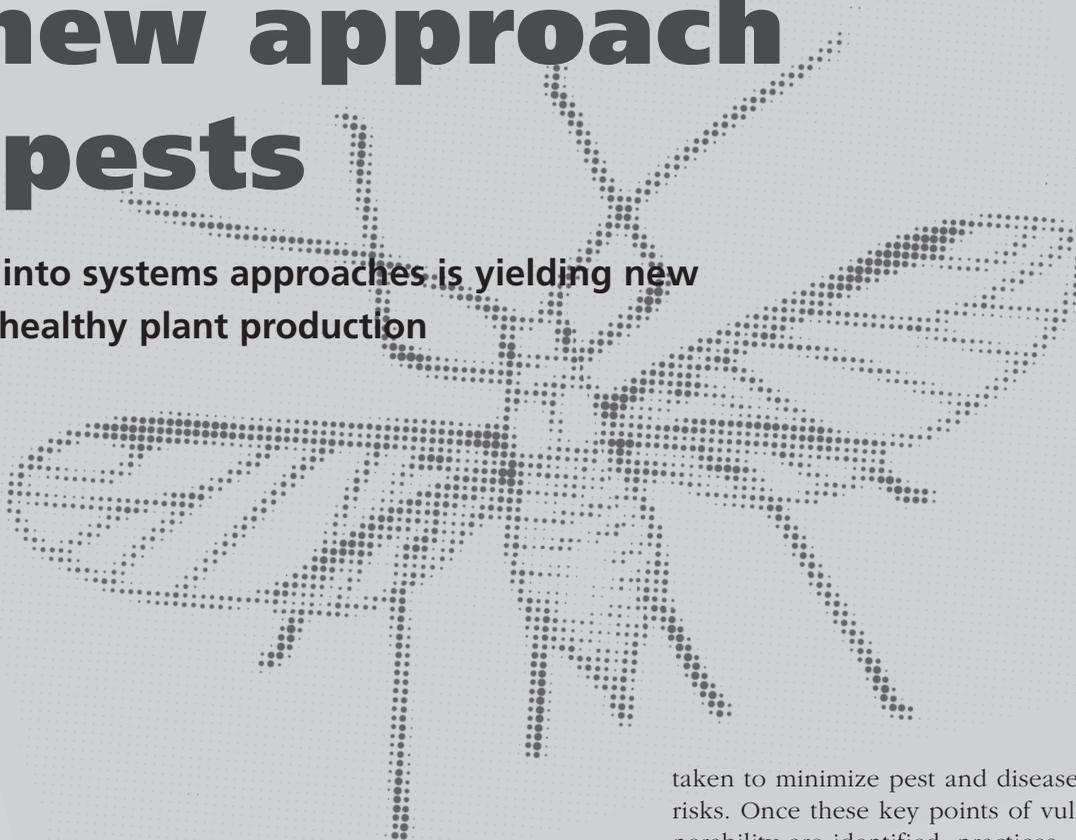


# A new approach to pests



Research into systems approaches is yielding new tools for healthy plant production

*By Jennifer Parke*

What does the term “systems approach” mean? A systems approach recognizes that the only way to fully understand a problem is to consider how all the component parts interact.

Systems approaches are being applied to many kinds of problems ranging from improving poor schools to producing higher-quality manufactured goods. How can a systems approach be applied to solving plant disease and pest problems in nurseries?

The systems approach examines all the stages in the nursery production process and identifies key points of vulnerability where steps can be

taken to minimize pest and disease risks. Once these key points of vulnerability are identified, practices known to provide protection are implemented and documented.

For example, we know that pests and pathogens can be introduced into the nursery on purchased plants, but the risk can be reduced if certain safeguards are implemented: plants can be visually examined by nursery staff trained to recognize unusual signs or symptoms, and plants can be temporarily quarantined to reduce the possibility of disease or pest spread.

The systems approach does not eliminate the use of pesticides, but instead emphasizes avoidance and prevention of diseases and pests.

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**A break from tradition**

Traditional approaches are essentially reactive. They rely on end-point inspections to detect infested plants.

Systems approaches, by contrast, are proactive. They reduce the risk of infestation by correcting unsafe nursery practices.

Consider the difference between following a wellness program, and only visiting the doctor when you get sick. A wellness program emphasizes disease prevention, reducing the need for emergency treatment, expensive surgeries and prescription medications. Likewise, a systems approach in nurseries can prevent the need to respond with a spray program, crop destruction order, or quarantine when a problem develops in the field or the greenhouse.

