NURSERY PAPERS
NOVEMBER 2018

INTEGRATED PEST MANAGEMENT (IPM): GOOD FOR PEOPLE, PLANTS AND PROFIT

Developed by Chris O'Connor, NGIA ***(BHort GradDipSustAgric.)***

Although many of the underlying principles of Integrated Pest Management (IPM) have been practiced for millennia, the formalisation of the IPM concept began in the 1950's in response to the negative impacts of broadscale pesticide use.

In the US, entomologists started to implement supervised insect control in crops such as cotton. This saw the implementation of controlled applications of pesticides, based upon monitoring results, as opposed to blanket applications of pesticides based on calendar intervals. From the improved results, the concept evolved and was expanded to other crops.

WHAT IS IPM?

There are numerous interpretations and definitions of IPM, many of which have evolved over time and are dependent upon the crop or commodity in question, and whether 'pest' is considered in a broad (weed, disease, fungus, insect, nematode) or narrow sense.

However, a useful definition for our industry is that IPM is a knowledge intensive practice, which is an *'Approach to pest and disease control that uses regular monitoring to determine when treatments are needed. It employs a combination of physical, chemical, cultural and biological strategies to keep pest numbers low enough to prevent economic plant damage from occurring.' (Goodwin et al 2000).*

This Nursery Paper takes you through the key points of implementing IPM in your nursery operation.

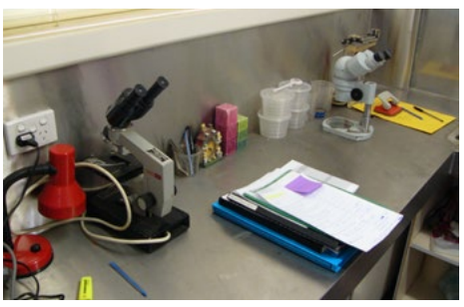
1. Monitoring

IPM starts with dedicated monitoring. ***If you are not monitoring, then you are simply not practicing IPM***. The importance of monitoring to a successful IPM program cannot be understated. Monitoring is the regular and systematic inspection of crops at planned intervals and forms the basis for gathering information on the pest pressures that the crop is facing. For monitoring to be effective, the person conducting it must be trained and proficient in identifying the pest or disease issue, as well as familiar with the crop under inspection. Additionally, **monitoring should be done on its own, and not in conjunction with other tasks**.

Monitoring, along with accurate record keeping, provides us with information that we can combine with our knowledge and then decide to intervene or act. This information can also tell us about the success of various treatment options. Without the monitoring information, any pest control response is merely a guess at best.

A good monitoring program also has the added benefit of providing early warning signs, enabling us to respond to pest issues more effectively. By having more time, we have a greater number of options to intervene before the pests become a problem.

The BioSecure HACCP Manual has a detailed procedure for conducting crop monitoring inspections and site surveillance inspections. The industry also has free eLearning courses based upon these procedures, which can be accessed through **www.nurseryproductionfms.com.au** or directly via **www.ngia.talentlms.com**



Examination Station – Nurseries practicing IPM should have the tools and knowledge to identify the common pests impacting upon their crops.

This communication has been funded by Hort Innovation using the nursery research and development levy and contributions from the Australian Government.
Hort Innovation Strategic levy investment | NURSERY FUND

2. Economic and action threshold

In IPM terms, an economic or action threshold is the point at which you decide to take some form of controlling action on a pest population.

In traditional terms, it is at this point that the economic impact of the pest on the crop outweighs the cost of doing nothing or not treating it. For example, insect damage on a few pieces of fruit may not be enough to decrease the value of the crop once it is sold. However, once it rises above a certain level, it can affect the price you will receive from the market.

