

An Overview of Systems-based Pest Management for Nursery Production



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Want to know the most inexpensive way to control pests? Prevent them!!

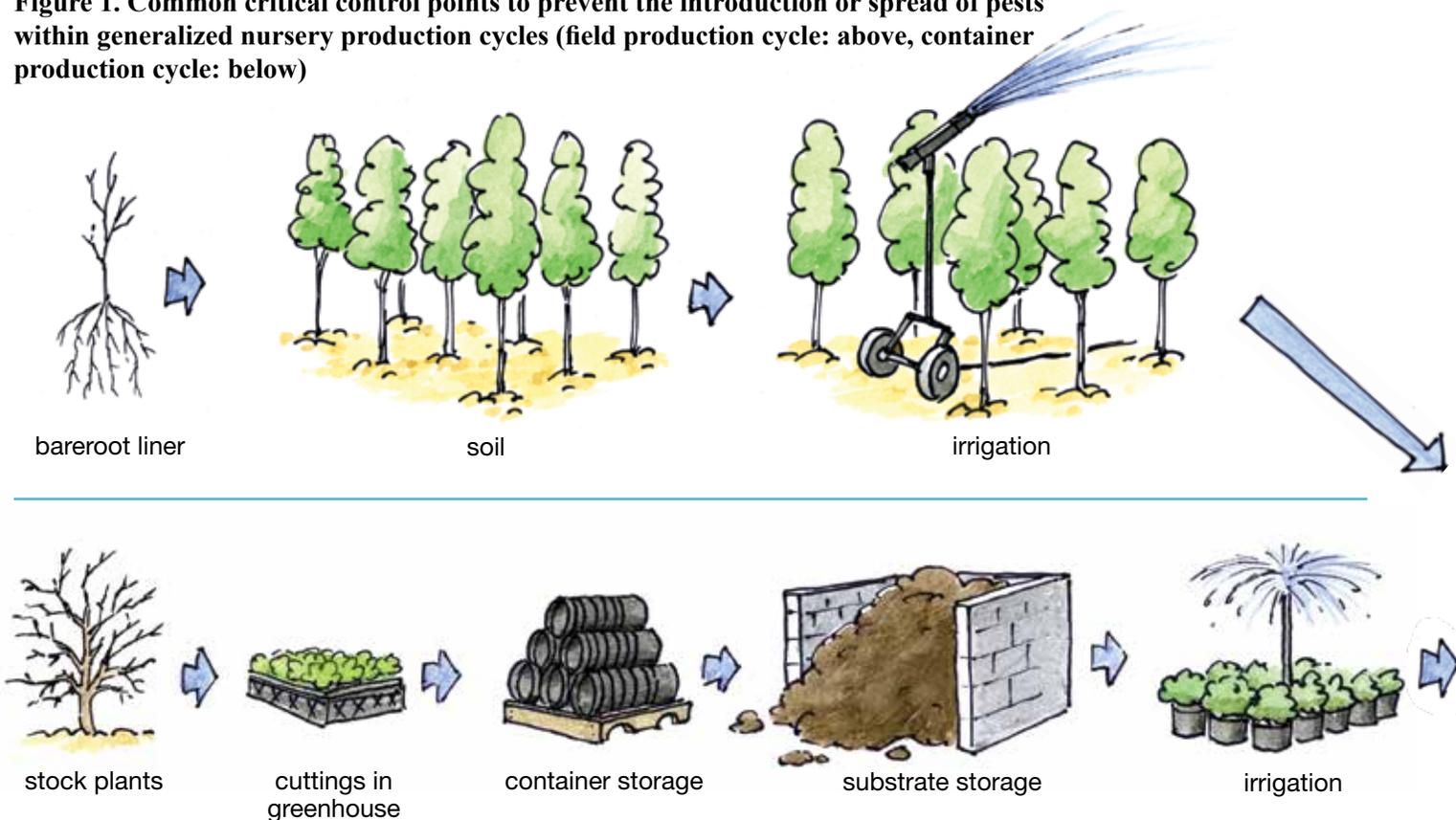
Benefits of Using Systems-based Pest Management

Systems-based pest management is just that – preventing pests at each step in the production system. By using a systems-based approach to pest management, growers can reduce the spread of pests, better understand the source of pests, safeguard their nursery from accepting infested liners from suppliers, and ensure that only pest-free plants are shipped to their customers. Systems-based pest management also equips a nursery to track plant and pest movement if a regulated pest is detected within the nursery.

