# Hawaii Cooperative Extension Service

## HORTICULTURE DIGEST

HITAHR · College of Tropical Agriculture and Human Resources
U. S. Department of Agriculture Cooperating

Department of Horticulture
University of Hawaii at Manoa

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### HOW TO BE A BETTER BOSS

The following are seven guides to help you be the kind of boss most people would like to work for.

1. Be considerate—take into account the problems of your people or workers. Consider the effect on them of the decisions you make. Encourage pride and respect for work well done;
2. Be consistent—unreasonable vacillations in mood and manner bewilder people. They want a leader whose course is steady and whose actions are predictable;
3. Be a good listener—the best way to lead people is by knowing them, and you learn to know them by listening to them;
4. Be confident in them. If you make it clear that you have faith in their capacity to do a first-rate job, they will repay your confidence with a first-rate job;
5. Be open to ideas. Listen to all ideas with a patient and open mind. If you "put down" a man's suggestions, he may not come to you with another;
6. Be communicative. Keep your people informed. As members of the team, they are entitled to know how the game is going;
7. Be a decision sharer. People who share your decision making automatically have a stake in the results, so you can depend on their cooperation.

### NEW HORTICULTURE STAFF MEMBER

We are pleased to report that Dr. David L. Hensley has accepted the position of Landscape Specialist in the Horticulture Department, University of Hawaii—Manoa. He will be moving to Hawaii with his wife and son and will start in his new position July 1, 1992.

Dr. Hensley is a native of Missouri with a B.S. degree in Horticulture from the University of Missouri and his M.S. and Ph.D. degrees in Horticulture from Purdue University. His professional career includes positions of Area Extension Horticulture Specialist in Missouri, Extension Specialist in Horticulture in Eastern Kentucky, and is currently Professor of Ornamental Horticulture at Kansas State University.

In his present position, Dr. Hensley is primarily responsible for the development and implementation of undergraduate courses in Landscape Development, Landscape Contracting, and Landscape Maintenance at Kansas State. His present research projects include: cultural factors affecting establishment and growth of plants in the nursery and landscape; evaluation of landscape plant material for stressful locations; landscape management studies; chemical regulation of growth of woody plants; establishment of plants along roadsides, and nitrogen fixation.

Dr. Hensley has worked in the landscape industry and has designed, installed, and managed landscapes. He is a frequent speaker at state and


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regional meetings and has an extensive list of publications, both scientific and trade publication articles.

## BOTRYTIS BLIGHTS OF FLOWER AND FOLIAGE PLANTS IN THE GREENHOUSE

The most commonly encountered diseases of herbaceous ornamentals are those caused by *Botrytis*. Blights (of any plant part), leaf spots, stem cankers, rots of corms, rhizomes, roots, tubers, and seeds, and damping-off of young seedlings are all symptoms of *Botrytis* diseases.

The name of the disease on a certain host sometimes describes a symptom characteristic of the disease on that host. For instance, on poinsettia, *Botrytis* causes a cutting rot as well as a bract blight. In general, all the diseases might be called *Botrytis* blight. The gray mold, describing the fungal sporulation, is also used to describe diseases caused by *Botrytis* spp.

### Pathogen Cycle

Infection might result from germinating conidia with penetration through undamaged tissue, stomata, or wounds. Most hyphae (branched, tubelike filament) growing from either dead plant parts of from extraneous organic matter in contact with host tissue. This organic matter serves as a "food base" for the fungus.

Conidia (asexual spores) of most *Botrytis* spp. are dry and dispersed in air currents in very large numbers over great distances. Sometimes they are dispersed in or on water droplets. Conidia in a film of water with dissolved nutrients for a minimum period (usually several hours, depending on temperature and other factors) are the basic requirement for infection. Conidia can also be dispersed by insects such as bees and aphids.

To some extent, the mycelial inocula (fungal strands) are more independent of persistent water films containing nutrients. Water does improve adherence of diseased plant parts, such as blossoms, to healthy tissue. Mycelial inocula may be minute to very large and are usually not as susceptible to environmental conditions as conidia. Pieces of wind-blown and rain-splashed plant debris containing mycelia are important dispersal propagules. Petals and whole senescent flowers, easily infected by *B. cinerea*, might drop onto healthy tissue or be dispersed by wind or rain.

