Conference Report

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The conference *Pests and Diseases 2002* was held under the auspices of the British Crop Protection Council (BCPC) at the Hilton Brighton Metropole Hotel in Brighton UK from the 18th to the 21st of November 2002. The meeting was well attended by approximately 700 delegates from all over the world. The agrochemical manufacturers such as Bayer, Takeda, Syngenta, and Rothamsted Research were represented by numerous delegates who presented their employers' latest developments. The main topics of approximately 70 presentations given orally in parallel sessions and of some 80 posters focused on modern strategies for the protection of cultivated plants from attack by insect pests, fungi, bacteria, plant viruses and nematodes. The strategies also included the use of biotechnological and gene technological methods of plant protection.

The first presentation was the 29th Bawden memorial lecture by J. SCHLUNDT (WHO, Geneva). In his discourse on the topic of "Risks and benefits of biological and chemical plant protection strategies – food safety aspects", SCHLUNDT particularly emphasized the possibilities of risk assessment and reduction of the exposure risk when using pesticides. Besides eliminating pesticides that pose a hazard to health from the market, better training of the users of agrochemicals was recommended to help reduce the health risk to man and animals.

A health risk, in his view, can be perceived and dealt with in different ways. If the risk is known, such as that of smoking, and if it is registered, it is acceptable to society. This contrasts with substances involving an unknown risk and for which no warning is given.

Another point emphasized in his presentation was the use of genetically modified plants (GMP) for food production. In his opinion, the currently existing three main GMP groups that impart resistance to insects (toxic protein from

Bacillus thuringiensis), resistance to viruses (e.g. via coat protein of the virus) or herbicide tolerance (e.g. glyphosate) do not pose any risk. The potential risk involved in genetically modified foodstuffs should however be carefully examined and assessed in each individual case of modification. In his view the developing biotechnology undoubtedly offers new possible approaches to improving human nutrition that should be pursued further.

An interesting approach based on these biotechnological methods to control the *Manduca sexta* larva, a known tobacco pest, was described by J.P. EDWARDS (Central Science Laboratory, York). He summarized the results of a current study on the effect of a fusion protein obtained from the insect neuropeptide allatostatin and the snowdrop lectin GNA (*Galanthus nivalis* agglutinin) on the lepidopterous larva *Lacanobia oleracea*. The fusion protein obtained from genetically modified *E. coli* bacteria was offered to the larvae as part of an artificial diet. This led to disturbed digestion and a significant growth inhibition in the pests.

S. SAITO (Sumitomo Chemical Co. Ltd. Japan) presented a new class of chemical substance whose insecticidal activity is based on a propyl ether structure. The spectrum of activity of Pyridalyl also includes, among others, the tobacco pests *Heliothis virescens* and *Spodoptera litura*. For the control of *Lepidoptera* larvae a range of application of 83–300 g a.i./ha was generally recommended for Pyridalyl. The acute oral toxicity in rats was reported as LD₅₀ > 5000 mg/kg. Pyridalyl has been found to be less toxic to beneficial insects. The introduction of Pyridalyl into the Japanese market and those of some other Asian countries is planned for 2004/2005.

R. NAUEN (Bayer Crop Science) described a newly developed product called Spiromesifen. This compound may play an important future role in controlling *Bemisia tabaci*.

Spiromesifen belongs to the new agents known as spirocyclic phenyl-substituted tetrone acids, and its activity and wide spectrum of activity are similar to those of Imidacloprid. The acute oral toxicity in rats is $LD_{50} > 2500$ mg/kg. The recommended range of application to control whitefly is 100–150 g a.i./ha. As for the insecticidal and acaricidal activities of Spiromesifen, no cross-resistances to other substance classes on the market have been reported to date.

A number of new compounds from the substance class of neonicotinoids were also presented. A joint development product of Bayer AG and Takeda Chemical Industries Ltd. is Clothianidin. In his paper, Y. OHKAWARA (Takeda, Japan) emphasized the high efficiency of this neonicotinoid in the control of aphids, its broad spectrum of activity and its low toxicity to mammals and the environment (acute oral LD_{50} for rats >5000 mg/kg). Due to the excellent systemic properties of the insecticide, application is possible via both the root and the leaf. As for tobacco, Clothianidin might well be used for the control of *Myzus persicae* and *Spodoptera*.

Following Y. OHKAWARA's contribution, M. SCHWARZ (Bayer Crop Science) presented results on the effectiveness of Clothianidin compared with other insecticides on the market. The high rate of uptake via the root and the systemic distribution of this neonicotinoid in the plant tissue lead to a rapid decrease in food intake by the pests. If used as a soil insecticide, Clothianidin is just as effective as the substance groups of organophosphates or pyrethroids. It is intended to be introduced in North America and Europe under the trade name Poncho® in 2003.

