IRAC International Article

Stewardship of neonicotinoids: A project to support proactive IRM for a key group of aphicides

The neonicotinoids are a major new class of insecticides for the control of aphids in the UK and one of the key target species is the peach-potato aphid, *Myzus persicae*. This insect is highly adaptable. In the UK, *kdr* and *super-kdr* resistance to pyrethroids, esterase resistance, primarily to OPs, and to some extent to carbamates and pyrethroids, and MACE resistance to pirimicarb and triazamate already exist and are well known (Foster et al., 2002; Waters et al., 2004). The neonicotinoids provide excellent control of *M. persicae* but concerns were raised in response to the continued expansion and diversification of neonicotinoid use in the UK. Many of the target crops including oilseed rape, brassicas, sugar beet and potatoes are hosts for *M. persicae* (e.g. Dewar et al., 2006) and there thus exists the potential for sequential selection of the insects throughout the growing season.

Given these concerns and the adaptable nature of this pest, the Department for Environment, Food and Rural Affairs (DEFRA) in the UK is funding a Sustainable Arable LINK programme project entitled *Stewardship of neonicotinoid insecticides: The potential of natural populations of Myzus persicae to evolve resistance*. The industrial partners are the British Potato Council, the British Beet Research Organisation, Bayer CropScience and Syngenta. The project is coordinated by Rothamsted Research, with major field inputs from ADAS and regulatory aspects are addressed by DEFRA Pesticide Safety Directorate.

The project started in April 2004 and is now in its third year, running until March 2007. The key aim is to investigate the risks of resistance to neonicotinoids developing in this species before it reaches damaging levels and to proactively provide inputs to ensure effective resistance management. The study has four main objectives: (1) A detailed characterisation of *M. persicae* clones already showing some variation in response to neonicotinoids, (2) Structured monitoring of field populations, (3) A study of operational factors influencing the expression and selection of resistance and (4) The development and dissemination of resistance management recommendations. Laboratory resistant clones show a consistent pattern of cross-resistance across all the neonicotinoids tested. It is not known what mechanism underlies the significant variation between clones, but it must confer a broad reduction in susceptibility to all the neonicotinoids tested. In some populations in the field there have seen slight reductions in sensitivity to neonicotinoids in recent years, but to date there is no clear indication of any significant resistance in the UK capable of causing control failures. Further work this summer will clarify the situation. Detailed studies of the selection process are being investigated in field simulators, and will conclude this year. Already the level of perceived risk of resistance is influencing the use patterns of newly registered neonicotinoid insecticides in the UK and this will increasingly be the case as this proactive study meets the challenge of tackling a potential resistance problem.

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