

# IPM & SPRAY MANAGEMENT

## INTEGRATED PEST MANAGEMENT

**Integrated Pest Management (IPM), or Integrated Crop Protection (ICP), is an effective combination of chemical, cultural and biological methods to keep weeds, insect pest numbers, disease pressure, and other crop production problems low enough to reduce the risk of significant economic loss. It aims to do this by preventing pest introduction to the production system and interrupting pest lifecycles at their most vulnerable stage. It compliments or provides practical alternatives to conventional pest control that often relies on synthetic chemicals applied on a calendar basis.**

### Key principles of IPM

#### Monitor

- Regularly for pest and beneficial organisms.
- Climatic conditions including current and future.
- Understand pest biology, control options and site history to optimise method e.g. pest hotspots, entry points and life cycles.
- Keep records.

#### Prevent

- Aim for prevention over eradication/cure where possible.
- Gain confidence in IPM practices through education, observation, and action.

#### Intervene

- Set action thresholds and only implement control if supported by monitoring.
- Keep records.



### What is a pest?

Pests in horticulture are any organism that causes damage or loss or pose a risk to a crop. This includes insects, mites, diseases, weeds, nematodes, invertebrates (e.g. snails and slugs) and animals (e.g. mice and rats).

### Management options (Prevent or Intervene)

- Implement management in a strategic and targeted manner.
- Minimise use of broad-spectrum products and calendar spraying where practical/possible.

IPM management practices are broadly classified:

- **CULTURAL** practices are farming activities that aim to avoid and suppress. e.g. crop hygiene, resistant cultivars, crop rotation and amelioration of soil.
- **BIOLOGICAL** practices make use of natural enemies. e.g. providing habitat and food sources to attract natural pest predators or release of beneficial organisms that prey on pests.
- **CHEMICAL** practices use synthetic or biological insecticides, fungicides and herbicides to sustainably complement other practices and avoid pest resistance e.g. rotating sprays across different Modes of Action (MOA) groups, or lures using synthetic or organic products.





## SPRAY MANAGEMENT

### Is your spray rig fit for purpose?

To answer this, you should evaluate 3 key principles of spray management:

- spray timing
- equipment calibration and
- spray coverage.

This covers the application of products including fungicides, insecticides, herbicides, liquid fertilisers, and other amendments.

By getting the correct overlap between these you'll have the best chance of achieving effective spraying, reduce off-target impacts and reduce costly inputs.

