



FEBRUARY 2026

INSECTICIDE RESISTANCE

Managing the risks

What is insecticide resistance?

How insecticide resistance develops

The repeated use of insecticides with the same active ingredient or products from the same insecticide class or group can cause changes to the genetic makeup of the target pest(s), selecting for individuals that do not get affected by the insecticide. They develop insecticide resistance.

The surviving individuals pass the genes of resistance to the next generation. This means that subsequent uses of the insecticide or insecticide class increase the proportion of less-susceptible or resistant individuals in the pest population. In the end, the entire population is resistant to the insecticide or insecticide class.

KEY MESSAGES

- Consider planting field margins or use cover crops that attract and house beneficial insects. Pots with annual plants that attract beneficials can be placed in greenhouses.
- Plantings of permanent native vegetation close to greenhouses or paddocks are effective. These are often called insectaries.
- Do not use insecticides with the same active ingredient or from the same insecticide group/class repeatedly to reduce the risk of insecticide resistance developing. Use an integrated approach, including beneficial insects, to reduce the sole reliance on the resistance risk insecticide group 28.
- Adopt cultural control methods such as slashing to reduce the number of host weed species for pests and deploy insecticide traps.



Figure 1 shows how repeat application of the same insecticide or insecticide group increases the number of resistant individuals in the pest population.

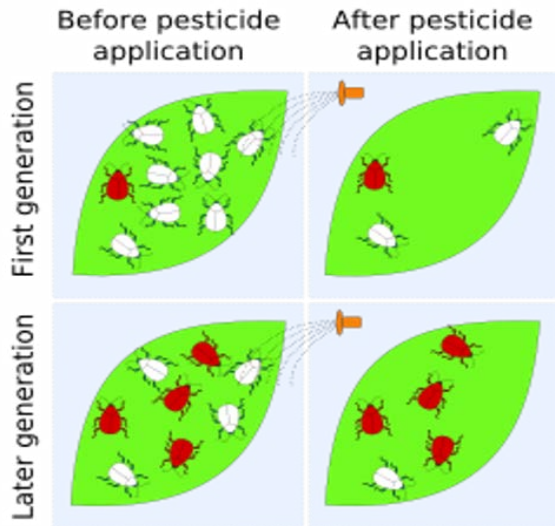


Figure 1: Plant Protection Central Research Institute, Gayret Mah.FSM Bulvari, Yenimahalle, Ankara Turkey

Insects with a short life cycle (2-4 weeks) are more likely to develop resistance. Worldwide, more than 500 species of insects, mites and spiders have developed some level of insecticide resistance.

FOR BROCCOLI AND CAULIFLOWER CROPS

The biological control method is to use diptera wasps in conjunction with one spray each of flubendiamide, spirotetramat and *Bacillus thuringiensis* to control diamondback moth at a similar level to a conventional spray program.

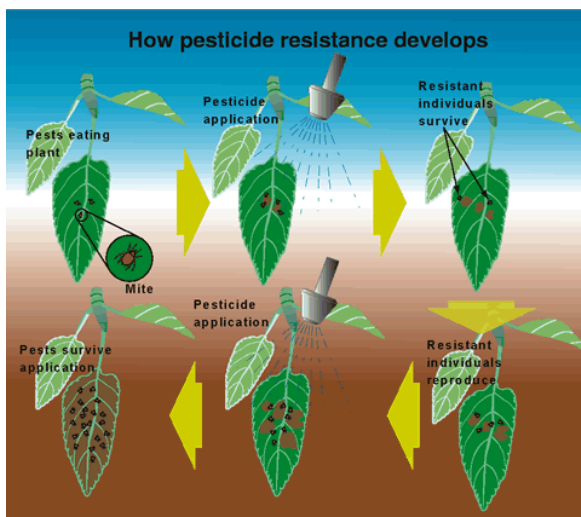


Figure 2: How pesticide resistance develops, Michigan State University
canr.msu.edu/grapes/integrated_pest_management/how-pesticide-resistance-develops



Figure 3: Sourced from IPM Technologies Pty Ltd. A cabbage crop which has severe diamondback moth damage, showing insecticide resistance after receiving multiple insecticide applications before group 28 insecticides were introduced.



Managing insecticide resistance – biological, cultural and chemical control

Biological control to complement chemical control

A reduction in the reliance of group/class 28 insecticides containing active ingredients such as flubendiamide, spirotetramat and *Bacillus thuringiensis* – which are important for growers as they are ‘soft’ on beneficial insects – can be achieved by using an integrated approach. The use of beneficial insects such as hoverflies, lacewings and parasitic wasps, which act as predators to pest species including whitefly, diamondback moth and Heliothis, can be used to complement group 28 chemicals. This approach can reduce the risk of resistance to group 28 chemicals which are a preferred option to active ingredients which are harmful to beneficial insects including: spinetoram, emamectin benzoate, indoxacarb, pirimicarb, fipronil, chlorpyrifos and alpha cypermethrin.

Cultural control

Pheromone traps or trap crop plantings can be used to attract certain insects and kill them.

Another application of pheromones is the confusion method or mating disruption. Here, a high concentration of artificially produced pheromones is used. This makes it impossible for the males to follow the pheromones of the females, thus hindering the reproduction of the pest.

Cross-resistance

Cross-resistance means resistance to a particular insecticide’s active ingredients results in resistance to other insecticides. To avoid cross-resistance, different chemical groups or classes must be rotated in spray applications to reduce the number of times active ingredients in the same group are used. Cross-resistance is usually present among active ingredients sharing similar binding target sites or similar detoxifying pathways in the target pest/s.

WHAT DOES THE LABEL TELL ME?

Information on resistance management is present on herbicide, insecticide and fungicide labels. The text box below provides an example. *Source: APVMA PubCris*

GROUND APPLICATION

Brassica Crops

Thorough coverage of the target area is essential. Apply in sufficient water. Use suitable application parameters (nozzles, pressure, boom height, speed, etc.) to ensure thorough and even coverage.

Application using rate per hectare

Thorough coverage of the target area is essential. Adjust water volumes according to the crop growth stage.

Application using rate per 100L (Dilute Spraying)

- Use a sprayer designed to apply high volumes of water up to the point of run-off and matched to the crop being sprayed.
- Set up and operate the sprayer to achieve even coverage throughout the crop canopy. Apply sufficient water to cover the crop to the point of run-off. Avoid excessive run-off.
- The required water volume may be determined by applying different test volumes, using different settings on the sprayer, from industry guidelines or expert advice.
- Add the amount of product specified in the Directions for Use table for each 100 L of water. Spray to the point of run-off, to a maximum of 1000 L/ha for vegetable crops.
- The required dilute spray volume will change and the sprayer set up and operation may also need to be changed, as the crop grows.



USEFUL RESOURCES

- Farm Biosecurity
farmbiosecurity.com.au/biosecurity-at-your-fingertips
- Australian Pesticides and Veterinary Medicines Authority (APVMA) Gazette which is published fortnightly and contains details on registration of new agrichemicals
apvma.gov.au
- Soil Wealth ICP webinar – Green peach aphid resistance management with Dr Siobhan de Little
soilwealth.com.au/2017/08/green-peach-aphid-resistance-management-with-dr-siobhan-de-little
- Soil Wealth ICP webinar – Managing pesticide resistance in vegetable crops with Dr Paul Horne
soilwealth.com.au/2016/10/managing-pesticide-resistance-in-vegetable-crops-with-dr-paul-horne

