Gene flow

The UK Biotechnology and Biological Sciences Research Council (BBSRC) and the Natural Environment Research Council (NERC) are launching a new scientific funding initiative for further research on gene flow in plants and microorganisms. Funding will be provided for research in the following areas:

- Comparative studies of gene expression and behaviour in plants and microbes genetically altered by conventional and trangenic techniques
- Studies of the processes of pollen and seed development

Studies of the extent to which genes move between organisms (of the same and different species) and an assessment of the past impact and potential future consequences for agriculture, the food chain and the environment.

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Weeds commit suicide

According to a report in the January/February 2000 issue of *Weed Science*, Brian Bailey and colleagues at the USDA-ARS in Beltsville, Maryland, USA, stubborn weeds develop a strong hypersensitive response when treated with the natural protein Nep1 from the soil fungus *Fusarium oxysporum*. Hypersensitive responses to infection are a natural plant defence mechanism, but with Nep1 this defence mechanism goes into maximum overdrive, sacrificing so many cells that the leaves die 3–24 hours later. Several problem North American broadleaf weeds, *e.g.* yellow starthistle, northern joint vetch and spotted knapweed, could be successfully controlled with this bioherbicide.

Disease diagnosis in 10 minutes

Hortitech (the commercial operation of HRI Wellesbourne) has introduced a series of rapid diagnostic kits which makes targeting disease control much easier. DeTechtor_ kits are available to detect important viral and bacterial pathogens of both edible and ornamental plants, including plum pox virus, tomato spotted wilt virus, *Erwinia amylovora* (cause of fireblight), *Ralstonia* (*Pseudomonas*) *solanacearum* (cause of brown rot in potatoes and bacterial wilt in a wide variety of other hosts) and *Xanthomonas campestris pv. campestris* (cause of black rot, a serious disease of brassicas). It is expected that fungal versions of the diagnosis kits should follow. Each diagnosis takes just 10 minutes. The kits are based on antibodies to the specific plant pathogens.

Biological control consortium

An international consortium was established on 29 February 2000 to promote the development of biopesticides in developing countries. National sustainable agriculture programmes and small-scale enterprises will be able to access training, advice and facilities to help them develop, produce, commercialise and use biopesticides effectively. The International Biopesticide Consortium for Development (IBCD) brings together 5 international organisations – CABI International Bioscience (Ascot, UK); International Institute of Tropical Agriculture (Cononou, Benin); Natural Resources Institute (Chatham, UK), Federal Biological Research Centre for Agriculture and Forestry (Darmstadt, Germany) and PACE Consulting (San Diego, USA). For further information contact: Miss Zoë Armitage, Communications Officer, CAB International HQ, Nosworthy Way, Wallingford, OX10 8DE, UK (email z.armitage@cabi.org

Post-harvest fruit coatings

Raymond McGuire and colleagues at the USDA Agricultural Research Service's Subtropical Horticulture Research Station in Miami, Florida, in conjunction with Mantrose Haeuser Co. Inc of Westport, Connecticut, have developed fruit coatings made from reformulated shellac and sucrose ester. These biocontrol coatings help maintain quality by promoting the growth of beneficial bacterial and yeast populations naturally on the fruit, which essentially starve the pathogens which would otherwise cause fruit decay. The coatings have also been found to reduce the development of off-flavours caused by the buildup of ethanol.

Microbes enhance pesticide breakdown

It may not be simply resistance which is causing the declining control of black grasses from isoproturon. Increased rates of bacterial degradation in the soil could be playing a part too, since some soil-living bacteria can break down pesticides and use them as an energy source. Repeated use of the same type of product selects for such microorganisms, raising the rate of degradation next time an application of the chemical is made. It is speculated that this could be happening where high rates of isoproturon have been used year on year. Researchers, led by Allan Walker, at the Horticultural Research Institute, Wellesbourne, UK, have isolated the genes in an indigenous *Arthrobacter* species responsible for the breakdown of isoproturon and other phenylureas, allowing for the identification of other microbes with that ability. This project has the goal to provide agrochemical manufacturers and growers with guidance on the optimal application strategies to avoid unwanted pesticide inactivation, especially though year-on-year buildup of pesticide-degrading bacteria in the soil. On the other hand the project also has the goal of actually improving the effectiveness of pesticide-degrading bacteria to inactivate pesticides in bioremediation technologies to deal with spillages, cleaning of spray equipment, and disposal of waste.

Biological control of soybean cyst nematodes

Edward Masler and colleagues at the USDA-ARS Nematology Laboratory in Beltsville, Maryland, USA, have isolated several peptides from extracts of soybean cyst nematodes which control feeding and movement by regulating nervous transmission and muscle activity. The research reported in a recent issue of the Annals of the New York Academy of Sciences, opens a new path for investigating biological control of this nematode, which is the most destructive pest of US soybeans.

