Ornamental Research News

Central Florida Research and Education Center

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In this issue...

PLANT PATHOLOGY

Diagnosis of Plant Diseases

David J. Norman, Ph.D.

To diagnose the cause of disease symptoms on a plant, it is important to first determine if these symptoms are actually being caused by a pathogen. Symptoms may also be caused by insects, the environment or by applications of fertilizers or pesticides.

Damage caused by insects can either be direct damage caused by biting or piercing of the plant or may be indirectly caused by releasing toxins into the plant while feeding. Toxins from insects can cause yellowing and, later, necrosis of the plant tissue. With the use of a hand lens or microscope, insects can usually be found and identified. Damage to plants can also be caused by chilling or overheating. Extremes in temperature can damage the protective cuticle on plant surfaces, which subsequently allows the plant tissue to become water-soaked. This water-soaked appearance of leaves can easily be confused with symptoms caused by bacterial infections.

Information from the grower about types, amounts, and frequency of fertilization and pesticide applications is important. If information is not available for the amounts and times of fertilizer applications, a soluble salts and pH reading of the soil can be taken. Concentration of soluble salts in planting media for most crops should be around 1000 æmhos. If concentrations of salts are considerably lower or higher, it indicates either under or over fertilization, respectively. The proper pH of soil for each crop will vary depending on needs of a particular plant species. However, if the pH of soil is either too low or too high, nutrients will be unavailable for uptake by the plant. Specific nutrient deficiencies or toxicities will then express themselves in symptoms on the plant that can sometimes be confused with symptoms caused by plant pathogens.

After eliminating pesticides, fertilizers, insects and the environment as the cause of symptoms, one can now examine the plant for plant pathogens. In order to properly diagnose an infected plant, the causal agent must be properly identified. To do this a complete examination of the plant specimen is needed. Roots, stems, and leaves must be examined, even if symptoms appear to be localized. This is especially true when examining chlorotic and wilted plants because symptoms in leaves may result from a fungal, bacterial, or nematode infection of the roots. Tissue samples must be taken and examined using a microscope. Simple observation of bacterial-streaming out of tissue can indicate bacterial infections, fungal spores on the surface of plant tissue can mean fungal infection, and the presence of nematodes having stylets (piercing mouth parts) in plant tissue indicates a nematode infestation. These pathogens must then be isolated, identified and, in many cases, reinoculated into healthy plants to prove that they were the causal agent of the particular symptoms observed. If a plant exhibits chlorosis, leaf distortions and/or breaks in color pattern, a virus may be the cause of the symptom. Because viruses cannot be isolated and grown without their host plant, their existence must be proved by electron microscopy, biochemical tests or by rubbing infected tissue onto indicator plants susceptible to the virus.

After pathogen identification has been accomplished, proper eradication procedures can be implemented, either chemical or cultural. If called for, pesticides appropriate for the specific pathogens can be selected, reducing costs and avoiding the overuse of ineffective chemicals.

RESEARCH REVIEW

Considering A New Irrigation System?

Chris Fooshee, Editor

Water usage is coming under increasing scrutiny by Florida's water management districts and the public, and agricultural producers are concerned about the potential regulation of water use and run off from nursery sites. Irrigation system selection and management can affect the amount and efficiency of water use in commercial greenhouse crop production. In a report published in May 1993, Catherine A. Neal, Ph.D. and Richard W. Henley, Ph.D., tested four irrigation systems comparing water use and runoff. The system types overhead sprinklers, drip, capillary- mat, and ebb-and-flow were tested on the growth of two crop cycles of *Dieffenbachia maculata* in six-inch pots. Each crop was grown for several months in different seasons, then measured and analyzed to see if plants of equal quality could be produced on all of the systems. The efficiency of a system was computed by dividing the volume of water retained by the volume of water applied to the plants.

The results of the tests showed the ebb-and-flow system to be the most efficient, when compared to overhead sprinklers, with an efficiency 75% or more. This was compared to 50-57% for drip and capillary-mat systems, and 8-9% efficiency for overhead sprinklers. Plant quality was satisfactory under all irrigation treatments, as measured by visual ratings, height, and fresh weights of tops and roots. There

were, however, significant interactions between irrigation and incorporated fertilizer treatments. While the incorporated fertilizer rate did not affect the growth of plants irrigated with overhead sprinklers, it did affect those plants watered using the other systems and varied with the season.

If one is considering converting to an alternative to overhead irrigation, the information in this report can help predict the possible water savings. The fact that crop performance can be significantly affected by the components of an irrigation system points out the need for evaluating any new system using one's own production practices, making modifications as necessary for the crop. Fertilizer rates, potting mixes, irrigation frequency and, where applicable, water reservoirs (such as trays or saucers) must all be considered to increase crop growth while reducing water use.

For more details about this study, see "Water Use and Runoff Comparisons of Greenhouse Irrigation Systems" by Catherine A. Neal and Richard W. Henley, published in the 1992 Proceedings of the Florida State Horticultural Society, volume 105, pages 191- 194.

EXTENSION CORNER

Liz Felter

Thanks

A big thank you to V.J. Growers Supply for supplying containers, and to Hermann Engelmann Greenhouse, Inc. for donating plants to the 4-H Congress. The 4-H Congress is a statewide gathering of youth, ages 8-18. Approximately 500 kids go to Gainesville each year to compete in contests and attend seminars in such areas as horticulture, animal science, home economics and energy conservation. Those who excel in the events advance to national competition held in Washington, D.C. This is the largest and most diverse program offered by Florida 4-H.

Plant Disease Diagnosis Services

Did you know it's easy to submit a diseased plant sample to the University of Florida's Plant Disease Clinic in Gainesville? It only costs $15.00 per sample. Here are some guidelines to follow:

- Obtain a Plant Disease Diagnosis form from your extension agent. Use one form for each sample and keep it separate from the sample.
- Submit generous amounts of plant material exhibiting symptoms.
- Do not add water.
- Keep samples cool until mailed.
- Do not mix samples together in the same bag.

- Remove excess soil; allow only enough medium to keep the roots moist.
- Note spray history for the last three weeks.
- Mail early in the week to avoid a weekend layover.
- Samples which will arrive in Gainesville in 2 days or less can be sealed in a plastic bag.
- Samples which will arrive in Gainesville in more than 2 days should be tightly packed in a dry box using packing peanuts or bubble wrap. Do NOT seal in a plastic bag.
- Include a check made out to the Florida Extension Plant Disease Clinic for all samples ($15.00 per sample). For details call Liz Felter at (407) 836-7570.

Central Florida Research and Education Center
2807 Binion Road, Apopka, Florida 32703
Telephone 407/884-2034 - Fax 904/392-9359
Hours 7:30 am until 4:00 pm, Monday thru Friday.
Grower Diagnostic Clinic - every Thursday 1:00 to 3:00 pm.
Ornamental Research News - Chris Fooshee, Editor
WCF@ifas.ufl.edu
