VEGEnotes
Your levy @ work

Sweet Corn Integrated Pest Management (IPM)

The Australian sweet corn industry has benefited from Integrated Pest Management (IPM) Research & Development (R&D) through the introduction of biological methods as opposed to broad-spectrum insecticides.

The conservation of naturally occurring parasitoids and predators is important as they, along with pathogens and some insecticides, are being used to manage helicoverpa (heliothis) in sweet corn.

Supersweet Sweet Corn

An integrated package of practices is more sustainable than one based on broad-spectrum insecticides alone. It involves a thorough understanding of pest-beneficial interactions, use of biological and narrow spectrum insecticides, spray decisions based on scouting information and pesticide application using improved equipment and techniques.

An IPM strategy aims to reduce the pest population to a minimum by taking into account the various components and how they might be manipulated. It then uses a range of tools and management options, which could include a combination of cultural, physical, biological and chemical control measures.

Helicoverpa (heliothis), a major pest of sweet corn.

The Bottom line

- **Scouting (monitoring) crops for pests and disease is critical.**
- **Cultural, physical, biological and chemical controls need to be considered.**
- **Be aware of new equipment and techniques for pesticide application.**
- **Target all pesticides at the cob and the silk to increase effectiveness.**

Management options in sweet corn

➢Scouting (Monitoring)

Monitoring for pests and diseases is a critical step in the crop protection cycle, without it you will have little evidence of the strategies needed or how well your current strategies are working.

A competent crop consultant can monitor sweet corn crops and provide assistance in making a spray decision. If you do not hire a professional crop consultant, the following procedures will help.

What to look for:

- Thoroughly examine a minimum of 20 to 30 plants per planting. In very large plantings you may need to sample several parts of the planting.
- A systematic sample should involve selecting a number of randomly spaced sites within the crop and assessing four to six plants at each site.
- The number of sites sampled will depend on the area of production and the time available for monitoring.
- Before tasselling look at the whole plant. From the start of tasselling, concentrate on the tassels and then the silks, from first appearance until they brown off. Intensive monitoring is usually no longer required once they have browned off. Monitor for aphids from the brown silk stage until harvest.
- Don't worry about not seeing a particular problem, you will. Choose plants randomly, being careful not to specifically target unhealthy plants while monitoring. If a plant doesn't look healthy and you don't know why, put it in a plastic bag and have the problem identified.

Carefully note and record the following:

- Number and maturity of heliothis eggs on the leaves and stems, particularly the top third of the plant, tassels and/or silks and wrapper leaves of the cob. White eggs are newly laid, brown eggs will hatch in about one day and shiny black eggs have been parasitised by a minute wasp, *Trichogramma*.
- Number of other pests such as armyworm, sorghum head caterpillar and yellow peach moth. Note the presence of thrips, aphids, mites and dried fruit beetles.
- Type and number of beneficial insects present. Exact number is essential for major pests.

Bronwyn Walsh, Entomologist, DPI - Monitoring a block of sweet corn.

For minor pests such as aphids, thrips and mites an approximate number is sufficient.

➢Naturally occurring beneficials

A large range of naturally occurring beneficials has been identified as important to managing Heliothis in sweet corn. They are now more effective in commercial fields due to the reduced use of broad-spectrum insecticides.

Trichogramma pretiosum is also a potential control agent for helicoverpa (heliothis) pests in sweet corn.

Telenomus, another parasite wasp species, also occurs naturally under field conditions and overwinters effectively, although its rate of parasitism is lower than the *Trichogramma* species, with only one wasp per egg being produced.

➢Biological & narrow spectrum insecticides

The 'Insect Pest Management in Sweet Corn' project produced data to support the registration of Success® (Spinosad) and Gemstar® (NPV) with the Australian Pesticides and Veterinary Medicines Authority (APVMA) for sweet corn in Australia.

These products effectively control Heliothis, when applied at the appropriate time and they preserve beneficial insects while being safe for the environment and end user.

Nuclear Polyhedrosis Virus (NPV) (e.g. Gemstar®) is an insect specific virus developed to control heliothis.

Late afternoon applications help prolong its effectiveness, as it is rapidly degraded by ultra-violet light. As it is specific to heliothis, beneficial insects are not affected.

Spinosad (for example Success®) is based on naturally produced metabolites of the soil micro-organism *Saccharopolyspora spinosa*. Although Spinosad is broken down in two to three days by UV light, its movement into the leaf results in the product having a longer residual effect. Spinosad has relatively low toxicity for most beneficial insects, although it can adversely affect *Trichogramma* wasps.

Bacillus thuringiensis (Bt) (for example Dipel®) is a bacterial biological insecticide used to control a wide range of caterpillar pests, including heliothis.

Standard Boom Spray modified with droppers

➢Pesticide application

Research has show that pest damage can be significantly reduced by targeting pesticides (both synthetic and biological) to the cob and silk area. Boom sprays modified with droppers have demonstrated a four-fold difference in the average deposit on silks compared to conventional boom sprays.

