

Harpin protein granted US registration

The US EPA has granted registration for the agricultural use of harpin, a protein discovered by Zhongmin Wei, Steven Beer and colleagues at Cornell University (*Science*, July 1992), that induces a plant to mobilise its own defences against pathogens and insects; the protein also enhances plant growth. The protein will be sold under the name Messenger™ by Eden Bioscience Corp. of Seattle, under license from the Cornell Research Foundation. Since entering into a licensing agreement in 1995, Cornell and Eden have conducted over 500 field trials of harpin on about 45 crops in 4 countries. The harpin protein, derived from *Erwinia amylovora*, elicits both hypersensitive and systemic acquired resistance (SAR) responses, thus providing protection against a broad range of pathogens. It also helps to repel insects and nematodes. Registration has been granted for use on all food commodities, fibre-producing crops, trees, turf and ornamentals

Take-all resistance

The substance responsible for the major resistance shown to the cereal disease take-all by rye and triticale has been identified. Research at Sydney University has isolated dihydroxybenzoxazin (DIBOA) from the root tips of the two species. The chemical completely stopped development of the fungus. The future aim is to identify and insert the genetic material responsible for the production of DIBOA into wheat.

Bacillus thuringiensis (Bt)

...entomologists at the USDA ARS National Center for Agricultural Utilization Research at Peoria, IL, have found that levels of fumonisin (a mycotoxin) were 30- to 40-fold lower in Bt corn than in non-Bt varieties in Illinois cornfields. Environmental conditions and the specific Bt corn hybrid play roles in the actual amount of mycotoxin reduction seen, but corn varieties that expressed the Bt protein throughout the plant rather than in specific areas were the least likely to have significant fumonisin levels.

...AgraQuest announces the discovery of a novel natural product that enhances the effectiveness of *Bacillus thuringiensis* (Bt), the most successful commercial bioinsecticide to date. The company filed US and international patents on the discovery.

When combined with Bt, the enhancer significantly improves the effectiveness of Bt against caterpillar pests. The enhancer could also be used to control pests that have developed resistance to commercial Bt sprays or to genetically engineered crops expressing Bt protein. Because the company does not currently market Bt products, the company expects to partner with other biotechnology companies to commercialise the enhancer technology. AgraQuest discovers, develops, and markets effective, environmentally friendly natural products for farm, home and public health pest management (<http://www.agraquest.com>).

Fighting the European corn borer

Instead of using insecticides or larvicides Bradley Binder of the US Agricultural Research Service's Corn Insects and Crop Genetics Research Unit at Iowa State University has been studying ways to stop the female corn borers from laying eggs in the first place. He has now identified a family of about 20 substances in an Argentinian corn strain, B-96, which appear to discourage egg laying. The main substance are 2-hydroxy-7-methoxy-1,4(2*H*)-benzoxazin-3(4*H*)-one (HMBOA) and its 2,4-dihydroxy analogue DIMBOA. Binder is seeking to identify the genes involved in the production of these compounds, and then to determine how to switch on or introduce these genes in commercial corn varieties.

New spray nozzle to cut drift

An adaptation of a hydraulic nozzle, known as the Neale Thomas nozzle, was unveiled by Graham Mathews (International Pesticide Application Research Centre, Silwood Park) and Neale Thomas (Aston University) at the SCI conference on Integrated Crop Management held in London on 4 April (see report on page 82). A fan-shaped air jet is directed to impinge on the liquid jet close to the nozzle orifice. An air-jet of comparable momentum hitting the breaking edge of the liquid sheet, causes the liquid sheet to stretch and bend, making it thinner. It also initiates oscillatory motion associated with cyclical separations of the airflow, or 'galloping motion', that produces packets of droplets typically at audible frequencies. The thinner sheet results in smaller droplets than would be

produced by the same nozzle without the air-jet. The air between packets of droplets is considered to reduce the impact of any other airflow, either induced by the forward speed of the sprayer or the wind, so that the droplets remain within the air-jet. This reduces the drift potential of the spray and allows smaller droplets to be projected to the intended foliar target. Wind tunnel tests indicated an increase in droplet numbers in the range of 100 to 200 µm compared with a conventional flat fan nozzle but that drift reductions in the order of 50% could be achieved.

'Natural' insecticide from EcoSmart

Following eight years of research into alternative pesticides, EcoSmart Technologies Inc. of Nashville, TN, have introduced Bioganic, a new line of consumer products, made from natural plant and tree oils widely used as food and cosmetic additives "Generally Recognised as Safe" (GRAS) by the Food and Drug Administration. They combine the killing power of chemical insecticides with the safety benefits of botanical insecticides and act by blocking octopamine, a neurotransmitter that regulates an insect's movement, behaviour, and metabolism. The Biorganic insecticides destroys ants, cockroaches, dust mites, flies, wasps hornets and a host of other common pests, as well as insects that attack agricultural crops and flowers (<http://www.bioganic.com>).

Snippets

...according to the International Rice Research Institute, China could be growing genetically modified rice from 2001-2002. Good results were obtained in 1999 from experimental crops in China. The transgenic rice contains a gene that confers resistance to the diseases that affect 30-40% of the rice crops grown in China. Use of this transgenic rice could avoid the rice shortages forecast for 2010 in Asia.

...researchers at the School of Pharmacy at the University of Bradford, UK, say growers should be able to use herbicide more economically and in a more environmentally acceptable way with a new hydrogel developed for the cleanup of oil spills. The consistency of the hydrogel, made almost entirely of water, can be adjusted to control the quantity and speed at which the active ingredients become available.