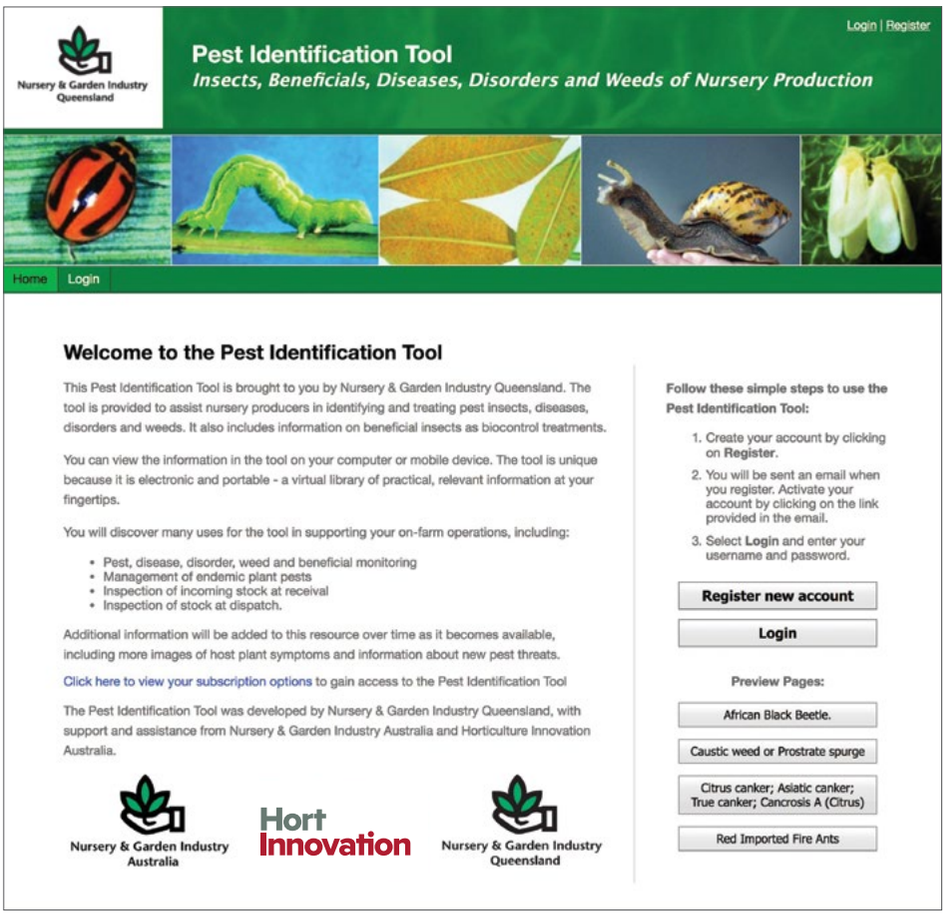
Although thresholds are easy to determine for some commodities, in other horticultural sectors such as the nursery industry, it is more complicated and generally considered to be zero or low. There are several reasons for this.

Firstly, the large diversity of the crops grown and the situations in which they are grown has meant that there is little data on economic thresholds.

Secondly, in certain cropping situations the impact of the pest may be that zero tolerance is allowed; for example, a few caterpillars on seedlings vs the same number of caterpillars on an advanced tree crop may result in different levels of crop damage.

Thirdly, is what the market is willing to accept; for example, fruit crops can stand some leaf damage as it is the fruit being sold. For nursery crops however, we are selling the entire plant, so the same level of leaf damage may not be acceptable to the market. The same applies to treatment options and some markets will not accept certain treatment options whereas others may tolerate their use.

Lastly, interstate market access requirements are heavily regulated for the nursery industry. As plants are shipped live, they can be a vector for plant pests and diseases, which means our thresholds for certain pests and diseases may well be zero.

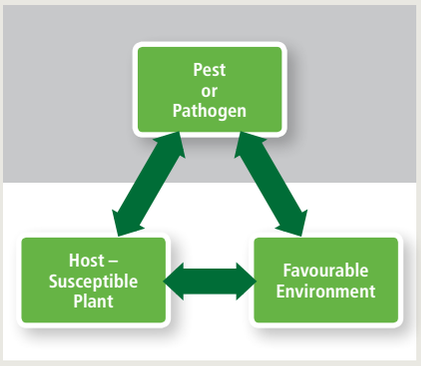


The Pest ID tool is a highly detailed database of pests and diseases which impact Australian nursery crops and is an invaluable tool for anyone practicing IPM in the industry.

Pest and disease triangle

The pest and disease triangle is a good model for visualising the interactions between pest, susceptible plant and the environment. For a plant pest to become an issue all 3 corners of the triangle need to be present; i.e. the disease or pest, a susceptible or host plant, as well as many favourable environmental conditions. By addressing one or all of these factors, plant pests can be effectively managed.

Understanding how to manipulate the corners of the triangle requires a good depth of knowledge about the pest's biology including its lifecycle, habits, and what damage it causes to the crop (see **www.pestid.com.au**). Likewise, a deep understanding of the crop biology and the local environment is also necessary, and this plays an important role in understanding abiotic plant health issues.



This vehicle dip demonstrates a good sanitary practice for vehicles moving on farm and between different parts of the farm.

Baiting for Phytophthora – IPM is a knowledge intensive practice, so take advantage of the skills and expertise available through the various pest and disease diagnostic services to compliment your own knowledge and skills.

3. Response tactics

There are several broad response categories which a grower can use to manage their pest pressures. These are based upon the information and knowledge they have about the pest, the affected crop, the local environment and monitoring results. These responses are best used in combination or integrated, not in isolation.

