



Integrated Pest Management in Celery

What is IPM?

IPM stands for 'Integrated Pest Management' and is used to control pests without relying on pesticides alone. With an IPM approach, pesticides provide support for other control measures such as weed management, variety selection, crop rotations and biological control, and the protection of beneficial insects (or allowing naturally occurring insects to survive). Identification of both pests and beneficials is important and there are several guides that growers can use.

Key beneficials

The most common species of beneficial insects found in celery crops are:

- ladybirds which feed on aphids
- brown lacewings which feed on aphids, small caterpillars and moth eggs
- damsel bugs which feed on caterpillars and other soft bodied insects
- *Aphidius*, a small wasp that is an aphid parasite

All of these can be found in very large numbers when pest pressure is high. When pest pressure is low, beneficials are present but there is not enough food supply to support a large population.



Left: Ladybird larva

Below: Damsel bug



All graphics courtesy of Denis Crawford - Graphic Science.

Key pests

Heliothis (*Helicoverpa punctigera* and *Helicoverpa armigera*) are considered the main pests affecting celery crops. Depending on the district, flights of *H. punctigera* usually occur around spring whereas flights of *H. armigera* are more common during summer. Both cause the same type of damage but because *H. armigera* is resistant to many insecticides, it is much harder to kill.

Cutworm, which is often considered an establishment pest, can become a problem when flights occur during summer, much in the same way as Heliothis.

Green peach aphid, which is a vector for celery mosaic virus, is also common, as well as vegetable weevil, which can either breed on weeds or move in from the edge of the crop.



Cutworm damage to celery

Minor pests

A variety of insects exist in any IPM crop, some of which will have no effect and others, such as

The bottom line

- Beneficial insects provide better control than most insecticides, which often target specific pests
- An IPM program greatly reduces the cost of pesticide, even though more expensive products are used (cheaper broad spectrum insecticides kill beneficial insects, which can result in other pest problems)

European earwigs, loopers and thrips, can cause minor damage. Some thrips, including onion, tomato and Western Flower Thrips (WFT) can carry Tomato Spotted Wilt virus (TSWV). The most common thrips found in celery are Plague Thrips. These insects do not carry TSWV and cause little feeding damage, except in extreme cases on very young plants. All these minor pests can be controlled by insecticides, beneficial insects or through cultural control methods.

Other beneficials

Native earwigs, parasitic wasps, predatory mites and predatory beetles are all found in small numbers in IPM crops and when combined, play a significant role in pest management.

Monitoring

For IPM to be successful, regular, usually weekly, monitoring is required. This is done by going into the crop, looking for pests and beneficial insects and then making a decision on what, if any, action needs to be taken. Monitoring allows growers to target the most vulnerable life stage of a pest and discover when an insecticide is most effective. Monitoring will also tell a grower if an insecticide, which can sometimes fail because of weather conditions, spray equipment or the expiry date of the chemical, has worked.



Brown lacewing larva attacking aphids

How is monitoring achieved?

On a farm, monitoring sites are chosen according to vulnerable areas and age of planting. Three sites are chosen as representatives of each age group of plants, young (two weeks old), middle and old (near harvest). Fifty plants from each site are selected and checked on the outer leaves for moth eggs, the lower leaves for aphids or in the

centre for grubs, as well as for beneficials. Suction samples that will collect anything living on the leaves, including beneficials, are taken from the younger plants. Pheromone traps are also used to count the number of moths present.

These methods, if done weekly, will monitor the number of beneficials, the flight of aphids or moths and tell the grower if aphids are breeding, if an insecticide has worked, if a problem is throughout the crop or just the edge, or if the pests are under control.

How are decisions made?

Growers need to assess the information collected through monitoring, along with other factors such as the age of the crop or growth stage of the plants, weather conditions, age of pest, withholding periods and crop value. From this, the relative number of pests to beneficials needs to be determined, and the likelihood of damage, given all of the above variables.

What is the role of pesticides?

Pesticides in an IPM program should support other non-chemical control measures and be used in a way that will have the least impact on other beneficial insects and mites. Large flights of pests can overwhelm the resident population of predators and parasites. Using a selective insecticide that will reduce the number of pests allows the beneficial insects to “catch up”, while avoiding damage to the crop. This approach will not kill the beneficial insects, which will eventually reinvade the sprayed areas.

In general, the herbicides and fungicides used in celery production are acceptable in an IPM strategy. However, growers are warned that frequent use of mancozeb could kill populations of beneficial mites.

Further Information

For further information contact IPM Technologies on (03) 9710 1554

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Jessica Page and Paul Horne
IPM Technologies

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VEGEnotes is coordinated, edited & printed by:
ARRIS Pty Ltd, ph 08 8303 7247 fax 08 8303 6752

Level 1, 50 Carrington Street
Sydney NSW 2000 Australia
Telephone (02) 8295 2300
Facsimile (02) 8295 2399
www.horticulture.com.au



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