### Conditions Favorable for Disease Development

Gray mold diseases are often called "diseases of bad management." In the controllable environment of the greenhouse, this is often true. An epidemic of gray mold disease depends on a complex sequence and interaction of biological events such as the production and dispersal of various inocula, infection, pathogenesis, and pathogen survival. Each event is predisposed by different sets of environmental and agricultural factors as temperature, rainfall, humidity, crop protection, nutrition, and phenology.

Epidemics caused by *Botrytis* spp. can happen very fast in comparison with those of most other diseases. The incubation and latent periods can be very short. A conidium can be formed within eight hours after infection. Many factors are known which predispose crops to *Botrytis* diseases (Table 1). Epidemics can be controlled but only by the integration of a wide variety of crop management practices.

Generally, epidemics caused by *Botrytis* spp. occur in cool, wet, and humid weather, conditions which favor sporulation, infection, and also predispose the host. Surface wetness and temperature operate together in determining initial infection from spores.

The stage of host development is an important factor in epidemiological studies. Typically, *Botrytis* diseases are those of older, and especially senescent, tissues. In many greenhouse crops, young tissues, such as bedding plant seedlings or newly harvested cuttings, are very susceptible. Between these two extremes there is normally a period of relative resistance when epidemics are rare.

Many factors might predispose plants to *Botrytis* diseases. Overirrigation of cuttings, excessive nitrogen fertilization, crop shading, shelter from the drying effects of greenhouse fan systems, spacing of plug seedlings or cuttings, high relative humidity in the greenhouse, and dense growth of stock plants are only some examples of predisposing factors.

### Disease Control

Even though *Botrytis* diseases can be controlled in many ways, they remain among the most economically destructive diseases in the greenhouse. Control of these fungi is difficult because they can attack crops at almost any stage in their growth and they can infect all plant parts. *Botrytis cinerea* occurs on a wide range of living cultivated and wild host species as well as persisting

**Table 1. Some factors which have been reported to definitely predispose plants to *Botrytis* disease epidemics.**

| Predisposing Factor | Host |
| --- | --- |
| Old, senescent tissue | Any rapidly drying floral part or any aging vegetative tissue |
| Frost | All frost-damaged tissue |
| Low temperature | Gladiolus corms |
| Wounds (caused by any agent) windblown sand, sun, hail, fungal lesions, rapid water intake | Most crops, especially grapes |
| Crop fertilizers (deficiencies and excesses of) N, P, K, Mg, Ca | Many crops, strawberries |
| Atmospheric pollutants such as ozone | Geranium, poinsettia |
| Ethylene | Cut-flowers, especially carnations |
| Pesticides and growth regulators: fungicides: ethylene-bisdithiocarbamate (EBDC), maneb, zineb | Tomato, grapes |
| Insecticides | Snapdragon |
| Chloropropham | Tulip |
| Microorganisms, epiphytic organisms, parasitic microorganisms, such as *Puccinia antirrhini* | Snapdragon |
| *Corynebacterium zonale* | Geranium |
| Mites | African violet |

on dead plant material. Thus, it presents a constant threat of infection.

**Fungicides.** In the early 1960s, chemical control was greatly enhanced by the introduction of systemic fungicides benomyl (Benlate DF or Tersan 1991 DF), thiophanate-methyl (Cleary's 3336), and carbendazim. These chemicals were extremely toxic to *Botrytis* spp. and were superior to the standard protectant fungicides such as captan and dichloran (Botran). The level of disease control was significant, but the development of tolerance by *Botrytis* spp. to benzimidazole fungicides was a serious setback. Following the emergence of resistance to benzimidazoles, dicarboximide fungicides iprodione, (Chipco 26019) and vinclozolin (Ornalin) have been used widely for control of *Botrytis* diseases on many crops. Recently dicarboximide-insensitive isolates of *B. cinerea* have been found. Chlorothalonil (Daconil 2787 or Exotherm Termil is also widely used and serves to counter this resistance. Some of the newer ergosterol biosynthesis inhibiting (EBI) fungicides might prove to be useful in the future.

