

NURSERY PAPERS

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REDUCING RELIANCE ON PESTICIDES

Growers have long relied on pesticides to protect their crops, but long term options for new chemistry are diminishing due to decreased investment by chemical companies.

The nursery industry has secured minor use permits for appropriate pesticides to be used in the near future, but these are a short term solution.

With this level of use comes more exposure to continual reviews by government regulators, and adverse effects can mean restricted use or the chemical may be deregistered altogether.

This Nursery Paper looks at the need for nurseries to transition from using pesticides to applying Integrated Pest Management (IPM) principles to future-proof production.



Crop monitoring requires a systematic approach and a thorough understanding of pest biology.

WHY TRANSITION TO IPM?

Growers apply pesticides (insecticides, herbicides, fungicides etc) to ensure their crops are protected and remain productive, especially when markets expect low cost, high quality product.

Crop management systems have relied on pesticides as they are perceived as being cheap, require less knowledge of pest biology for decision making and provide effective control, especially when pest levels are harmful to the crop.

Due to the shortfall in new pesticides, NGIA and Hort Innovation have gained approval for a number of minor use permits from the APVMA for pesticide chemistries that would not otherwise be registered for nursery production.

Securing these minor use permits ensures that industry has legal access to alternative modes of action and choice when it comes to managing pesticide application programs.

The temptation is that these products are used preventatively and applied as calendar events. This leads to poorly timed sprays, resistance through overuse, and wasted sprays if the targeted pest is not correctly identified, leading to additional costs in time and money.

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THE DIMINISHING NUMBER OF PESTICIDES

Long term options for new chemistry to control pests and diseases in the nursery industry are diminishing, due to decreased investment by chemical companies.

The reasons for this are

- costs running into millions of dollars for development and registration
- time to develop – it takes approximately 11 years of research and development to reach commercialisation
- risk on return if the product is forced off the market through risk of harm to ecology and human health.

Market opinion that can influence the use of pesticide options regardless of registration will only add further pressure into the future.

Confronted by all of these issues, growers' exclusive dependence on pesticides for crop protection will need to change.

Transitioning to a more sustainable and rigorous systems-based approach incorporating Integrated Pest Management (IPM) principles will help to ensure a secure future.

IPM uses regular monitoring to determine if and when treatments are necessary to control pest and disease.

Treatments can be based on a combination of physical, chemical, cultural and biological strategies to keep pest numbers low enough to prevent economic plant damage.



Additionally, this approach has an adverse effect in removing non-target beneficial organisms from the production environment, creating one that is more favourable to the pest.

As a result, what is normally considered a secondary or tertiary pest becomes a primary pest due to the lack of natural control.

A classic case of this are the common phytophagous or plant feeding mites, which were one of the reasons that Integrated Pest Management (IPM) was developed back in the 1960's.

Unfortunately, many growers rely heavily on chemical strategies alone as they are more familiar with them and regrettably do not integrate the other tactical components, which then restricts their ability to reduce the amount of chemicals being applied.

Other reasons for the development of resistant pests are not enough focus on scouting and monitoring, not formulating a plan for pest, disease and weed management, and failing to create a clean environment for biocontrol agents to be effective.

IPM: BE PROACTIVE, NOT REACTIVE

If there is to be a swing towards implementing IPM tactics – scouting and monitoring, creating a clean environment for biocontrol agents, and having a plan to manage pests, disease and weeds – growers will need to shift their thinking on crop protection from reactive pest control to a strategy of proactive pest management.

Rather than observing pests rise to thresholds before acting, growers must employ tactics at key stages early enough to prevent pests reaching actionable levels at all.

Table 1 (see next page) highlights a more recent interpretation of IPM principles.

This includes augmenting natural enemies, combining alternative methods to be more effective, selecting products that are more compatible with



Regular monitoring can prevent a small problem becoming a larger issue.

beneficials, and timing and splitting applications of pesticides to reduce use.

There is a strong emphasis on nursery growers to consider all available plant protection methods and from the first three IPM principles, to include a combination of methods that work in unison.

This is followed by integrating appropriate non-chemical measures and using plant protection products at levels that are both economically and ecologically justified.

Even when using pesticides, it should be done in a manner that causes the least amount of disruption to agro-ecosystems, encourages natural pest control mechanisms and maintains the growth of a healthy crop.

Assess and evaluate the effectiveness of the crop protection measures, rather than concentrating solely on yield and total pest absence.

When using these principles, it is also important to consider how any potential IPM strategies will fit into your existing nursery crop system and still be cost effective.

GET A HEAD START ON IPM

For many growers, trying to implement an IPM systems approach that is biologically based requires intensive knowledge in the areas of crop type, growth stages susceptible to damage, the biology of the pests, their ecology and where they will thrive, as well as production practices that can influence their prevalence.

Also, as we are trying to introduce live organisms for prevention management, adopting a mantra of 'start clean and stay clean' is paramount, hence the focus on prevention and suppression at the beginning.

Fortunately for nursery growers such a system already exists and can be implemented by adopting the best management practices (BMP) of the Nursery Industry Accreditation Scheme Australia (NIASA) program and the systems approach of the BioSecure HACCP program.

This will form a solid framework for establishing the principles of prevention, suppression, monitoring and decision-making.

The preventative steps are taken at all critical stages of production and include good sanitation practices and a monitoring program robust enough to identify any issues early.

This gives growers the option to consider remediation via a combination of non-chemical means, such as predatory mites and pest repelling/attracting plants for suitable control.



Inspection.



