Managing chewing and biting pests in strawberries

STRAWBERRY INNOVATION

Corn earworm and native budworm (*Helicoverpa* spp.), cutworms (*Agrotis* spp.) and scarab beetles (Scarabaeidae) are some of the chewing and biting pests that may impact on the health and profitability of your strawberry crops. This fact sheet summarises the information you'll need to sustainably manage these chewing and biting pests in your crops.

What is the nature of these pests?

The caterpillars (larvae) of these pests are difficult to control for a number of reasons including development of resistance to insecticides (particularly for corn earworm), rapid population increases, and the practical difficulties of achieving complete spray coverage.

A need for more affordable and effective control of heliothis (corn earworm and native budworm) has led growers to seek help and then trial and implement integrated management approaches. Integrated Crop Protection (ICP) considers the whole production system - all pest threats, beneficials, the crop, soil health and environmental influences. In ICP, the aim is not zero pests, but sustainable pest management to reduce damage to acceptable economic levels.

Mature corn earworm larvae (photo courtesy of Queensland Department of Primary Industries and Fisheries)

ICP tips for managing chewing and biting pests

- Read the pest management chapter of the Australian Good Practice Guide for Strawberries, available here.
- Identify and monitor populations of both pests and beneficials. Record observations of eggs, small larvae and adults.
- Don't rely on synthetic insecticides for control – understand all the available management options. Rotate between pesticide groups to avoid resistance.
- Know your acceptable limits of crop damage and identify when you may need to spray.
- If insecticide sprays are necessary, choose soft options to avoid disrupting natural enemies.
- Understand environmental conditions conducive to the survival and spread of pests and beneficials, and to biopesticide performance (biopesticides are pesticides derived from natural materials such as animals, plants, bacteria and certain minerals).
- Disrupt pest life cycles by targeting overwintering and survival sites.

The management of heliothis is complex. Knowledge of the beneficial organisms in and around your crops, and their relationship with the pests, is necessary in order to make effective treatment decisions. The pest pressure, the number of beneficials and their population trend (increasing or decreasing) can be determined through close monitoring and are the basis of pest management decisions at each crop stage.

What damage do they cause?

Heliothis (corn earworm and native budworm) burrow into fruit causing entry holes and the potential for internal rotting. Young cutworm caterpillars climb plants and skeletonise the leaves or eat small holes. As the larvae grow

This project has been funded by Hort Innovation, using the strawberry research and development levy and contributions from the Australian Government. Hort Innovation is the grower owned, not-for-profit research and development corporation for Australian horticulture.

Hort Innovation Strategic levy investment | STRAWBERRY FUND | RMCG

they begin to cut through stems at ground level and feed on the top growth of felled plants. Caterpillars that are almost fully grown often remain underground and chew into plants at or below ground level.

How can I protect my crop from these caterpillars?

Start early! Start looking! Record your observations.

Look at incoming runners and make sure they are clean and free of eggs and larvae, before planting. Slugs, cutworms and armyworms attack newly transplanted and emerging crops. Scout young crops regularly: turn over leaves and check for eggs, larvae, and recent damage, and also for the presence of beneficial organisms. Cutworms usually feed late in the afternoon or at night so this is a good time to look for them. By day they hide under debris or in the soil.

Weather monitoring is also critical because temperature affects the generation times of pests and beneficials that have been introduced. Heliothis eggs hatch in 3 to 7 days in warm weather. Larvae are mature after two to three weeks and pupate in the soil. Adults emerge after a further two weeks. The life cycle takes about 5 to 7 weeks in summer.

Scout crops regularly and know what to look for

Pheromone traps can be used to give early warning of the presence of some pests. Finding heliothis eggs should trigger crop protection activity. The appearance of the eggs provides predictive information useful in decision-making about the timing of the crop protection activity. Newly laid eggs are white in colour, brown eggs are nearing hatching, and shiny black eggs are parasitised and unlikely to hatch.

Soil monitoring

For strawberry crops grown during spring-summer, populations of over-wintering heliothis pupae in the soil can be monitored. In one-metre row lengths, dig carefully to expose emergence tunnels and look for pupae in the chambers. The pupae are usually found in the upper 10 cm. If more than one pupa is found in 10 m^2, cultivation to disrupt the pest's life cycle is recommended before planting runners.

Heliothis eggs (photo courtesy Brad Scholz Queensland Department of Primary Industries)

Implementing ICP - understanding the options

Predicting the potential effectiveness of ICP requires understanding of the damage thresholds and the targets of each ICP practice. The ICP approaches that consider both the pest life cycles and the stages at which crops are most at risk, are likely to be more effective.

The first step is to limit use of broad spectrum insecticides and instead use biopesticides and soft option insecticides. The nature of commercially available beneficials and biopesticides and their sensitivities need to be understood to ensure these options are used effectively. Important information on biopesticide application timing, rates and coverage appears on the product label along with additional guidelines, e.g. for *Bacillus thuringiensis* (Bt) applications, avoid overhead irrigation on the treated area for 24 to 48 hours to prevent wash-off; stickers that promote adherence to leaf surfaces and UV light inhibitors may enhance efficacy.

Beneficial organisms, like parasitoid wasps (such as Diadegma, Trichogramma and Telenomus), predatory bugs (such as shield bugs, damsel bugs and assassin bugs), tachnid flies and earwigs readily control eggs and caterpillars. Spiders, lacewings and ladybirds are more generalist predators which can also offer relief against some aphids and thrips. If beneficials are present they can often control low numbers of pests. However, if conditions favour the pests, their

populations may build rapidly and additional control methods (such as narrow-spectrum insecticides, biopesticides or introduced beneficials) may be needed to restore the balance. An excellent source of information on commercially available beneficials is the website (www.goodbugs.org.au).

Biopesticides include *Bacillus thuringiensis* (Bt), a bacterium that is applied as a spray (sold as Dipel® and Delfin®). Bt is effective against all caterpillar species that eat it including heliothis, cutworms and armyworm. Bt spray coverage needs to be complete and it should be applied at egg hatching and young larval stages as it is only effective on small grubs.

Trichogramma - an important egg parasitoid of moth eggs

The **nuclear polyhedrosis virus (NPV)** is another biopesticide. It is a viral pathogen that is species specific, i.e. Armigen® is a formulation of the Helicoverpa NPV and only effective when eaten by heliothis caterpillars. They are most effective against young caterpillars and therefore crop stages where egg laying is most prevalent should be targeted.

Soft option insecticides like spinetoram and related fermentation products of biological organisms (such as Success Neo®) affect the nervous system of heliothis, some thrips and beetle pests. Flubendiamide (Belt®) is specific to caterpillar pests. These technologies are safer to use and better for the environment. However, overuse of any one product may lead to the development of resistance.

Cultural control options for managing chewing and biting pests include:

- Managing weed levels to reduce cutworm populations. Weedy fields tend to attract more moths to lay their eggs. Annual planting and thorough pruning of second-year plantings reduce survival of overwintering larvae.
- Cultivating to a depth of 10cm at the end of winter helps to reduce the survival of over-wintering pupae and reduces the starting population of heliothis before the next planting in spring.

Chemical control options for managing chewing and biting pests can be found on the Australian Pesticides and Veterinary Medicines Authority (APVMA) chemical database (https://portal.apvma.gov.au/pubcris) and permit database (https://portal.apvma.gov.au/permits). Always read the label and observe withholding periods.

SOURCES

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