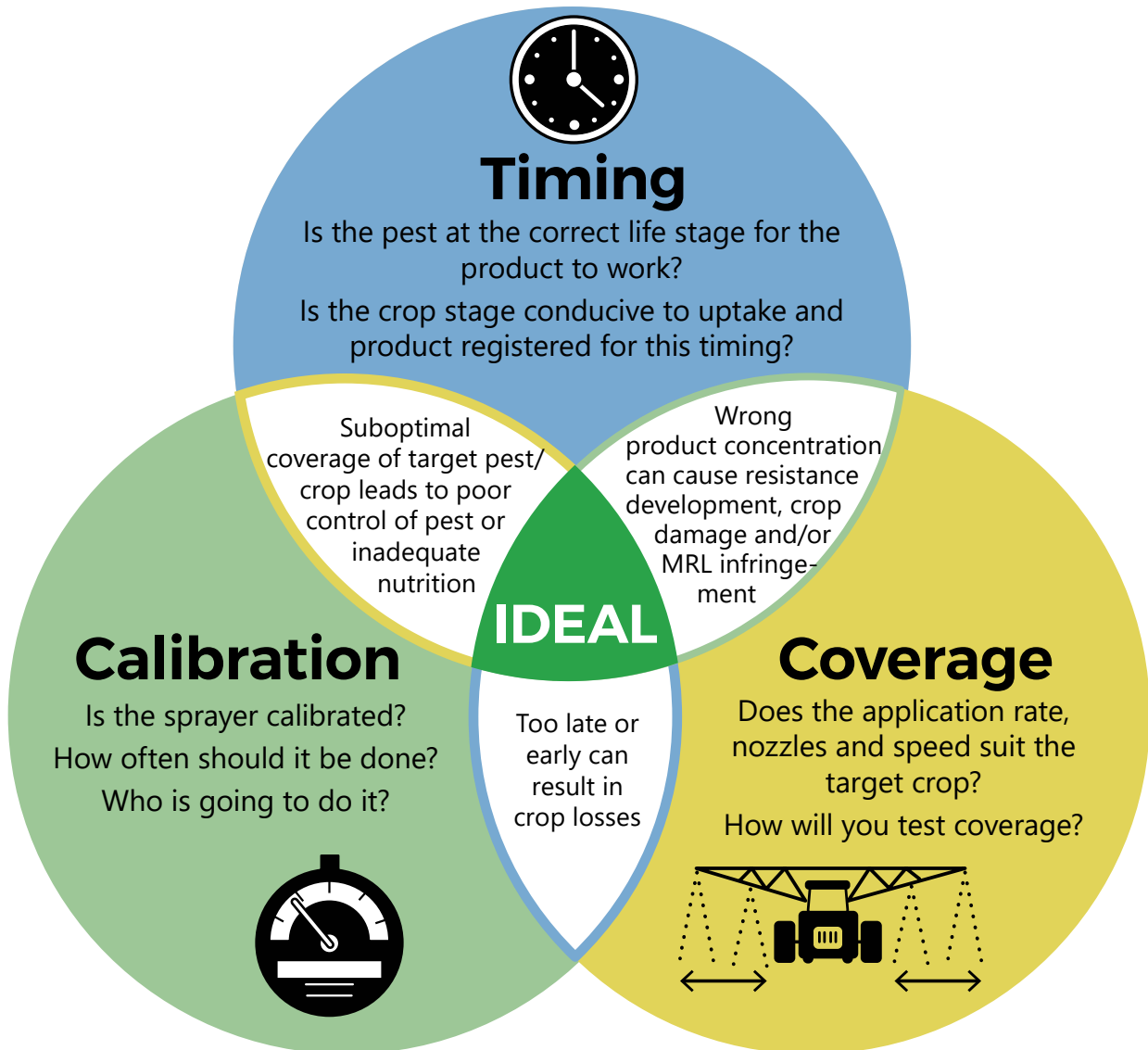
## LEGAL REQUIREMENTS

There are many legal requirements for spraying, these include:

- Appropriate certification and training of spray equipment operators and consultants.
- Storage and washdown facilities.
- Equipment calibration and spray records.
- Minimising spray drift and product run-off.
- Complying with with-holding periods, to avoid maximum residue limit (MRL) issues.



**Always follow the directions on the product label. If you don't know ASK, better to find out now than wait to be fined later! This also ensures the safety of yourself and your staff.**



## Correct Timing



Requires effective monitoring of crop development and pest cycles.

### Is the pest at the correct life stage for product to work?

Many products are only active on certain pest lifecycle stages. If you use a product outside of this susceptible period, you will not achieve effective pest control. Understanding how a product works is important. Also ensure the product is registered for use and comply with withholding periods.

**Example:** Abamectin used for pests like mites, sucking insects and leaf miners, needs to be ingested. Once ingested it will attack the nerve system to kill them. If you mostly have leaf miner pupa in your crop, you won't achieve control as they are not feeding. Remember, eggs can't eat! You need to postpone treatment until they are close to hatching or have hatched.

### Is the crop stage conducive to uptake and registered for this timing?

Applied nutrients are most effective when crop development is optimal for uptake.

Some are best applied to the soil/growth medium for root absorption whilst others should be applied to foliage. Do your research and talk to local agronomists to get advice.

## Calibration



### Is the sprayer calibrated?

All products must be applied at specific application rates to ensure effective pest control or nutrient inputs for optimal growth and to comply with legal residue limits in produce.

To enable this, the water output of a sprayer must be calibrated and recorded. This includes specific machinery, sprayer equipment, speed, and nozzles.

### How often should it be done?

A formal calibration should be done at least annually or as per manufacturer's instructions and immediately after replacing nozzles. This is also a good time to complete other maintenance tasks like servicing the pump, cleaning, and checking lines and nozzles, and replacing worn out components.

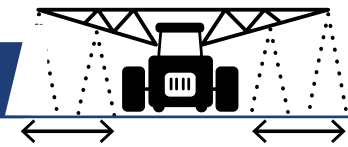
Effective operation must also be checked before and during each use. Basically, this means if you run out of mix before the end, something is wrong and should be investigated immediately. If you have a lot left over at the end, again, something is wrong.