**Environmental controls.** The greenhouse environment can be manipulated to promote conditions unfavorable for infection. Relative humidity can be reduced by increasing the temperature and venting at the end of the day. Air circulation over and through the crop fertilization planned to avoid lush vegetative growth, cultural practices such as irrigation method, spacing, and sanitation (including removal of weed hosts as well as debris) are all measures that can contribute to control by reducing the inoculum and creation environmental conditions less suitable for infection of plants.

In producing a crop in the greenhouse, the following measures can generally be applied to all ornamentals:

1. Before crop production is initiated, remove and destroy all diseased plants or parts and all plant debris and weeds. Continue sanitation practices throughout production.
2. Use disease-free seeds, plants, stock plants, or propagating stock as bulbs, corms, tubers, rhizomes.
3. Handle all plants carefully during transplanting to avoid damaging any tissue.
4. Irrigate the growing medium without wetting the foliage. Overhead irrigation is not satisfactory. Not only does it wet the leaves, but it also jars the plants. This has been shown in geranium crops to release a great number of spores into the air.
5. Space plants with leaves not touching so that air circulation over all the plant surfaces is possible.
6. Keep the relative humidity as low as practical. Evacuate warm, moist air in the evening and replace it with cool dry air. This cool dry air should be heated, reducing the relative humidity and thus the tendency for condensation of water onto plant parts.
7. Apply protective fungicides thoroughly and in anticipation of the concurrence of developing inoculum and susceptible plant growth in the greenhouse. Continue on an appropriate schedule as long as the weather remains cool and dry. With some crops it might be possible to apply fungicides after blossoms open.

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Reprinted from the Ohio Florists' Association Bulletin, Number 733, November 1990.

## NURSERY NOTES

### *HERE'S AN IDEA YOU CAN SELL: FLORAL BEAUTIFICATION PROJECTS REDUCE CRIME*

When the Wisconsin Department of Transportation launched a beautification project and began landscaping rest areas and tourist information centers with flowers, it got results it did not expect. Vandalism at the rest areas, which previously occurred frequently, has all but stopped. State transportation officials had other reasons for landscaping the sites, but they theorize that flowers make the buildings and grounds warmer and more personal. While vandals willingly deface and damage cold impersonal structures, they may be induced by the flowers to identify with the rest areas and respect them.

The Horticultural Helper

### *CORNELL FINDS BAKING SODA EFFECTIVE IN FUNGUS CONTROL*

A solution of common baking soda has been found to control some fungal diseases in roses. According to research conducted at Cornell, a baking soda mixture was found effective in controlling powdery mildew and blackspot on roses. "It's not uncommon for fungal diseases to develop a tolerance to fungicides," plant pathologist Kenneth R. Horst explains. "With all the concerns over chemicals in the garden and greenhouse, we were interested in finding an effective, environmentally safe and inexpensive treatment for economically important plant diseases". Who knows what "pantry power" might be used for in the future?

NYSFI Update

### *ARALIA NAME CHANGES*

Authors at the Missouri Botanic Garden have recently reviewed the nomenclature of some cultivated tropical Old World and Pacific Araliaceae an brought it into agreement with contemporary taxonomic concepts of the family. Some changes for some of the commonly grown Aralia in Hawaii are:

| OLD NAME | NEW NAME |
|---|---|
| Brassaia actinophylla | Schefflera actinophylla |
| Dizygotheca elegantissima | Schefflera elegantissima |
| Tupidanthas pueckleri | Schefflera pueckleri |
| Polyscias filicifolia | Polyscias cumingiana |
| Polyscias balforiana | Polyscias scutellaria |

*A GROWTH INDUSTRY*

Statistics from "Production and Marketing of Floriculture and Environmental Horticulture Products: A Statistical Review, 1960–1988" released by the Commodity Economics Division of the U.S. Department of Agriculture's Economic Research Service shows that the greenhouse/nursery industry is one of the fastest growth sectors in agriculture in the United States, with an average annual increase of 10 percent.

