

NURSERY PAPERS

NOVEMBER
2019

Creating Personalised Management Plans for Key Nursery Pests

Management of pests (insects, mites and disease-causing pathogens) will always play a significant role in the production of nursery stock. This nursery paper will assist production managers to develop a personalised plan to deal with the most significant pests relevant to their business.

There are seven simple steps to develop the plan. The first three steps are common to all plans and include establishing physical boundaries in the nursery, evaluating current monitoring practices and prioritising pests. The remaining four steps are completed for each high priority pest.

WHAT ARE THE BENEFITS?

Developing an initial pest management plan is relatively simple, and provides a range of benefits that will:

1. Reduce costs and minimise unsaleable stock by facilitating the management of problems at an early stage
2. Highlight cost effective strategies through recording successful and unsuccessful management practices
3. Provide quality assurance to clients
4. Provide standardised information for new staff/manager training
5. Facilitate the uptake of new approaches to pest management e.g. fertilising, irrigation, potting regimes
6. Provide historic records to assist in budgeting for pest management
7. Encourage managers to be proactive, leading to a reduction in pesticide use and healthier plants overall.



Source: Queensland Department of Agriculture and Fisheries (QDAF)



STARTING THE PLAN

Ideally, pest management plans should be recorded electronically. This allows for easy editing, the addition or sharing of information, and the security of back-ups. Most word processing and spreadsheet programs are suitable. In particular, Google Docs/Sheets or similar cloud based systems are beneficial as multiple users can access them as required.

STEP 1.

DEFINE AREAS WITHIN AND AROUND YOUR NURSERY

This step is important when developing management plans for specific areas within the nursery. List the physical parameters of each growing area, including a description of the irrigation system, shade or sun exposure, prevailing winds, microclimates of each area and sub-surface parameters (e.g. weed matting over a certain depth of gravel and when it was installed). It's also valuable to document specific aspects of growing areas that require specific maintenance.

STEP 2.

COMPILE A LIST OF IMPORTANT PESTS

List pests or pest groups that affect your nursery and rate them based on the frequency and severity of damage. In most cases, pests or pest groups that damage a relatively large subset of plants grown in the nursery are more important. However, some plants are very susceptible to certain pests which do not affect other plants. These pests may also warrant their own management plan, particularly if the plant species is a valuable crop line.

It may also be valuable to list pests that occasionally impact the nursery, to ensure that the monitoring regime is sufficient to detect all pests and, thus, minimise economic damage.

STEP 3.

ASSESS MONITORING PRACTICES

There are two basic styles of monitoring, passive and active. Passive monitoring occurs when staff are completing daily nursery activities, like weeding and moving stock, and notice something is wrong with a plant or crop line. While passive monitoring is useful, it is haphazard, as busy staff may miss other aspects of nursery production. Activities that focus on plant health (e.g. selecting stock) are more likely to detect problems due to the natural emphasis on healthy plants, with unhealthy plants also noticed during this process. Unfortunately, problems at this late stage are costly; increasing production time, taking up space and requiring management actions to ensure plants are of saleable quality.

Active monitoring involves specifically assessing and recording plant health including, but not limited to, the presence of pests, so that early management actions can be implemented to limit stock loss or dispatch delays. This includes a number of methods, such as:

- Direct observations
- Plant beating to monitor insects and mites
- Observing traps (e.g. sticky traps)
- Using data recorders (e.g. temperature, soil moisture, pH, EC.)

Many of these are described in this online ***thrips pest management plan***. For more information, there are nursery resources available on best practice monitoring on the nursery production Farm Management System (FMS) **website**.



Psyllid resistant varieties are available. Once damaged, leaves will not recover (QDAF)



STEP 4.

SUMMARISE PEST LIFECYCLE AND BIOLOGY

Knowledge of the biology and lifecycle of pests allow proactive and targeted management. Given the diversity of organisms, it is not possible to consider all aspects here. However, considerations include:

- What is the known host range?
Are there known resistant or tolerant varieties/species that can be grown instead of susceptible ones?
- During what months/seasons is the pest active?
- Where is the pest when it's not damaging plants? Does it persist in crop debris, weeds etc?
- Where are eggs laid or spores produced?
- How many generations/infections are there per year?
- How does it get into the nursery?
- Where does it pupate/feed/rest/survive/overwinter?
- For insects, where do immature stages go after hatching? Larvae that have just hatched are the easiest to manage, and damage plants the least.
- Given the information above, will the current monitoring practices, described in step 3, be sufficient to detect the pest before damage occurs?

You can use the first section of the **Pest Management Plan Template** to collect and store information on each significant pest or pest group. Each pest goes on a separate worksheet.

STEP 5.

LIST MANAGEMENT OPTIONS

Review available literature like production nursery **factsheets**, **pest management plans** and other resources at your disposal (which may include those found in Step 4) and then list all of the potential management options available to you.