A survey of past and current research activities in the development of the neonicotinoid insecticides, their application as well as their significance in the market was given by P. JESCHKE (Bayer Crop Science). The first neonicotinoid compounds with selective effect on the nicotinic acetylcholine receptors of the insects were synthesized in the 1970s. One of these early compounds was Nithiazine that, however, did not enjoy broad commercial use. More than 2000 samples were studied of numerous derivatives of the basic chemical structure in the 1980s. This finally led to the selection of the highly effective Imidacloprid. In 1991, Imidacloprid was introduced into the market under the trade names Admire®, Confidor®, Gaucho® and Provado®. It has meanwhile become the best-selling insecticide worldwide.

In contrast to the first generation of neonicotinoids, Imidacloprid and Clothianidin, new developments such as Thiametoxam and Dinetofuran offer a broader spectrum of activity, improved insecticidal activity and a wider range of application possibilities (soil and seed treatment, leaf application) due to their improved physicochemical properties (greater water solubility, improved systemic translocation).

In his paper, I. DENHOLM (Rothamsted Research, UK) presented results from a current study on the development of resistance in pests to the neonicotinoids available on the market. Although it is obviously difficult for the pests to develop resistance mechanisms, a few do seem to have managed to neutralize the insecticidal effect by oxidative detoxification of the neonicotinoids. Thus, resistance developments were reported for whitefly (*Bemisia tabaci*) in

tobacco cultivation in Venezuela. Furthermore, a slight increase in resistance development was observed for aphids in Greek tobaccos after application of Imidacloprid. Like the substance class of neonicotinoids, the cyanotropans presented by R.J. LIND (Syngenta, UK) also act as agonists of the nicotinic acetylcholine receptors. However, as shown in experiments with *Heliothis virescens*, cyanotropans occupy different binding sites at the acetylcholine receptor compared with Imidacloprid. The cyanotropane structures that are of interest in plant protection are related to the natural substance stemofoline, a tropane ether contained in the leaves of *Stemona japonica*. Cyanotropans have proved highly effective against pests such as *Bemisia tabaci* and *Myzus persicae*.

In the field of fungicides, particular mention should be given here to Fluoxastrobin (HEC5725), described by S. DUTZMANN (Bayer Crop Science). This fungicide, which belongs to the class of the dihydrodioxazines, was discovered in 1994 and patented by Bayer. Like the strobilurines, it inhibits the electron transfer chain between cytochromes *b* and *c* and possesses a wide-range spectrum of activities against ascomycetes, basidiomycetes, deuteromycetes and oomycetes. In view of its low toxicity to mammals and the environment (acute oral toxicity, rat (LD_{50}) > 2500 mg a.i./kg b.w.), its rapid uptake and its excellent systemic properties, it seems to be well suited for seed treatment and as a leaf spray. Introduction of this fungicide into the European market is planned for 2004.

Prothioconazole (JAU 6476), a fungicide belonging to the substance class of the triazolinthiones, can be used in combination with Fluoxastrobin. According to A. MAULER-MACHNIK (Bayer Crop Science), this newly developed fungicide has a wide-range spectrum of activity against *Fusarium* spp., *Rhizoctonia* spp., *Alternaria* spp. and *Botrytis cinerea*. Prothioconazole acts in the harmful fungi as a demethylating inhibitor of their sterol synthesis and possesses low toxicity to mammals and the environment (acute oral toxicity, rat (LD_{50}) > 6200 mg/kg b.w.). Here too, introduction into the market is planned for 2004.

Ethaboxam, a new aminothiazole carboxamide fungicide, is especially well suited for the control of *Phytophthora* and *Phytium* spp., which are also harmful to tobacco. It was described by D.S. KIM (LG Life Sciences Ltd.). Its biological activity against the harmful fungi is attributable to an inhibition of mycelium growth and sporulation. Additional excellent properties of Ethaboxam are its low toxicity to mammals and the environment as well as its rapid systemic distribution in the plant. Ethaboxam was discovered in 1993 and has been registered for use in Korea since 1999 under the trade name Guardian®.

A biotechnological method for the induction of systemic resistance in the plant was presented by N. TOSUN (Department of Plant Protection, Ege University, Izmir, Turkey). On the basis of the elicitor properties of yeast extracts and in combination with strobilurin and triazole fungicides or Cupracol (copper oxychloride), fungicidal or bactericidal activity against *Phytophthora infestans* and *Pseudomonas syringae* has been observed. The combination of the systemic resistance inducers with the application of conventional pesticides thus offers new approaches to improving the effective control of harmful organisms and reducing the costs of fungicide use.