

Demegen and transgenic tobacco and cotton

Demegen Inc. announced that scientists at the USDA have produced tobacco and cotton transgenic plants, which express a gene encoding a novel antimicrobial peptide and show high levels of resistance against three important fungal pathogens. Researchers at Demegen, designed the synthetic peptide, D4E1, which has a broad spectrum activity against several bacteria and fungal phytopathogens. Patents assigned or licenced to the company cover this technology. The scientists reported that transgenic tobacco plants demonstrated a significant reduction in anthracnose severity caused by the tobacco pathogen *Colletotrichum destructivum*. Also crude protein extracts from leaf tissue of these plants reduced the germination of conidia of the fungus *Aspergillus flavus* by 75% and the wilt fungus *Verticillium dahliae* by 99%. Preliminary results from a parallel experiment with immature cottonseeds from transformed cotton plants showed a similar inhibition *in vitro* of germinated conidia of *A. flavus* and *V. dahliae* (<http://www.demegen.com>).

KHH BioSci's bioprotectant from giant hogweed

The Milsana bioprotectant trademark for an extract from the giant hogweed (*Heracleum mantegazzianum*) has been obtained from BASF AG by KHH BioSci Inc. The agreement covers North America, South America, Japan and South Africa and includes patent and technology rights. The company plans to develop and market the natural replacement for fungicides. The plant is induced to produce more naturally occurring phenolic substances that prevent powdery mildew and grey mould when Milsana is applied. In 2000, approval for the use of Milsana in ornamental and glasshouse crops is expected to be granted by the US EPA.

Rice blast resistance

...mixed cultures

According to a report published in *Nature* (2000, 406, 718) growing mixed varieties of rice offers better protection against disease and higher yields. Christopher Mundt of Oregon State University, USA and colleagues in China and the Philippines persuaded thousands of rice farmers in Yunnan Province, China, to mix rice varieties grown over 2 years. Results showed a 94% decrease in fungal rice blast

disease compared with monoculture plots, and disease-susceptible rice varieties had 89% greater yield when they were planted in mixtures. Greater yields and improved resistance has been demonstrated in small trials, but this study showed that it holds true on a large scale. This cultivation merits wider uptake, despite the practical problems in harvesting presented by mixed varieties of varied quality.

...pathogen-host interactions

Researchers at DuPont Agricultural Products in Wilmington, Delaware, USA, have found proof of a direct interaction between a single gene in the rice blast pathogen and a single gene in the host rice plant. The rice plant has cell sites that can recognise and bind the protein produced by the fungus gene. This binding in the plant cell alerts the plant's gene to produce defence proteins that halt the progress of the fungus (*EMBO Journal*, 2000, 19, 4004).

Wild oat resistance to herbicides in the UK

Five years of research funded by the government and industry shows that the incidence of wild oat resistance to approved herbicides in the UK is increasing. Change in farming practices has meant increasing resistance across 19 counties. Infestations of 10 wild oats/m² can lower farmer returns by £100/ha. Resistance can take target site and/or enhanced metabolism forms; target site resistance tends to be associated with "fop" herbicides and enhanced metabolism with both "fop" and "dim" herbicides. Farmers are urged to identify their wild oat type, collect seeds, send them to a laboratory for resistance testing and to choose their herbicides accordingly.

Fighting fire ants with fungus

The battle against the red imported fire ant (*Solenopsis invicta*) in the southern USA has been uphill. Research at the University of Florida, Gainesville, FL, has identified a naturally occurring fungus *Beauveria bassiana* in South America that offers control. Work is now in hand to formulate products for the market. The preferred encapsulated formulation is a powder mixed with food particles that is released when the capsule is transported to the nest. The formulation is licensed and in registration trials. The fungus is non-toxic to vertebrates and kills 13 other species of

ants. Mortality occurs 3 to 4 days after contact.

Noxious weeds

Following the recent *Pesticide Outlook* articles on noxious weeds (2000, 11(3), 99) a few recent reports have appeared on the same subject:

...Researchers at USDA ARS have developed a new noxious weeds section on the University of Montana's "Invaders" website (http://invader.dbs.umt.edu/noxious_weeds). The website allows land managers to compare noxious weeds lists from 48 States and 6 Canadian provinces, and provides a national ranking of weeds based on the number of states where they are designated noxious. The information available will facilitate control and research efforts at the local and national levels, and prediction of future potential problems by examination of lists from neighbouring states or regions.