### Who is going to do it?

All businesses that sell and service sprayers should be able to provide a calibration service or give contact information for private providers. After initial setup you may be able to complete your own calibrations, but staff must be appropriately certified and trained. When buying new equipment, an on-farm calibration service often comes with it. If buying second hand, get professional advice to determine its suitability for your farm if you don't have the appropriate skills and experience. Also ensure second hand machinery complies with current safety requirements.



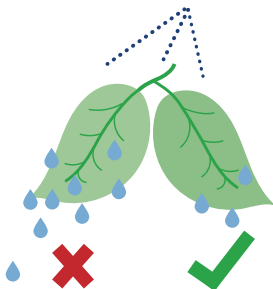
## Coverage



### Application Rate

Is often specified on product labels but must also be assessed on your crop to ensure all plant parts are adequately covered.

If using L/100L it is critical to only spray to the point of run-off, having water raining off plants afterwards is too much! It not only wastes expensive product, it leads to excessive run-off into the environment.



### Speed

Machinery can vary in recorded speed (i.e. what's on your speedo) and actual speed. Such as when different tyres or modifications are made post-manufacturing. Keep this in mind when switching spray units between machines.

Faster is not always better, particularly in crops with high leaf density like tomatoes.

#### SPEED CHECK

1. Measure out a set distance e.g. 100m
2. Time how long it takes to travel the distance
3. Repeat 2-3 times and take an average of time

#### Calculate speed example:

100m in 1.5min (90sec) = 1000m/15min  
= 1km/15min  
= 4km/hr

### HOW WILL YOU TEST COVERAGE?

Options include kaolin clay, dyes and indicator paper.



### Nozzle selection

Nozzle and pump water output and operating pressure

- When setting up a sprayer or checking your existing system, do the sums. The combined nozzle output should not exceed 75% of the pump capacity<sup>1</sup>.

### Nozzle types

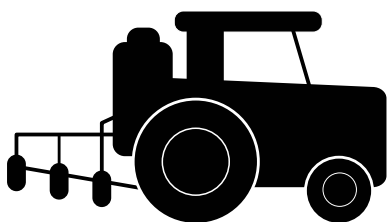
- Many product labels specify acceptable droplet sizes, ignoring these is not only illegal but it can negatively affect pest control.
- Other considerations are spray pattern and drift potential.

### Positioning

- This includes the nozzle spray angle, distance between nozzles, distance to the crop and air direction (if using an air-based system).
- Too low or close to the target will leave gaps, reducing control efficacy. Too high will give excessive overlap and therefore overdosing which wastes expensive products, can damage the crop and/or leave behind excessive chemical levels in soil that will leach into the environment.

#### IMPORTANT

Start outside area and don't stop or slow down until past the end. This will ensure you are at a constant speed so the measurement is accurate.



START



STOP

Prepared by Dr Karina Griffin for SFIRP-BC-24 April 2024

#### References and other useful resources

- » Australian Macadamia Society 2022. Macadamia Grower Toolkit, First Edition.
- » <sup>1</sup>North Dakota state University 2018. Spray Equipment and Calibration (AE73). [www.ag.ndsu.edu/publicationS/crops/spray-equipment-and-calibration](http://www.ag.ndsu.edu/publicationS/crops/spray-equipment-and-calibration)
- » Spraying Systems co. (cited 28/03/2024). Technical Reference. 1.800.95.SPRAY. [www.spray.com/en-au/-/media/dam/industrial/usa/sales-material/catalog/cat75hyd\\_us\\_tech-reference\\_a.pdf](http://www.spray.com/en-au/-/media/dam/industrial/usa/sales-material/catalog/cat75hyd_us_tech-reference_a.pdf)
- » Crop Science Australia 2019. Understanding the point of run-off when spraying [www.crop.bayer.com.au/news-and-insights/news/news-container/2019/10/07/05/36/growersedge-runoff](http://www.crop.bayer.com.au/news-and-insights/news/news-container/2019/10/07/05/36/growersedge-runoff)

Title photo: Denis Doukhan

This resource has been prepared by the Building Capacity and Resilience within the NSW Vegetable Industry project, funded by the Australian and NSW Government's Storm and Flood Industry Recovery Program with support from AUSVEG.



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