outlook*, 1996, 7(3), 21).

New 'natural' rodenticide

Delmar Products Ltd. have launched EradiRat and EradiMouse, which consist of food-grade cellulose with molasses as a sweet attractant. The product is highly attractive to rodents, because it is rock-hard and they need to grind their teeth constantly. The rodents are unable to use the cellulose as a food source and the animals' fat reserves are used up to maintain normal body processes. The cellulose impacts in the part of the intestine where dangerous bacteria breed, producing toxins which cause the already weakened rodent to die of blood poisoning. No poisonous anticoagulant rodenticides are involved so there is no poison which can be transferred to other animals that eat the rodent carcass; it is also claimed to be a more humane method of killing. Because the dead rodents have no body fat and no stomach contents their bodies do not smell and attract other pests; they tend to die underground and decompose naturally. For more information contact Delmar Products Ltd., 397 Eastern Avenue, Gants Hill, Ilford, Essex IG2 6LR, UK.

Plant pathogen decoded

Brazilian researchers from a San Paulo-based consortium have sequenced for the first time the genome of a plant pathogen, namely *Xylella fastidiosa*, which infects citrus crops (as well as coffee and nuts). *X. fastidiosa* is spread by an the sharpshooter leafhopper, multiplying in the insects foregut and passing into a citrus tree every time the leafhopper feeds on the plant's sap; the disease citrus variegated chlorosis is the result. Unravelling the bacteria's genetic code brought some surprises; *e.g.* there are no genes for 'avirulence' factors, which trigger plant defences, explaining why *X. fastidiosa* us such a successful pest. It is hoped that having the complete genome sequence of *X. fastidiosa* will reveal weaknesses in the microbe's defences that can be exploited by chemists or plant breeders. For more information see *Nature*, 2000, 406, 151-157.

New hoe demonstrated

A demonstration took place on 4 May at Silsoe, Bedfordshire, UK, of the new vision-guided steerage hoe developed by the Silsoe Research Institute, ADAS and the Institute for Arable Crop Research (IACR), with funding from the Ministry of Agriculture, Fisheries and Food (MAFF) and the British Beet Research Organisation (BBRO). The hoe (see *Pesticide Outlook* 1999, 10(1), 4) uses camera guidance to ensure accurate, mechanical inter-row weeding at high work rates. Trials during last season in both cereals and sugar beet were very promising in engineering and agronomic terms; accuracy of ± 3 cm at 6 kph was achieved in crops as small as sugar beet at two true leaves even in the presence of significant weed populations. Larger well established crops presented no difficulty up to the point of canopy closure. As a result of a partnership with ADAS trials were conducted in peat soils (ADAS, Arthur Rickwood) and clay soils (ADAS, Boxworth), as well as the sandy loams at Silsoe. Agronomic results (obtained with ADAS) in both cereals and sugar beet have shown that use of the hoe in conjunction with reduced herbicides improves or maintains weed control relative to full dose herbicide programmes. There have been no adverse effects on yield. Silsoe is now working with Robydome Ltd and Garford Farm Machinery to make a commercial unit available for spring 2001. For more information see http://www.sri.bbsrc.ac.uk/

Fall in UK skylark populations

A report from the Royal Society for the Protection of Birds has shown that the recent decline in skylark populations in the UK is not due to the effects of pesticides, but rather due to a combination of other factors:

- the trend from spring-sown to autumn cereals.
- the trend from hay meadows to silage

Both these trends have led to poorer nesting success due to lower insect availability and vulnerability to nest damage.

Soluble film for agrochemical packaging

Chris-Craft Industrial Products, a water-soluble film producer, and farm equipment maker Flexi-Coil have designed a safe handling system for agrochemicals that uses a water-soluble film, called MonoSol®. The film, which dissolves in water as the product is mixed, is a polymer that is compatible with alkaline products and resistant to organic solvents. The system ensures safety since the produce is totally contained and physical contact between the product and end-users is avoided. MonoSol® pouches dissolve in water as the agrochemical is mixed, eliminating the need to dispose of contaminated packages or intermediary mixing containers (for more information see http://www.monosol.com/).

Genomic sequencing of *Ustilago maydis*

Exelixis Inc. has completed a working draft genomic sequence of *Ustilago maydis*, commonly known as corn smut, an important model system for plant fungal diseases. By combining this information with genomic studies of other commercially important fungi, the company can quickly identify new, broad-spectrum targets that may significantly shorten the development timetable for fungicides; based on statistical and bioinformatic analysis, it has sequenced over 97% of all encoded genes. This project was initiated earlier this year, and the sequencing and bioinformatic annotation phase is expected to be completed this summer. Exelixis is systematically knocking out each *U. maydis* gene and analyzing the effect of each knockout, which will allow the company to identify new fungicide targets and to understand how *U. maydis*, and other economically important fungi, identify, penetrate, and proliferate within the host plant. For further information see http://www.exelixis.com

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Swallowtail butterflies unharmed by Bt pollen