There are many different aspects to consider when managing each pest, therefore, use the **Pest Management Plan Template** to prompt and record the information. This will include information on:



A small-scale trial investigating the efficacy and potential phytotoxicity of a pre-emergent herbicide. Untreated trays (left), treated trays (right). Source: QDAF

- How to prevent pests coming into the nursery and limiting their spread (quarantine/isolation section)
- Recording resistant or tolerant crops and varieties, or perhaps crop lines that can be used as a suitable replacement (varietal management)
- Management actions that passively reduce pest pressure through cultural practices (cultural and physical management)
- How to detect the pest (monitoring and traps sections)
- Biological control, including naturally occurring predators and those that are commercially available (biocontrol management)
- Pesticides available including rotation, resistance, resistance management and their effect on predators (pesticide management).

Include any particular conditions required to ensure optimal growth of impacted plant species. Healthy crops including those grown under optimal conditions are more likely to resist infection and tolerate a higher amount of damage.

Include all management options available to you, even those that may be impractical or require a large capital investment, as they can be reconsidered later. It is recommended to keep an open mind; be creative in the way that management options can be applied to your business.

Some management actions, or combinations of actions, may not be possible to implement all at once. In these situations, break down the process

into smaller, more achievable steps. This also provides an opportunity to evaluate how well the management actions are working (step 6). Keep in mind that it can take several years to optimise new management actions, particularly if large changes have been made. Businesses that have stopped relying on pesticides and instead manage pests within an Integrated Pest Management (IPM) framework often indicate that this is the case; the benefits take time to be realised, but are well worth the effort.

STEP 6.

EVALUATE MANAGEMENT OPTIONS

It's important to establish management actions that deliver consistent results. Monitoring is critical, and provides reliable data to evaluate success. Small-scale trials are also valuable, such as applying a product to certain plants or growing plants under different conditions, to improve aspects of production and pest management. However, always leave some plants untreated. If you apply the condition to all plants, you have no frame of reference to observe the effect.

Monitor and record the results. If results are inconsistent, not convincing or appear 'too good to be true', repeat the trial. This can provide confidence that the new management option is repeatable and provides an economically viable option for your business.

STEP 7.

UPDATE AND REVIEW THE PLAN

Just like pests, your management plan is a living document. Add comments and observations on a regular basis recording successful actions, sub-optimal factors and alternatives you would like to try next time.

It is also recommended to keep up-to-date with new generation pesticides (labels and **minor use permits**) that may have relatively low impact on predators, parasites and pollinator species. Biocontrol agent producers continue to make more products available to manage a wider range of pests. Newer technologies are also available (and now more affordable) which can monitor many aspects of nursery production and alert you to critical conditions, to take action and mitigate risk.



Source: QDAF

CONCLUSION

Pest management plans are useful documents that can improve plant production, reduce pest damage and crop loss. The FMS website has several resources that can assist in creating the plan. While the process in completing a plan is relatively simple, making significant changes in production can be challenging. Take part in workshops, talk to growers and industry experts, and get involved in industry development projects. These small steps will keep you moving towards your goal.

The process described here, particularly with regard to small-scale trials, can be applied to any aspect of crop production. This paper has focused on pest management and fits strongly within an Integrated Pest Management (IPM) framework. However, given pests are influenced by many aspects of production, it can be helpful to use this same process for other parts of your business. As such, the concept of IPM continues to grow in both industry acceptance and usage.

ACKNOWLEDGMENTS

This nursery paper was written by Andrew Manners and Fiona Giblin (Department of Agriculture and Fisheries, Queensland – DAF). It has been produced as part of the nursery levy and Hort Innovation funded project 'Building the resilience and on-farm biosecurity capacity of the Australian production nursery industry' (NY15002).

LINKS TO RESOURCES

Nursery production Farm Management System (FMS): <http://nurseryproductionfms.com.au>

Thrips Management Plan: <http://nurseryproductionfms.com.au/pests-diseases-weeds/pest-and-disease-management-plans/>

Pest Management Plan Template: <http://nurseryproductionfms.com.au/download/pest-management-plan-template/>

Pest and disease facts sheets: <http://nurseryproductionfms.com.au/pests-diseases-weeds/pest-and-disease-fact-sheets/>

Minor use permits: <http://nurseryproductionfms.com.au/minor-use-permits-mups-for-pesticides/>

NGIQ biosecurity, pest & disease resources: <https://www.ngiq.asn.au/resources/technical-information/biosecurity-pest-disease/>

PAST EDITIONS OF NURSERY PAPERS ARE AVAILABLE ONLINE on the Nursery & Garden Industry Australia website
http://www.ngia.com.au/Section?Action=View&Section_id=46