WIDER ISSUES
Laura Temple, AHDB – HGCA E: laura.temple@hgca.com

Pollen beetle thresholds: a leap of faith?

Using thresholds as the basis of pollen beetle control may sometimes seem like a leap of faith but HGCA research is enabling a much greater understanding of the relationship between pest and crop. This research can then be used to develop more robust thresholds and predict the risk of yield loss. If insecticide resistance in pollen beetles becomes widespread the options for control will be limited, so maximising the active market life of existing products is crucial.

Since 2000, Europe and the UK have seen an increase of 60% in the arable area used for oilseed rape (OSR) production, indicating the importance of OSR in many arable rotations. With OSR selling for more than £350 per tonne at the time of writing, rape is no longer restricted to ‘break crop’ status and is recognised as a valuable commodity in its own right. However expansion of the OSR area has also increased the impact and importance of pests such as pollen beetles.

Pollen beetles migrate from their overwintering sites to OSR crops in spring and if present in large enough numbers pre-flowering can completely devastate the crop. The UK, to date, has not seen levels high enough to have such a catastrophic effect, but in 2006, Northern Germany experienced 100% crop loss in many fields (> 30000 ha) and serious losses in a further 200000 ha. This was due to loss of control of pollen beetles which had become resistant to pyrethroid insecticides.

Pollen beetles cause damage in pre-flowering crops by biting into and killing buds in the process of extracting pollen (Figure 1). The damage period is limited, for as soon as flowers begin to open the damage caused to buds declines due to increased pollen availability in open flowers. Indeed HGCA-funded work at Rothamsted Research (Project RD-2007-3394) has shown that the presence of an earlier flowering ‘trap’ crop such as turnip rape can attract the beetles away from the pre-flowering rape, reducing damage.

Figure 1. Pollen beetle biting into pre-flowering oilseed rape

Thresholds and the value they bring
Thresholds for pollen beetle control, as with various other cereal and oilseed pests, have been available to growers for many years, but how well are they understood, and how much trust and confidence does the industry place in them?

A straw poll at recent HGCA Agronomy Workshops showed the majority of growers do use thresholds for guidance on whether to control pollen beetle and other pests. However, a worryingly low number then went on to trust the thresholds. This is perhaps not surprising as many thresholds were developed about 30 years ago and varieties and crop husbandry have changed since then.

New data from HGCA project RD-2005-3242 indicates that well-grown, healthy OSR

KEY POINTS

- Pollen beetles cause damage in pre-flowering oilseed rape crops by biting into and killing buds in the process of extracting pollen.
- Current thresholds recommend control of beetles in winter oilseed rape when there are more than 15 beetles/plant in well-grown crops or 5 beetles/plant in backward crops.
- The development of resistant pollen beetles across Europe has compromised the efficacy of many pyrethroids. This resistance can now found right across Britain.
- Adhering to thresholds to minimise and manage risk of resistance is important.
crops can actually tolerate far higher pest levels than was thought. Original thresholds were based on pollen beetle numbers, but new information is suggesting that risk should now be estimated on the basis of plant development. For example, in some years only 50% of OSR flowers actively contribute towards the production of pods, leaving the other 50% redundant, and termed as 'excess' (i.e. the plants overproduce flowers to allow for losses during pollination and ripening). Even thin, backward or spring sown crops can produce large numbers of excess flowers.

Steve Ellis, Senior Entomologist from ADAS, advises using a risk assessment-based approach to pollen beetle protection. Ideally early assessment of the crop should be made to gain some measurement of its ability to tolerate pollen beetle attack. Green Area Index (GAI) is measured to help manage nitrogen applications and it is possible that this could also be used as an indicator of excess flower number, although it must be stressed that this concept is based on only one year of study.

Current thresholds recommend control of beetles when there are more than 15 beetles/plant in well-grown crops, 5 beetles/plant in backward crops, and 3 beetles/plant in spring OSR on average across the field at the green-yellow bud stage, but thresholds across Europe vary considerably from 1-15 per plant/shoot/raceme. This variability is due to the famous capacity of OSR to compensate for damage during the growing season. In the same context it can also compensate from damage by pollen beetles - up to a point. These thresholds are undergoing a review, as part of project RD-2005-3242 and further information will be available on the HGCA website from early April (www.hgca.com/research).

Increasing resistance

One key reason for applying insecticides according to thresholds is the recent development of pyrethroid resistance. Pyrethroids were historically the mainstay of pollen beetle control and due to their low cost, the temptation has been to tank-mix them with other crop protection chemicals applied at the same time. This provides an insurance against pollen beetle, even when numbers are well below threshold levels, whilst minimising the number of spray applications made to the growing crop. and has recently revised its advice on choice of chemicals.

Alternative insecticides

The development of resistance across Europe has compromised the efficacy of many pyrethroids. This has led to the registration of alternative chemicals for pollen beetle control, including the neonicotinoids, thiacloprid (Bisca) and acetamiprid (Insyst); the pyridine azemethrin, pymetrozine (Plenum) and the oxadiazine, indoxacarb (Steward). These chemicals cost more than the relatively cheap pyrethroids, so this will inevitably change the economic calculations regarding thresholds.

However, the value of the crop is now so high that small increases in yield (1%) will easily pay for the treatment and application costs. These chemicals are all effective against pollen beetle today, but an important reason for adhering to thresholds is to minimise the risk of resistance developing to these new compounds tomorrow. It is perfectly possible for beetles to become resistant to more than one group of insecticides. There are plenty of precedents for this happening in other insects, and no reason to suppose that it would not happen in pollen beetles too.

For further information on projects RD-2005-3425 and RD-2007-3394, as well as details of other HGCA-funded pest management projects, visit www.hgca.com/research.