...researchers from CSIRO and Weeds Cooperative Research Centre in Australia have released the rust fungus *Puccinia myrsiphylli* in New South Wales, South Australia and Western Australia in a bid to control bridal creeper (*Asparagus asparagoides*), a Weed of National Significance.

Effect of GM crops on birds

In a report published in *Science* (2000, 289, 1554) Professor Andrew Watkinson and colleagues from the University of East Anglia, UK, predict that the use of GM sugar beet in the UK could lead to a decline of up to 90% in the population of skylarks. The use of GM herbicide-tolerant (GMHT) beet, the researchers claim, will lead to more herbicide being used, and skylarks, which feed on weed seeds, will suffer a further decline in numbers on top of that already caused by intensive farming practices. These findings have been criticised since they are based on a computer model rather than field research. In a commentary by Les Firbank of the Centre for Ecology and Hydrology in the UK and Frank Forcella at USDA-ARS in Morris, MN, USA, accompanying the Watkinson paper (*Science*, 2000, 289, 1481), the authors state that the model provides a "welcome conceptual framework", but further work will be necessary to resolve some of the model's simplifications. According to the

commentary, some data from the USA, where GMHT crops are currently growing, suggest that weed control with GMHT crops may not be as effective as some of the model results indicate. Such differences emphasise the need for field trials to complement such theoretical studies.

Temperature affects weed resistance

Researchers at the USDA-ARS Plant Stress and Germplasm Research Unit at Lubbock, Texas, have shown that a few hours' difference in herbicide application time on a hot summer afternoon means the difference between success and failure for cotton farmers trying to control major weeds like pigweed *Amaranthus* spp.). Pigweed sprayed with Staple (pyrithiobac-sodium) on an afternoon when temperatures climbed above 34 °C was unaffected, but 2 metres away, pigweed that was sprayed in the cooler morning was almost totally killed. Staple works by inhibiting key plant enzymes which are most vulnerable at temperatures 20–34 °C (the 'thermal application range'). Farmers are recommended to check the 5-day forecast before spraying Staple, to see which are the coolest days, and should consider stopping application before the day gets too warm. The researchers expect several other weeds to have similar thermal application ranges.

Pesticides information provided by the European Commission on the Internet

The European Commission's Health and Consumer Protection Directorate-General (DG) has a subscription-based public

Internet Website: www.europa.eu.int/comm/dg24/. Any announcements or new documents will be automatically emailed to the recipient. The Web-page is linked from the UK's Pesticides Safety Directorate's new Website www.pesticides.gov.uk. Included on the Website is specific information on pesticidal active substances and plant protection products. Information on Maximum Residue Levels is also available. The European Commission operates another Web resource known as CIRCA (Communication and Information Resource Centre Administrator). CIRCA enables a given community, in this case the Interest Group for Pesticides, to maintain a private space on the Internet where information can be shared.

Snippets

...according to the UK's Horticultural Research International, biological control of sclerotinia could soon be possible in commercial lettuce and oilseed rape. Control in lettuce can be reproduced equivalent to the level achieved with a fungicide. The biological control agent is a soil fungus called *Coniothyrium minitans*, already available in Germany as Contans. It destroys the resting bodies or sclerotia of sclerotinia.

...a team at the University of Connecticut Health Center, USA, has identified more than 100 toxins from the venom of the funnel-web spider. These could offer possibilities for new insecticides if the gene for the toxins are introduced into viruses that attack insects. A modified virus would be species-specific and would not target

beneficial insects such as bees. A number of trials have been carried out in the past into the use of baculoviruses combined with insect toxins, e.g. by DuPont and American Cyanamid.

...Maxforce claim that the active ingredient, fipronil, is passed through cockroach colonies via a domino effect. New research has shown that insects that have consumed fipronil will regurgitate their stomach contents before death. The vomit is highly attractive to other insects and further insect deaths result. Vomophagy can now be added to the other three routes of transfer of bait between insects: cannibalism, trophallaxis and cross-contact.

...the European Crop Protection Association is supporting a research programme into sustainable ways of reducing the overall load of crop protection products in surface waters. The programme, to be known as DRIPPS, will review farmyard point-source contamination and compare this with diffuse sources. A consortium of 7 partners, including the UK's National Farmers Union and ADAS is developing the EU-wide project.

...according to a report by Richard Roberts and colleagues from the North Wales Health Authority in *The Lancet* (12 August 2000) the mechanical removal of head lice by wet-combing the hair with a fine-toothed comb ('bug-busting') was less effective than malathion lotion in a study of 167 schoolchildren in Wales. The cure rate was 38% for bug-busting and 78% for malathion.