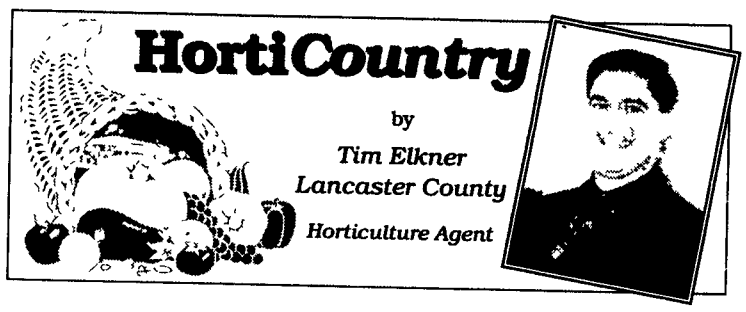

INSECT AND DISEASE MANAGEMENT IN VEGETABLE TRANSPLANTS

Pest management for vegetable transplant production is an integrated process and includes sanitation, sound cultural practices, the use of resistant cultivars (where possible), and finally, proper use of the correct pesticide.

Your pest management program should be starting now in the greenhouse. Begin the season with a clean, weed-free disinfected greenhouse. This means clearing the growing area of any plant debris, weeds, and any discarded flats or tools. After cleanup, wash and disinfect empty benches, potting areas, storage shelves, tools, and leftover cell packs and flats that you plan to reuse.

Your disinfecting solution can contain any of the sanitizing products such as Green-Shield, Physan 20, Triathlon, Zero Tol, or chlorine bleach (10 percent solution). Be sure to follow the manufacturer's directions when using any commercially prepared materials.

If you are using a 1 to 9 bleach solution, remember that it requires a 30-minute soak in order to be effective. Also, while chlorine bleach is an effective sanitizer, please note that there will be a 50 percent reduction in strength of a chlorine solution after just two hours. Therefore, you should prepare a new solution each time you plan to sanitize. This includes a new solution after lunch if you started working in the morning.

Once you have the growing area and equipment sanitized, be sure to avoid recontamination. Dirty hose nozzles or tools can contaminate potting soil and the general growing area. Be sure that everything brought into the area is clean! The floor or soil in the growing area is a good source of insects and diseases. Do not stand on the benches after they have been cleaned as you can easily move diseases up from the floor on your shoes. Use hooks to keep your hose nozzle off the floor. Ideally, grow your transplants off the floor as well, either on benches or pallets.

The floor in your greenhouse should be well drained and cleaned before plants are started there. Some growers have taken to covering the entire floor with black fiber cloth to both prevent weed growth and make clean up easier after transplant production. Once dry, plant and soil residues are easily swept-up and removed.

Does your growing area have good air movement? Circulating air not only distributes heat more evenly but can also reduce condensation in the greenhouse. Consider installing a horizontal air flow (HAF) system in your transplant production area.

I've heard growers ask if allowing the greenhouse to "freeze" for several days in cold weather means that insect pests will be killed. No, according to Alan Michael, our regional ornamental specialist. Heat is much more effective for pest destruction.

For example, heat has been shown to be more effective for the control of thrips, according to Leanne Pundt of the University of Connecticut. In one study, high temperature (104 degrees F) combined with very low humidity (less than 10 percent) for three to four days killed most adult thrips. However, your greenhouse must be completely weed-free for this method to work.

If you have constant thrips problems, this control method might be something to try this summer.

Finally, always use disease-free media for transplant production. If using soil, be sure it is pasteurized before you bring it into the growing area. Successful soil pasteurization requires 30 minutes at 180 degrees F. Be sure to frequently sanitize and maintain clean areas where soil is mixed and pots are filled. Ideally, you will have separate areas if you are producing both vegetable transplants and ornamentals. Bringing cuttings of flowering plants into the vegetable area can introduce pests such as thrips and diseases such as tobacco spotted wilt virus (TSWV). Look at your available space(s) and plan accordingly.

Proper disease control in the greenhouse starts with correct identification of the cause of the problem. The symptoms caused by diseases can also be caused by poor cultural practices. Chemicals cannot control problems caused by improper crop management, so it is important that you follow good cultural techniques.

Consider using seed treatments to control root diseases and/or some bacterial diseases. Seed treatments are either preventative or eradicative. Preventative treatments are intended to protect the seed from decay and soil-borne fungi. Eradicative treatments are intended to kill harmful organisms on or in the seed. Be sure to follow recommended procedures when using eradicative treatments as these procedures can also reduce germination or even kill the seeds you are treating.

Root diseases can be controlled by using fungicides as a soil drench. Always read and follow the directions on the label of any fungicide you are using. Frequently, a fungicide applied to the soil surface will need to be watered in to be effective. For foliar diseases, complete coverage of all leaf surfaces (top and bottom) is necessary for successful control. Good scouting practices and early treatment of disease infestations will result in reduced plant loss and better overall control.

Another important disease control practice is to reduce the relative humidity in the greenhouse, especially during the evening when cooler temperatures might result in water droplets forming on the leaf surfaces. Run your exhaust fans for a few minutes to force warm, humid air out of the greenhouse and replace it with cooler, drier outside air. Then heat the cooler air to reduce the humidity inside the greenhouse. You may need to repeat this procedure two or three times per hour after the sun sets and again at sunrise. This will raise your heating costs somewhat but what will it cost you if you lose all of your vegetable transplants to disease, especially close to planting time?

Good scouting practices will also help you detect and control insect infestations in your transplants before the problem becomes severe. Again familiarize yourself with the symptoms of insect infestations as well as the life cycles of the pest you are likely to encounter such as thrips, aphids, mites and fungus gnats. Use sticky cards to monitor for adult thrips, aphids, and fungus gnats. Actual plant inspections are also necessary, particularly to detect mites and immature whiteflies. Examine plants at 10 locations per 1,000 square feet of greenhouse weekly. Each time you scout, start at a different location in your growing area.

Chemical controls are frequently needed to control insect pests in vegetable transplants. Be sure you have identified the pest correctly and selected a material labeled to control that pest. While there are not as many choices for insect pest control in a greenhouse as there are for field situations, there are still several choices for each pest that allow you to choose what will work best in your situation. This includes "softer" materials that will help preserve natural predators you may be using.

As always, be sure to thoroughly read the label and follow the directions for any insecticide you use for pest control.

Remember, disease and insect pest control for vegetable transplant production starts before any plants are in the greenhouse. Waiting until seeding time to start this chore may not leave enough time to do the job thoroughly. Once the transplants are growing in the greenhouse, regular scouting is necessary to detect pest outbreaks and control them before they become major infestations. Attention to detail throughout the process of vegetable transplant production should help you have healthy, vigorous plants to get your crop off to a good start in the field.