Good Horticultural Practices Reduce Risk of Insect and Disease Problems

Raymond A. Cloyd and Clifford S. Sadof
Entomology Department, Purdue University
1158 Entomology Hall, West Lafayette, IN 47907-1158
Phone: (317) 494-8761 Fax: (317) 494-2152

Good horticultural practices are the foundation of any successful pest management program. The ability to control greenhouse growing conditions can set the stage for a success or a disaster. Over or under fertilization, using the improper medium, overwatering, lack of sanitation, or crowding can make it difficult for even pesticides to rescue a crop. To encourage proper cultural management we will review how poor cultural practices can contribute to insect/mite and disease problems.

A. Fertility

High or low fertility levels can increase crop susceptibility to diseases, insects and mites. Many plants grown under optimal light and nutrient conditions produce chemical defenses that can protect them from diseases and insects. Changes in light and nutrition can compromise these defenses, giving pests a clear path to the crop. For example, chrysanthemums are more susceptible to *Erwinia chrysanthemi* and *Pseudomonas cichorii* under high fertilizer rates. High levels of fertilizer in general or high ammonia nitrogen can increase poinsettia sensativity to *Botrytis*. Geraniums are more susceptible to *Xanthomonas* blight under high nitrogen levels. Fusarium wilt is more severe under ammonia nitrogen sources (i.e. ammonia nitrate) than nitrate sources (i.e. calcium nitrate). High fertility levels can increase soluble salts in the medium which stresses plants and increases their susceptibility to root rot diseases (*Pythium* and *Phytophthora*). In addition, research has demonstrated that more whitefly eggs are found on poinsettia fertilized with ammonium nitrate than calcium nitrate. Soft, succulent tissue associated with excessive fertilization is often easier for insects/mites to penetrate with their mouthparts. In addition,

plants respond to high fertility levels by moving more nutrients to new growth. This provides pests easier access to nutrients they need to grow and reproduce. Consequently, insects and mites can grow faster and cause greater injury to the crop.

B. Media

Growers that use well-drained media minimize problems with root rots, fungus gnats, and shoreflies. A medium that drains well allows water to pass through easily and maintains adequate air pore spaces. Poor draining medium holds too much water and contains less air space. This creates conditions that promote root rot development. Medium that doesn't drain well can hold more water on the surface, promoting algae growth. Both fungus gnats and shoreflies breed in algae. If this problem is not corrected, high populations of both insects can build-up in a short period of time. Fungus gnat larvae damage plants directly by feeding on root tips and tunneling into roots and stems. This reduces the plants ability to take-up water and nutrients. In addition, they have the potential to transmit *Pythium* and *Thielaviopsis*. Shoreflies don't directly damage plants because they primarily feed on algae. However, large numbers can present a nuisance problem and they have been implicated in transmitting diseases.

C. Watering

Overwatering plants predisposes them to root rot problems, and increased numbers of fungus gnats and shoreflies. Excessive watering stresses plants, because excess water fills air pore spaces creating low oxygen levels. This increases susceptibility to root rots. High moisture levels keep the medium surface moist resulting in algae build-up that provides breeding sites for fungus gnats and shoreflies.

D. Sanitation

Weeds and plant debris provide sites that pathogens and insects/mites can use to survive and spread to the main crop. Weeds harbor pathogens, most notably viruses, that are obtained by insects and then transmitted to the main crop when they feed. A perfect example of an insect-virus relationship is western flower thrips, *Frankliniella occidentalis* and the tospoviruses, tomato spotted wilt virus and impatiens necrotic spot virus. Weeds that serve as reservoirs for tomato spotted wilt virus are chickweed, lambsquarters, nightshades, shepherds's purse, pigweed, and bindweed. Some weeds such as sowthistle (*Sonchus* spp.) are susceptible to powdery mildew, which can migrate from the weed onto the main crop. In addition to harboring diseases, weeds also provide refuge for whiteflies, aphids, leafminers, and spidermites. Insects/mites can move from desiccating weeds onto the main crop.

Plant debris (i. e. leaves, flowers, and medium) provides refuge for the resting stages of various pathogens and insects/mites. Pathogens can be spread onto crops from dried-up plant debris that is subject to splashing water or air movement. *Erwinia chrysanthemi* , the casual agent of bacterial blight of chrysanthe-

mum, survives in dead plant debris that serves as a source of infection to newly introduced plants. Insects/mites can migrate to fresh plant material as plant debris dries out. Also, left-over medium provides sites for fungus gnat adults to lay eggs and western flower thrips to pupate.

E. Crop Spacing

Plants spaced closely together reduce light penetration to the lower leaves, increase humidity, and allow leaves to stay wet longer. This increases susceptibility to diseases such as *Botrytis* and powdery mildew. Plants that are spaced too closely increase the possibility of In addition, plants spaced close together make it difficult to get uniform coverage with foliar insects/mites moving from plant-to-plant by means of touching leaves.applied insecticides and/or fungicides.

Greenhouse managers that make the effort to adopt proper cultural practices for their crops are likely to spend less time fighting pest problems, and more time growing and marketing a healthy crop.

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