A number of growers in all districts are modifying boom sprays to take advantage of this improvement. Optimisation of aircraft application can be achieved through modification of spray patterns (eg reduced swath width), increased water volume, and the use of aids such as Global Positioning Systems (GPS).

➢Insecticide resistance management strategies

Resistance to one or more pesticides has been a problem in many vegetable crops, including sweet corn, for many years.

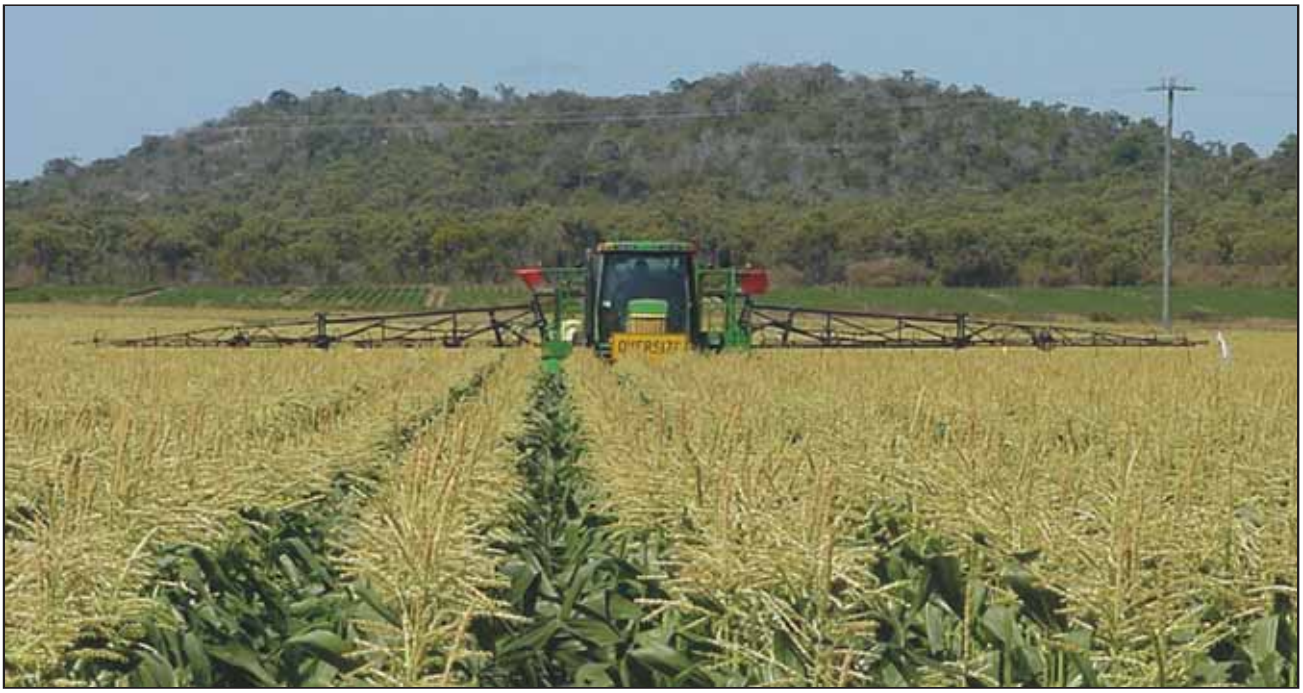
For example, heliothis has developed resistance to a wide range of carbamates and synthetic pyrethroids during the past two decades. Resistance management strategies, either for a particular crop or a growing region, help safeguard the effectiveness of new pesticides to ensure they will control heliothis and/or other pests for a number of years. Resistance management strategies are based on the principle of rotating products among chemical groups.

➢Making a pest management decision

First decide if action, such as pesticide application, is needed to avoid loss from pest damage. If action is required, remember the following important tips.

- Choose pesticides that will be the least damaging to beneficial insects
- Spray only when the pest level becomes economically damaging
- Spray at the stage in the pest life cycle when it is most susceptible
- Spray individual plantings and not the whole farm
- Target sprays on appropriate plant parts, i.e. the silks.

Monitoring and action thresholds help you make these decisions. The threshold you set will depend on the activity of beneficial insects and the risks you are willing to take in not controlling the pest.



Boom Sprayer fitted with Droppers

Weekly sampling for heliothis eggs will indicate parasitism levels present within the crop and guide you in your choice of insecticides. A high percentage of black eggs indicates a high parasitism level, reducing the need to take action against the pest.

Record all these in your monitoring log, as they can be used to judge when outbreaks may occur and what steps may be required to control them.

Further Reading

"Sweet Corn Insect Pests and their Natural Enemies" an IPM field guide
by Richard Llewellyn.

"Growing Sweet Corn" a NSW Agriculture Ag Note
by Clarrie Beckingham, NSW Agriculture.

"Heliothis in Sweet Corn"- a DPI Farm Note
by Peter Deuter, Brendan Nolan, and Bronwyn Walsh, Department of Primary Industries and Agency for Food and Fibre Sciences, Horticulture.

www.nre.vic.gov.au/agvic/ihd/projects/sc

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