Because systems approaches

emphasize safe production practices that result in healthy plants, nurseries that document these practices can gain access to national and international markets that otherwise might be unavailable to them. The cost of implementing a systems approach is often outweighed by the benefits of accessing these markets.

There are several different nursery programs that currently utilize a version of a systems approach. They include the U.S. Nursery Certification Program (USNCP), two interrelated nursery certification programs in Canada, and several programs based on the Hazard Analysis of Critical Control Points (HAACP) framework.

Oregon's Grower-Assisted Inspection Program (GAIP) is an example of an HAACP-based program.

**United States Nursery Certification Program (USNCP)**

The USDA APHIS is currently piloting a systems approach program for nurseries called the U.S. Nursery Certification Program (USNCP). Four nurseries in Oregon and one each in California and Georgia are currently accredited to produce and ship material with USNCP certification.

The USNCP is based on the North American Plant Protection Organization (NAPPO) shipping standards for nursery plants negotiated between the departments of agriculture in the U.S., Canada and Mexico. The USNCP has two main components — the phytosanitary management program and the pest management plan.

The program has requirements for documentation, inspection and

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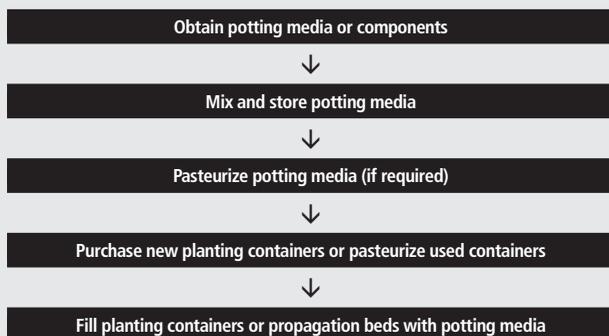
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## Nursery production flow chart

### Potting media, containers



### Water



### Plants



### Pest and disease management



An example of a simple production flow chart for a container nursery. Each step in the process should be evaluated for its potential to introduce pests and pathogens.

audits. There is also a requirement to track plant material from the source, through the production process and on to the recipient. An attractive feature of the USNCP is that once accredited, a nursery is permitted to issue its own electronic phytosanitary documents. This has obvious scheduling advantages over third party-issued documents. It also benefits the regulatory agency, which can redirect inspectors to work on other, more pressing phytosanitary issues. In addition to these benefits, pilot USNCP participants report improved product quality, increased awareness of plant health and an increased ability to manage inventory.

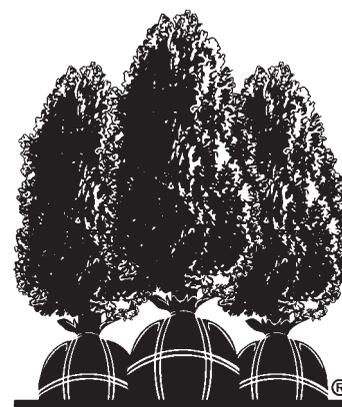
The program is currently designed

to meet the import requirements of Canada, but additional countries are expected to adopt this type of program in the future. Eventually, those nurseries that ship internationally will likely be required to participate in a program such as the USNCP.

USDA APHIS wants to expand the program in response to increased interest by nurseries and state departments of agriculture. The program is being reviewed to assess its effectiveness in comparison with traditional nursery end-point inspection and phytosanitary certification programs.

Other systems approaches for

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Examples of Critical Control Points	Best Management Practices
Contaminated ground	Do not place containers on contaminated ground. Prevent ground from becoming contaminated. Place a 3" thick rock or gravel barrier between the ground and the plants. Prevent splashing of water from ground onto plants.
Contaminated irrigation water	Treat irrigation water to disinfect it before use, or use water that is free of pathogens.
Contaminated pots	Use new pots, or properly disinfect used pots.
Buy-ins of infested plants	Buy only from certified suppliers. Inspect plants upon arrival. Quarantine plants for 90 days.
Poor drainage	Prevent standing water. Improve slope and drainage.
Infested leafy debris	Prevent accumulation of infested leafy debris.