Caribbean war on ticks

The Caribbean *Amblyomma* Programme has been set up to try to eradicate the *Amblyomma variegatum* tick which came from Africa to the Caribbean 170 years ago. The tick reproduces itself on livestock and, sometimes, on humans. Its bite causes inflammations and abscesses. Worse still, it infects animals with pericarditis (caused by *Cowdria ruminantium*) and dermato mycosis (brought by *Dermatophilus congolensis*). Recently, livestock in some islands has been particularly seriously hit. The programme will involve training local farmers to treat their livestock with acaricides (http://capweb.org/cap /index.html).

Collaboration on dengue control

The US Department of Agriculture (USDA) and Brazilian government officials signed an agreement on 29 February 2000 to conduct a joint biological research project to control the *Aedes aegypti* mosquito that transmits Dengue viris biologically (see *Pesticide Outlook* 1996, 7(1), 25). WHO estimates that there may be 50 million cases of dengue worldwide each year. The mosquito has been largely eliminated from the US, now confined to the southernmost areas of Florida and Texas. Under the agreement, the scientists will use *Edhazardia aedis*, a microsporidium developed by USDA scientists at the Center for Medical, Agricultural and Veterinary Entomology in Gainsville, Florida. In the mid 1990s, small-scale field trials using *E. aedis* in the US were successful at controlling *A. aegypti* mosquitoes in Florida. Researchers are planning larger-scale trials in Brazil later this year, and then large-scale releases of the organism to control the mosquito.

Controlling a lousy problem

A simple kit to detect sheep lice, developed by CSIRO Animal Health and Elizabeth Macarthur Agricultural Institute (New South Wales Agriculture) in Australia, with funding support from the Woolmark Company, will be trialed on selected farms in New South Wales this year, and could be on the market by 2002. An Australian company, AGEN Biomedical, developed the prototype kit. A simple lice test for farmers would mean only those flocks confirmed as lousy would need to be treated, saving at least A$10million a year in the cost associated with chemical treatments. Reducing chemical residues in wool also has important environmental and trade benefits, and increases the marketability of raw wool and lanolin. New European residue standards to be imposed between now and 2007 will require reductions in chemical residues in wool.

OBITUARY – EDWARD KNIPLING

The celebrated entomologist Edward F. Knipling, who pioneered research to develop pesticide-free ways to protect livestock and crops from the devastating effects of insects, died 17 March 2000 at his home in Arlington, Virginia, USA, from cancer at the age of 91. Knipling retired

from USDA's Agricultural Research Service (ARS) in 1973 after 42 years with the Department, but continued to work with the ARS as a research collaborator.

Working with ARS colleague Raymond C. Bushland, Knipling pioneered the sterile male insect technique to suppress insect pests. This technique involves irradiating male insects, then turning them loose to mate with wild fertile female insects. These matings do not produce fertilized eggs, so numbers of insect offspring plummet dramatically.

Knipling and Bushland first developed the technique to combat screwworm flies, whose flesh-eating maggots parasitize livestock, wildlife and humans. The technique resulted in the eradication of the wild screwworm population in the United States, Mexico and parts of Central America, saving the North American livestock industry millions of dollars annually and winning praise from environmentalists.

Today, Knipling's technique is used worldwide to eradicate outbreaks of other pests such as Mediterranean fruit flies. In Africa, the technique is used to control the tsetse fly, which spreads sleeping sickness.

Knipling also is considered the "founding father" of the concept of areawide integrated pest management. Realizing that for most pests total eradication is not feasible, in the early 1980s Knipling developed the concept of using specific insect parasites, predators, and other tactics over a broad area to keep pest populations below the point where they impose a financial burden on farmers and ranchers. Kept at low levels, the pests would be more responsive to biological, rather than chemical control.

Today, Knipling's areawide concept has grown to include not only parasites and predators as weapons against crop pests, but also other environmentally friendly tactics, such as mating disruption and insect attractants.

Among his many honours, Knipling received the National Medal of Science (the highest recognition in the USA for contributions to science) in 1967 from President Johnson.

GM genes don't seem to spread into the environment

Researchers led by microbiologist John Heritage at the University of Leeds have been looking for evidence that a gene in a commercial variety of GM maize was being picked up and activated by bacteria. They found no evidence that gut bacteria from chickens had accepted and activated the gene, called *bla*, which confers resistance to the common antibiotic ampicillin, *bla* gene, after the birds had been fed the GM Maize for 5 days. Although chickens do not appear to activate the gene, the evidence as to whether genes can be transferred from GM crops to bacteria is incomplete and Dr Heritage now plants to test what happens to the *bla* gene when the maize is fed to sheep. This work was presented at a recent meeting of the British Society of Animal Science at Scarborough, UK, and reported in the 25th March 2000 issue of the *New Scientist*.

Snippets

… researchers at the Dutch Institute for Plant Breeding and Reproduction Research (CPRO-DLO) have produced an entirely new crop: the Fructanbeet™. This is a sugar beet, genetically modified to produce fructans by insertion of genes from the Jerusalem artichoke.

… Brazilian oil palm plantations of the highly productive African variety of *Elaeis guineenis* have been decimated by a heart rot disease. At the research station at Rio Urubu researchers are seeking to develop by hybridisation with local Amazonian species such as *E. oleifera*, plants which are resistant to the disease. At the same time they are seeking to isolate the resistant gene in the Amazonian species with can be introduced into the African variety.