Financial Risk From Pests

Pests (insects, mites, diseases and weeds) can pose a risk during nursery production by reducing plant growth or plant quality. Reduced growth or quality can decrease nursery profits by lengthening production cycles, lessening the number of marketable plants, or lowering sale prices. Pests can also cause plant death or halt sales altogether if they are regulated pests. The discovery of a regulated pest such as *Phytophthora ramorum*, the organism that causes sudden oak death and a foliar blight of many ornamental plants, can lead to quarantines, forced plant destruction and a subsequent loss of significant revenue. Nursery growers who adopt a systems-based approach to pest management reduce the risks associated with the movement of plants through the production cycle and improve their ability to respond to and recover from the detection of pests, especially those that are regulated.

Figure 1. Common critical control points to prevent the introduction or spread of pests within generalized nursery production cycles (field production cycle: above, container production cycle: below)



What Is Systems-based Pest Management?

Unlike conventional pest management, systems-based pest management is a proactive approach. Owners or managers invest time up front preventing pest-related problems rather than solely responding to problems as they arise. Systems-based pest management starts with tracing the production path and identifying high-risk or vulnerable points during the production chain when pests could be introduced or easily spread throughout the nursery (Figure 1).

These high-risk points are called “critical control points” and are the most effective places to prevent, control, contain, reduce or eliminate risk due to pests. Common critical control points include receiving areas, propagation houses, container storage areas, substrate piles, irrigation water, cull piles, etc. Once these critical control points are identified, a set of practices is put into place that collectively provides overlapping and cumulative pest prevention as well as early detection and control.

Adopting a Systems-based Pest Management Approach

Adopting new practices throughout a nursery can be daunting. If you are uncomfortable adopting an entirely new approach to pest management at one time, try adopting one or two key practices each year over a four-to-five-year period until the entire production chain has transitioned to systems-based pest management. For example, begin sanitizing used containers in year one, monitor pest population levels on susceptible plants in year two, etc. Each year you can focus on mastering that specific strategy and reap the associated benefits. At the end of the four-to-five-year period, your nursery will start receiving the benefits of cumulative practices and strategies by having a fully implemented systems-based pest management program.



shipping to
customer

Whether you are a container producer or grow plants in the field, following simple prevention strategies can help mitigate the spread of insects, mites, pathogens and weeds within your production areas. This publication features examples of methods to reduce risk due to pests within the identified critical control points. For a more comprehensive list of strategies and detailed information on adopting systems-based pest management in the nursery, see the resources listed at the end of this document, in particular, “Systems-based Approach to Pest Management: A Quick Reference Guide.”

Examples of Reducing Risk at Critical Control Points

Receiving and Shipping

Inspecting incoming liners is a great first line of defense. It gives the nursery producer an early advantage by excluding infected or infested plant material from the main production area. It’s important to be able to recognize the signs and symptoms that indicate a pest problem. If you need to sharpen your diagnostic skills, be sure to attend educational seminars, workshops and field days offered by your UT Extension office. If you need assistance identifying suspect pests or diseases, contact your local UT Extension office and/or a Tennessee Department of Agriculture plant inspector. Also, remember to always buy from reputable, certified or licensed nurseries. When shipping plants, be sure to follow all shipping regulations. Do not ship plants if you suspect they are infected or infested with injurious pests. Remember — your plants, your name, your reputation!

Propagation

Propagation is a key control point. Buying-in plants, especially when from outside your state or region, is a vulnerability that can be avoided by propagating plants at your facility and/or sourcing them locally. This “buy local” strategy can greatly reduce the likelihood of introducing major regulated diseases to your state and nursery. This is especially true if you grow boxwood (boxwood blight) or many of the ornamentals susceptible to *Phytophthora ramorum*. Keep a sharp eye during propagation and maintain stringent sanitation procedures, including sanitizing all bench surfaces and tools, such as pruners, knives, etc. Select material from pest-free stock plants and avoid using the lower portion of plants for cuttings, micropropagation or grafting because this area is within the rain splash zone and may harbor soilborne pathogens. Avoid collecting plant tissue for propagation

on windy, wet days when the conditions are more favorable for fungal organisms and bacteria that cause disease.

Production

Whether you are a container producer or grow plants in the field, following simple sanitation tips can help mitigate the spread of unwanted insects, mites, pathogens or weeds within your production areas. Container growers who reuse pots should follow proper sanitation and handling guidelines because it is the pot that should be recycled, not pests! Cover the ground with a layer of gravel to keep containers from coming in contact with soil or sitting in puddles, both of which can spread pathogens that cause root rot diseases (Figures 2 and 3).



Figure 2. Good Example: Containers are stored on gravel, preventing contact with soil or puddled water.



Figure 3. Bad Example: Containers are in contact with soil that may harbor root rot pathogens.

Substrate should be stored on a concrete slab with adequate drainage (Figures 4 and 5).



Figure 4. Good Example: Substrate is stored on a well-drained container pad with dedicated equipment to prevent contamination from soil.