Table 1. Discovery of Critical Control Points should drive the development of Best Management Practices. Shown are example CCPs for preventing Phytophthora contamination of nursery plants as identified by Oregon State University and USDA ARS scientists in studies funded by the USDA's Floriculture and Nursery Research Initiative.

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nursery stock production that are being used internationally include the Canadian Nursery Certification Program (CNCNP) and the Clean Plants Program. The CNCNP mirrors the requirements of the USNCP. It is audited and accredited by the Canadian Food Inspection Agency. The Clean Plants Program is administered by the Canadian Nursery Certification Institute, and was developed by the Canadian Nursery and Landscape Association to serve as a “feeder” program for CNCNP nurseries.

### Analyzing potential hazards

Other pilot efforts of the systems approach concept have been based on hazard analysis of critical control Points (HACCP). HACCP is a risk management program that can be applied to many different types of production systems.

For example, HACCP is widely used in the food processing industry to identify and control potential sources of food-borne contaminants.

A central idea underpinning HACCP is that prevention of problems is far more cost-effective than mitigating them later on. HACCP requires that the production process is systematically and rigorously examined to identify potential hazards that may affect the final product. A control point is defined as a step in a system where specific procedures can be applied to achieve a defined effect. It must be a step that can be measured, monitored, controlled and corrected.

A critical control point (CCP) is the best point, step, or procedure at which significant hazards can be prevented or reduced to minimum hazard. Once

potential hazards and CCPs have been identified, the production process is changed to manage hazards instead of relying on end-point inspection or testing of the final product, which could result in rejection of the product.

The HACCP approach has only recently been applied to plant production systems. A modification of the HACCP approach was used to determine CCPs for contamination by *Phytophthora* spp. in Oregon nurseries (Parke et al., 2008). Discovery of CCPs drive the development of best management practices (Table 1). Guidelines for container and in-ground nursery production systems based on HACCP have been developed in Australia (BioSecure HACCP Guidelines, 2008). These guidelines provide an excellent model for

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### ▲ SYSTEMS APPROACH

#### Manual outlines pest and pathogen prevention methods

When it comes to preventing the introduction and spread of plant pests and pathogens, a proactive approach that intelligently targets areas of highest risk is better than reacting to things as they happen. The Oregon Association of Nurseries has published the "Safe Procurement and Production Manual," a 100-page guide to producing healthy nursery stock by using a systems approach. This easy-to-follow book helps growers evaluate their own nursery operations. It contains best practices that are proven to be effective at reducing risks from plant pests and pathogens. The book is available online now as a PDF download, at no cost, from [www.oan.org](http://www.oan.org). A print version will be made available to growers later this summer. This article is based on an excerpt from the book.



implementing a similar approach in the United States.

A flow chart addresses all the general steps that occur during the nursery plant production process, and detailed tables provide control measures, critical limits, monitoring procedures, corrective actions, and recordkeeping for each step in the process.

These guidelines complement and validate the best management practice guidelines for nurseries that were developed by the Nursery Industry Accreditation Scheme Australia (NIASA). Nurseries in Australia that have NIASA accreditation may become certified by complying with the BioSecure HACCP guidelines and passing an annual audit. Certified nurseries have greater access to international export markets.

#### Grower-Assisted Inspection Program

A practical implementation of the

HACCP approach has recently been established on a pilot basis by the Oregon Department of Agriculture.

The Grower-Assisted Inspection Program (GAIP) engages nursery growers in detecting and preventing the spread of the quarantine pathogen *Phytophthora ramorum* and other foliar *Phytophthora* species.

GAIP participants are required to undergo training and become certified in *Phytophthora* disease management, and to conduct a hazard analysis for their nursery's production and procurement practices based on CCPs identified by scientists at Oregon State University, USDA-ARS, and elsewhere. Nursery workers can become certified by taking an online course and passing a test offered by the university. Participants also are required to develop a mitigation manual based on best cultural practices.

GAIP nurseries also undergo regular federally mandated inspections, and their practices are audited by the ODA. Finally, they must implement corrective actions when an audit identifies a non-compliance issue.

Although the efficacy of GAIP in reducing *Phytophthora* disease incidence is still being evaluated, it appears that nurseries are benefitting from implementing best practices that target specific CCPs.

#### Summary

In summary, systems approaches provide a holistic way for growers to manage disease and problems in their nurseries, ensuring a healthier product. When linked to a certification program, adoption of a systems approach can also enable greater access to interstate and international markets. ©

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