- **Prevention** – Prevention of plant pests is obviously the best approach and can be the least expensive. Activities include quarantine procedures; good sanitary practices, including starting with clean inputs such as sterile media, new or disinfested used pots, disinfested irrigation water; removal of pest and disease reservoirs e.g. weeds, clean tools, and visitor restrictions.
- **Cultural and Environmental** – This is the use of good growing practices or modification to ensure plant health, as healthy plants are generally less susceptible to pest pressures. Examples include the use of disease tolerant or resistant plant varieties; the effective management of irrigation, fertilisation, light requirements; promotion of good air circulation; ensuring good drainage; separating new crops from old and grouping crops according to the cultural needs.
- **Physical & Mechanical** – This includes using screening or barricades such as weed matting and gravel for growing beds, or insect screens on greenhouses. Hand pulling of weeds is a physical method of weed control, whereas the use of coir weed barrier in pots is a physical approach.
- **Biological** – Biological approaches are generally focused around the stewardship of the natural enemies of plant pests. This may include releasing beneficial insects or predatory insects, and promoting environments, which support biodiversity including predatory insects.
- **Chemical** – Chemical interventions should incorporate responsible use considerations including prioritising chemicals which are low impact i.e. reduced toxicity, target specific and with limited persistence. Chemicals should also be managed or rotated to minimise any resistance development in pest populations.

When applied correctly, IPM should see maximum effectiveness generated from each control method. It is a good management system to ensure that industry does not come to rely on only a handful of control options.

4. Links to the Nursery Production Farm Management System (NPFMS)

A mandatory element within BioSecure HACCP is the requirement to undertake the IPM practices of crop monitoring and site surveillance. These practices provide a knowledge base which enable growers to make informed and strategic decisions on how they manage pests and diseases. Monitoring, record keeping and independent auditing also demonstrate to government and the marketplace that a grower has implemented IPM practice within their business.

NIASA as a Best Management Practice program focuses on core areas where gains for a nursery can be achieved relatively quickly and easily, with an emphasis on continuous improvement.

BioSecure HACCP however takes the program to another level and demands a much more disciplined approach to nursery and crop management practices which, when combined with EcoHort, results in a holistic program which can be defined as being an Integrated Crop Management system for the nursery industry.

As indicated at the start of this paper, IPM is a knowledge intensive practice and hence there are numerous information sources.

Some of these are listed in the "Links to Resources" section to help you to increase your knowledge.

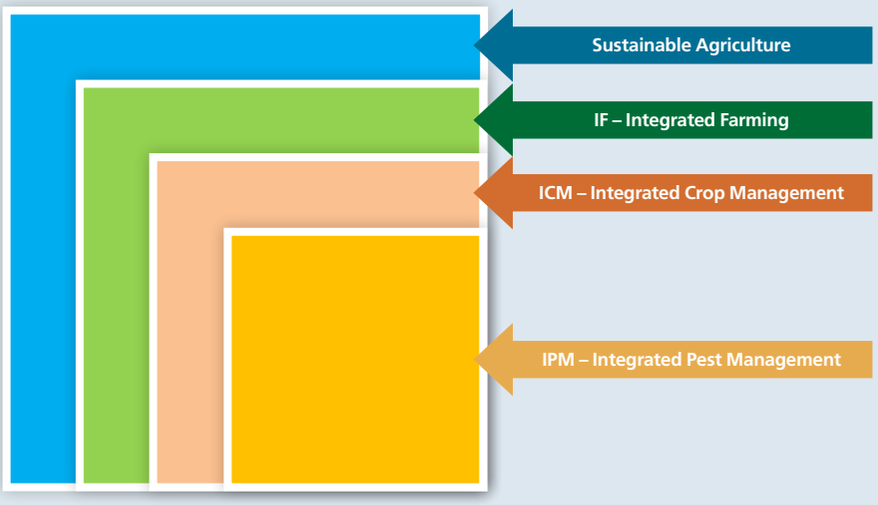
5. Beyond IPM

IPM as a concept is nearly 70 years old and during this time there has been several evolutions as the concept has become more sophisticated.

Integrated Crop Management (ICM)/ Integrated Farm Management (IFM) expands IPM from managing pests to incorporating all aspects of producing a crop on farm.

It is a whole-of-business approach, which delivers sustainable farming outcomes for the grower and community more broadly. ICM/IFM see the overlap of more traditional concepts and practices (permaculture, agroecological, organic etc) whilst incorporating the science and technology of modern agriculture.

This enables a much more holistic and sustainable approach to farming, which is good for people, plants and profit.



IPM has evolved over time and is now considered a subset of integrated crop management, which in turn is more broadly part of sustainable agriculture. By operating with these philosophies, industry will retain pace with the increasing standards for social licence to operate whilst remaining profitable.

LINKS TO RESOURCES

Production Nursery Pest and Disease Webinars:
https://www.youtube.com/playlist?list=PLTjhYhkq_-xaBuxaCvOw_wimwoRJAnC8h

Pest ID Tool:
https://pestid.com.au/

Pest and Disease Fact Sheets and Management Plans:
http://nurseryproductionfms.com.au/pests-diseases-weeds/

Crop Monitoring and Site Surveillance eLearning courses:
ngia.talentlms.com

Pest Management in Ornamentals Information Guide (Goodwin, S. et al 2000):
http://nurseryproductionfms.com.au/download/integrated-pest-management-in-ornamentals-information-guide/

Container Nursery Production and Business Management Manual Newman, J. (Ed) University of California, Oakland California (2014)

Integrated Pest Management for Floriculture and Nurseries Dreistadt, S. University of California, Oakland California (2001)

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*