## SCREENING SPATHIPHYLLUM CULTIVARS FOR RESISTANCE TO CYLINDROCLADIUM ROOT ROT

*Cylindrocladium spathiphylli* causes severe root rot of spathiphyllum and damping-off of young spathiphyllum plants. Losses to this pathogen vary widely and disease levels may be low and chronic or on an epidemic scale in commercial nurseries. Fungicides are available to reduce infection rates but plants with more than 30% root rot rarely recover, even with therapeutic fungicidal applications.

Several cultivars of spathiphyllum were screened for resistance to *C. spathiphylli*. These included 'Tasson', 'Queen Amazonica', 'Wendlandii', 'Wallisii', 'Clevelandii Merry', 'Clevelandii White Lady', 'Silver Streak', and 'Mini', obtained from Lyon Arboretum or Florida. All cultivars were highly susceptible to *Cylindrocladium* except for 'Mini' and 'Silver Streak'. Typically, 4 weeks after inoculation with *C. spathiphylli*, susceptible plants of cultivars such as 'Tasson' were dead or exhibited 90 to 100% root rot with severe corm rot. The cultivar 'Mini' showed slight resistance with 80% root rot and moderate corm rot. The foliage remained green in spite of the severe root rot at 4 weeks.

'Silver Streak', obtained from Lyon Arboretum, was the only cultivar showing good resistance or high tolerance. Four weeks after inoculation, less than 10% of the roots were rotted.

Recently, 'Leprechaun', a cultivar donated by Hawaiian Sunshine Nursery was tested and it also showed tolerance to *Cylindrocladium* (Fig. 1). Root rots developed very slowly and corms had very few lesions. Two months following inoculation, most of the plants showed less than 50% root rot and tops remained green and turgid.

It is anticipated that with application of clean culture practices and supplemental fungicide use Cylindrocladium root rot can be effectively controlled in 'Silver Streak' and 'Leprechaun'.

J. Y. Uchida, P. S. Yahata,
C. Y. Kadooka, and M. Aragaki

**Figure 1. Healthy *Spathiphyllum* cv. 'Leprechaun' (top row) and diseased *Spathiphyllum* cv. 'Tasson' (bottom row). All plants were inoculated with *Cylindrocladium* 3 weeks before photography.**

## AVAILABLE PUBLICATIONS

The following recent publications are available from the University of Hawaii by contacting the author directly.

*DENDROBIUM*

This publication, ECONOMIC FACT SHEET No. 13, by K. Wanitprapha, K. M. Yokoyama, S. T. Nakamoto, K. W. Leonhardt, and J. M. Halloran provides information on the productivity of dendrobium orchids, the world supply and demand, selected markets, and the dendrobium in Hawaii. Contact Kulavit Wanitprapha, Department of Agricultural and Resource Economics, 3050 Maile Way, Honolulu, HI 96822.

*BUMPY FRUIT OF PAPAYA AS RELATED TO BORON DEFICIENCY*

This publication, COMMODITY FACT SHEET PA-4(B), by M. S. Nishina provides information on studies on boron nutrition on papaya under Hawaiian soil conditions. Contact Melvin S. Nishina, 875 Komohana Street, Hilo, HI 96720.

*PHYTOPHTHORA DISEASES OF ORCHIDS IN HAWAII*

This publication, RESEARCH EXTENSION SERIES 129, by J. Y. Uchida and M. Aragaki provides information on this disease and its symptoms, the causal organisms and their spread, and control measures. Color plates are provided to aid in identification. Contact Janice Y. Uchida, Department of Plant Pathology, 3190 Maile Way, Honolulu, HI 96822.

*AN ECONOMIC PROFILE OF HAWAII'S LANDSCAPE SERVICES*

This publication, RESEARCH EXTENSION SERIES 128, by L. J. Cox, J. R. Hollyer, and D. M. Schug presents information on the role of landscape services in Hawaii's economy based on surveys of businesses and organizations that provide these services. Contact Linda J. Cox, Department of Agricultural and Resource Economics, 3050 Maile Way, Honolulu, HI 96822.

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