Figure 5. Bad Example: Substrate storage area is poorly drained. Puddles may serve as a reservoir for root rot pathogens.

Field growers should monitor their fields and the flow of irrigation runoff to prevent infested soil from being carried to new areas. When a soilborne pathogen is detected in a field, employees should wear rubber boots that can be dipped or hosed off before entering uninfested fields in order to prevent spreading the pathogen.

Water Management

Plant growth depends on the proper management of irrigation. Too much or too little water or ill-timed applications can compromise plant health and predispose plants to disease or mite and insect problems. Avoid over irrigating as that can lead to excessive runoff, carrying away needed fertilizer and pesticides that were applied to the plant (Figure 6).

However, water should drain from production pads; crowned beds aid proper drainage (Figure 7).



Figure 6. Bad Example: Runoff from container production can contain nutrients and pesticides.



Figure 8. Bad Example: Over-irrigation and/or poorly draining container pads can lead to root rot and overall poor plant health.



Figure 7. Good Example: Container pad is crowned for good surface drainage.

Pathogen-infested water can come into contact with plants as puddled water on the ground or directly through irrigation applications (Figure 8).

Drain tiles may need to be installed to allow for adequate drainage of production fields. Knowing how to manage water and irrigating properly are important components of a systems-based pest management approach.

Site Maintenance

Non-crop areas require maintenance, too. For example, weeds growing in non-crop areas such as roadways and ditches can wreak havoc on production areas. Keeping drainage ditches, roadways and storage areas free of weeds will help prevent weed seed from infiltrating production areas. Weeds that are allowed to go to seed around substrate storage piles can find their way into production areas by hitching a ride with newly potted plants. Weeds can also serve as host plants for insects, mites and pathogens. Maintaining non-crop areas is a vital component of a systems-based approach to pest management.

Integrated Pest Management

Using strategies from integrated pest management (IPM) complements a systems-based pest management approach. One IPM strategy is scouting for pests. A dedicated scout can monitor for pests by using traps and can scout susceptible host plants during the appropriate time frame for each pest. In addition, employees can be trained and rewarded for making the effort to detect pests during their assigned tasks. Due to the number of plant species grown and the variety of pests that affect nursery crops, learning to identify all possible pests may be challenging for new employees or employees whose main responsibility is not scouting. Therefore, have employees focus on learning the top 10 problem pests at your nursery first. Consider posting photos of the most relevant pests in common areas such as break rooms. The UT Institute of Agriculture has print and electronic resources, including the mobile

device app *IPMPro*, that can assist scouting efforts. More information can be found in the Resources section.

Record Keeping

Keeping thorough records of plant movement will allow plants to be traced easily should a problem develop. Important information to include is the date of arrival, each inhabited location within the nursery, scouting dates, any pest problems encountered while scouting, control measures and the results of control measures. Records should be kept for incoming and outgoing plant material, propagated material and plants in production.

Following a systems-based approach to pest management can lead to many benefits for nursery owners and managers. By taking a systematic, holistic approach, nurseries can enjoy the peace of mind and economic benefits of excluding some pests and early detection and eradication of other pests. In instances when pests have spread within the nursery, traceability through record keeping can limit forced destruction of plants when a regulated pest is found. Systems-based pest management can be adapted to any size of nursery. For more information on transitioning to systems-based pest management, contact your county UT Extension agent or regional or statewide nursery Extension specialist.

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**SOUTHERN
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Resources:

Cochran, D., A. Fulcher, F. Hale, and A. Windham with an introduction by J. Parke. Systems-based approach to pest management: A quick reference guide. Available at plantsciences.utk.edu/fulcher_systems_pstmgtwkshp.htm.

Fulcher, A. Scouting and monitoring pests of deciduous trees during nursery production. Available at extension.tennessee.edu/publications/Documents/W142.pdf.

Greisbach, J., J. Parke, G. Chastagner, N. Grünwald, and J. Aguirre. Production and procurement manual: A systems approach to the production of healthy nursery stock. Available at grunwaldlab.cgrb.oregonstate.edu/sites/default/files/SafeProduction.pdf.

IPMPro is a mobile device app for the Green Industry that was launched by the University of Tennessee Research Foundation in 2012. Developed by the UT Institute of Agriculture along with Clemson University, North Carolina State University, the University of Georgia, the University of Kentucky, the University of Maryland and Virginia Polytechnic Institute, it contains images and information on identification, life cycle, management, and control measures for major nursery pests and timely plant care tasks in Tennessee and 21 other states. *IPMPro* also sends push notifications, textlike messages scheduled specifically for the business's location, to alert the grower, landscaper or arborist of pest activity and time-sensitive cultural practices. More information and a list of states covered by *IPMPro* are available at ipmproapp.com.



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