Table 1: Summary of Integrated Pest Management Principles

Principle steps	Strategy or tactics to consider by stage to achieve control. Source: Barzman	NIASA and BioSecure HACCP Requirements, Procedures and Records
Principle 1 – prevention and suppression	<ul style="list-style-type: none"> – Combination of agronomic levers applied synergistically – Focus on trying to deal with a multi-pest approach. – Creating a system where less likely to experience presence of pests and/or reduction of incidence or severity of their impact. – Examples of this are: hygiene, certification of suppliers; control of fertilisation; crop residue management; trap crops that attract pests and provide refuge for natural enemies 	<ul style="list-style-type: none"> – NIASA production and facility hygiene requirements – Cleaning disinfestation/sanitation – Approved supplier register – Materials import inspection – Water disinfestation – Irrigation water quality – Growing media disinfestation – Growing media specification
Principle 2 – monitoring	<ul style="list-style-type: none"> – Monitoring for pests and natural enemies at regular intervals – Utilise early warning forecasting or predictive modelling 	<ul style="list-style-type: none"> – Authorised inspection by a competent person – Crop monitoring – Weed monitoring – Site surveillance – Sticky trap monitoring – Indicator plant monitoring
Principle 3 – decision based on monitoring and thresholds	<ul style="list-style-type: none"> – Action thresholds are fine for insects but more difficult to use for weeds and diseases – Decision support systems need to be based on decisions and rules of entire IPM principles – Seek advice from professionally qualified advisors 	<ul style="list-style-type: none"> – NIASA pest, disease and weed management plans
Principle 4 – non-chemical methods	<ul style="list-style-type: none"> – These include mating disruption, augmenting natural enemies and use of effective agronomic, cultural and physical control methods – Mindset that seeks to implement synergies gained from combining alternative methods that are considered ineffective individually 	<ul style="list-style-type: none"> – Biological organism release
Principle 5 – pesticide selection	<ul style="list-style-type: none"> – Select products more compatible with beneficial natural enemies – Selecting biopesticides due to their reduced level of residual persistence – Biopesticides should not be considered as a one-for-one replacement of chemical pesticides 	<ul style="list-style-type: none"> – Biological organism release
Principle 6 – reduced pesticide use	<ul style="list-style-type: none"> – Reducing pesticide use in terms of application frequency, spot spraying or dose reduction 	
Principle 7 – anti-resistance strategies	<ul style="list-style-type: none"> – Major driver for the implementation of IPM – Combining pesticides with different modes of action, application timing and splitting applications 	
Principle 8 – evaluation	<ul style="list-style-type: none"> – Assess the effectiveness of the crop protection measures implemented. – Do not base it against just yield and total pest absence 	<ul style="list-style-type: none"> – Materials despatch inspection – Corrective action report



HOW DO THE PROGRAMS CATER FOR A START TO IPM?

NIASA is a national scheme providing guidelines for production nurseries to operate under BMP and commit to continuous improvement, whereas BioSecure HACCP is a program designed to assist growers determine their current and future pest, disease and weed risks, and enable them to meet their biosecurity obligations on farm.

Both programs have systematic, specified practices and procedures that are synergistic with an IPM systems approach and both are externally audited to ensure compliance to the standards.

They each support the grower in identifying opportunities for any farm improvements and efficiencies to enhance profitability.

Table 1 maps out many of the protocol and procedure requirements the grower must meet under both programs and illustrates how they relate directly to the framework of the robust IPM principles that add to the resilience of pest management.

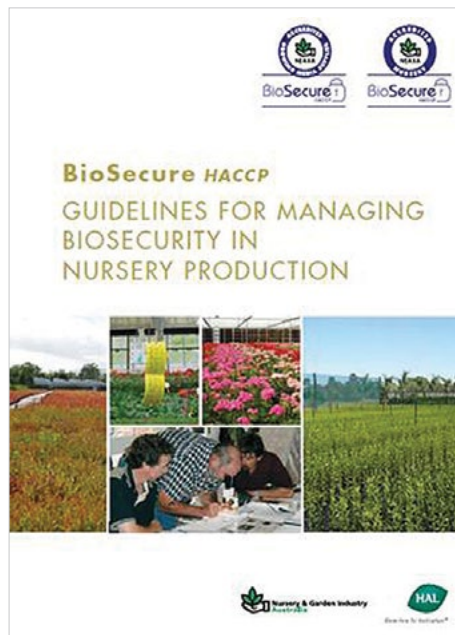


OPPORTUNITY TO IMPLEMENT PRINCIPLES OF IPM

As seen in Table 1, the Nursery Production Farm Management Systems (FMS) programs provide direction and are structured to give growers a solid foundation and processes to start IPM, as well as delivering subsequent benefits that include interstate market access.

Once this IPM foundation is implemented and operational, the next stages to focus on are the principles 4 to 7. This is where more knowledge and understanding is required for growers to be comfortable with introducing IPM-compatible control options for biocontrol agents, such as beneficial nematodes and entomopathogenic fungi.

This reduces reliance on pesticides for pest management.



The industry BioSecure HACCP program is an integrated systems based approach to managing pests in production nurseries, and builds upon IPM approaches.

LINKS TO RESOURCES

For further information go to the Nursery Production FMS website www.nurseryproductionfms.com.au and contact biosecure@ngia.com.au for accreditation information.

To find out more on IPM and pest and beneficial organism biology and ecology, search the NPFMS site for information via publications such as 'Integrated Pest Management in Ornamentals Information Guide'.

The site also contains fact sheets, videos and webinars to assist in the development of a pest management plan and is complemented by the site Pest-ID www.pestid.com.au for identification of pests.

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