Field and laboratory studies carried out by researchers from the University of Illinois and reported in the *Proceedings of the National Academy of Science* (July 5, 2000, 97(14), 7700) show that black swallowtail butterfly (*Palilio polyxenes*) caterpillars were not harmed by pollen from corn genetically engineered to produce a particular strain of *Bacillus thuringiensis* (Bt) toxin. The results have refuelled the debate about the safety of Bt. An earlier study reported in *Nature* in May 1999 by Cornell University had found that Bt pollen may present a threat to Monarch butterfly (*Danaus plexippus*) caterpillars. Direct comparison is not possible because the Bt strains (event 176 in the Cornell study and event 810 in the Illinois study) and the butterfly species were different (for more information see http://www.admin.uiuc.edu/NB/00.06/05btcorn.html)

GM mosquitos

Researchers at Imperial College, London, and the European Molecular Biology Laboratory at Heidelberg, Germany, have created the world's first GM malaria mosquito. They inserted an extra gene that produces a green fluorescent protein which distinguishes the transgenic insect from other mosquitoes and makes it visible under UV light. This achievement means that it may soon be possible to substitute other genes that could make the malaria-carrying *Anopheles* mosquito produce antibodies to the malaria parasite or a resistance to it.

Biocontrol of *Fusarium* wilt

In a collaborative study at the USDA-ARS Biocontrol of Plant Diseases laboratory at Beltsville, MD, USA, and the Agriculture and Agri-Food Canada in Ontario, Canada, researchers have identified a strain of *F. oxysporum*, CS-20, which reduces damage by the pathogenic strain of *F. oxysporum* causing *Fusarium* wilt on tomatoes. This work, in which harmless strains of *Fusarium* are pitting against the disease-causing strain, is important since methyl bromide (due for phase-out by 2005) is the principal current treatment.

HGCA funds agrochemical research

The Home Grown Cereal Authority (HGCA) is funding numerous research projects on cereals and oilseed rape to assist UK farmers to stay competitive. These include investigations into the:

- need to increase nitrogen rates to cereals in the year following the use of strobilurin fungicides
- control of *Fusarium* ear blight by fungicide combinations containing strobilurins
- use of adjuvants to prolong the activity of the repellent cinnamamide to protect oilseed rape from pigeons

These projects are being carried out at Harper Adams University College in Shropshire, the Central Science Laboratory at York, the Morley Research Centre and the John Innes Centre in Norwich (for information on the HGCA and its research project funding see http://www.hgca.com/)

Portable phosphine fumigator

A portable phosphine fumigator, developed at the CSIRO Entomology's Stored Grain Research laboratory in Canberra, Australia, will now be produced and marketed under license by the Indian company United Phosphorus Ltd. Because of its portability and inherent simplicity, this fumigator will be very valuable in the devoping world where grain storage is notoriously vulnerable to insect infestation (see *Pesticide Outlook* 2000, 11(3), 88–93) (http://www.ento.csiro.au)

Ozone as methyl bromide replacement

Ozone is being developed by PureOx of Sparks, Nevada, USA, as a replacement for methyl bromide in some of its uses. The PureOx™ sterilization system utilizes newly developed technology which maintains the anti-microbial activity of gaseous ozone for sufficiently long periods of time to allow it to be effectively and reliably used as a food sterilant on a commercial basis. Ozone used in the PurOx™ process is generated entirely on site, as needed, using carefully controlled electrical discharge. There is no opportunity for leaks or spills during shipment or storage. Newly generated ozone is pumped into a closed, stainless steel treatment vessel containing the material to be treated. Exposure is continued for a time sufficient to sterilize the materials within the vessel. Excess ozone is then pumped from the treatment vessel and converted back to oxygen before release to the atmosphere. Trace amounts of ozone remaining within the treated materials also revert to atmospheric oxygen within minutes leaving absolutely no residue. Ozone generated by the PureOx system can be used as a treatment for insects and other pests in fruits, vegetables and many other food products (http://www.pureox.com/)

Snippets

...diclocymet has been launched commercially by Sumitomo Chemical as a fungicide for rice blast. Japanese demand is expected to be Yen 30 bn/y. Agros and other companies will sell the single-ingredient preparation for Sumitomo Chemical. Takeda Chemical and Aventis Crop Science Japan are among the companies that will market the formulation supplied by Sumitomo Chemical.

...researchers at the USDA-ARS Application and Production Technology Research Unit at Stoneville, Mississippi, have shown that mixing refined cottonseed oil with malathion sprays (used for aerial spraying to control cotton boll weevils) enhances the effectiveness of the malathion sprays, allowing a reduction in the number of malathion applications.

...Novartis has introduced an aphicide with a new mode of action. Pymetrozine stops aphids feeding within an hour of ingesting sap from a treated plant. The aphicide works against all key aphid types and does not harm beneficial insects. At higher rates of use protection can last up to 14 days.

...The Central Food Technological Research Institute (CFTRI) in India has found that the dried powder prepared from the roots of *Decalepis hamiltone* (swallowroot) can be used as a bioinsecticide for food grains. The CFTRI has applied for a patent for the bioinsecticide. Studies on three pests of food grains: rice weevil (*Sitophilus oryzae*), the lesser grain borer (*Rhyopertha dominica*) and rust-red flour beetle (*Tribolium castaneum*) showed that the dried powder extract of *Decalepis* roots at 5% concentration destroyed 96% of stored grain pests, and at 10% it destroyed 99.97%.

Please send any contributions to the NEWS sections in *Pesticide Outlook* to Hamish Kidd, The Royal Society of Chemistry, Thomas Graham House, Science Park, Cambridge CB4 0WF. FAX +44 (0)1223 420247; email KIDDH@RSC.ORG.