THE MAINE LEAF

A Newsletter for Maine Horticulturists

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Edited by Richard Folsom
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COMMENTS FROM THE STATE HORTICULTURIST

E. Ann Gibbs

Hardwood Trees Beware!
Our hardwoods seem to be taking a beating with the introduction of many wood-boring beetles from Asia. Most of the beetles have been brought in solid wood packing and are now spreading and causing damage to trees. One new species was identified this summer and another beetle is spreading.

The emerald ash borer (*Agrilus planipennis)* is an insect pest that was discovered in July feeding on ash trees in Michigan. This same pest was also confirmed in Windsor, Canada, across the border from Detroit, where it has killed 100's of street trees. This borer is indigenous to Asia where it attacks various species of ash, elm and walnut. The scary part about this pest is that it has probably been in the area at least 5 years.

The adults are emerald green, hence the name, and smaller than a penny. Damage occurs when larvae feed on the inner wood, forming galleries, eventually girdling branches and tree trunks. Symptoms include D shaped exit holes on branches and trunks, branch dieback and eventually death of the tree.

Michigan has imposed a quarantine for the infested area and there were few nurseries in this area exporting ash. Keep an eye on any ash nursery stock that you import and call if you have questions.

Another pest is spreading. Last week officials from the New Jersey Dept of Agriculture (NJDA) confirmed that Asian longhorned beetle (ALB) has been found in their state. ALB was detected close to a tunnel that is a major thoroughfare to New York City. NJDA has quarantined a nine-acre site with about 100 infested trees. An observant homeowner found the beetle. This once again illustrates the importance of the public in detecting invasive species.

So keep your eyes open and don't bring any firewood from NJ or MI. Rumor has it there will be lots available!

Maine's action plan for managing invasive aquatic species has been sent to the governor for approval.

The Land and Water Resource Council (LWRC) approved the state's management plan last week. The LWRC is comprised of the commissioners from natural resource agencies. This plan has been in the works since January 2002 and was written under the guidance of the Interagency Task Force on Aquatic plants and Nuisance species. Dale Pierson of Pierson Nurseries, Becky Linney of Groundnut Hill Nurseries and myself, represent horticulture interests on the task force.

While most of the plan focuses on boats as the major pathway for spread of invasive plants, the nursery industry plays a role selling plants for water gardens. The state has a list of 11 aquatic plant species that cannot be sold. This summer there were several incidences where illegal plants were sold that had been mislabeled and incorrectly identified. One of the tasks in the plan is to develop a list of suppliers of aquatic plants and educate them regarding Maine's law.

The plan will be submitted to the federal government later this fall enabling the state access to federal funds. If you have any questions about the task force or the plan contact, Dale, Becky or myself.

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PEST CONDITIONS ON ORNAMENTALS

Richard W. Folsom, Assistant Horticulturist

Insect pests were a problem for many growers this past spring. **Aphid** and **thrips** populations started early, built up quickly and became difficult to knock down for some. Pests may have overwintered in greenhouses on stray weeds or been brought in on purchased plants. Aphids were active early outside and may have flown in open doors and vents. Whatever the source, crops should be monitored regularly to catch developing pest populations. Strict sanitation should be practiced in the greenhouse. All weeds should be controlled in the fall, in the spring before opening and again as needed. Old stock plants (particularly if pest infested) should be disposed of. Watch incoming plants and control any incipient pest problems or immediately get back to your supplier. Be aware that state horticulture laws prohibit the sale of badly infested plants to other growers or the general public, and stop sales may be ordered if a grower is unable to control pests or persistently sells infested plants. If you are selling plants, pest control must be a part of crop culture just like watering and fertilization. There are new pesticides that are quite effective in controlling greenhouse pests, particularly if applied early and at regular intervals. The following are some effective controls: for **aphids**- Endeavor, Marathon II, Orthene, KnoxOut, DuraGuard, Closure, Azatin, BotaniGard; for **thrips**- Conserve, Orthene, DuraGuard, Avid, Closure, BotaniGard; for **whiteflies**- Marathon II, Distance,, Endeavor, Azatin, Avid, BotaniGard; for **spider mites**- Avid, Sanmite, Akari, Floramite, Hexygon, Pylon, Ovation, BotaniGard; for **fungus gnats**- Adept, DuraGuard, KnoxOut, Azatin, Citation, Distance.

As for perennials and woody plants, we did not find any of the new **daylily rust** (although common daylily problems like leaf streak, "spring sickness" and thrips injury were apparent). The **lily leaf beetle** continues to spread with new finds in Sagadahoc, Lincoln and Waldo Counties and has become a severe pest of *Lilium* if left uncontrolled. The **japanese beetle** was widespread, but beetles parasitized by the introduced tachinid fly (look for a white egg just behind the head on the thorax) were much in evidence. Chewing damage from the **three-lined potato beetle** was found on the leaves of *Physalis* and *Datura* and from the **golden tortoise beetle** on sweet potato vine and morning glory. **Lacebug** was common on aster, andromeda, rhododendron and other plants. Damage was caused by a variety of **sawflies** (red-headed pine sawfly on mugo pine, dogwood sawfly, garden loosestrife sawfly, rose sawfly, pear slug). Some flowering cherry street trees in Portland have been found heavily infested with **white prunicola scale** (trunk and branches white with the scale). I have not seen this pest in nurseries, but watch for it. The **leopard moth**, a European insect introduced into NY/NJ over 120 years ago, has been known from the southern tip of Maine for years. The large spotted caterpillars of this moth bore into the branches and trunks of a variety of hardwood trees. Damage might superficially look like asian longhorn beetle with large holes and ejected sawdust in top parts of trees, but the spotted caterpillars of the moth look much different than the fat grub of the beetle and the leopard moth keeps its holes covered with silken web. The leopard moth was found in crabapples further north in York County than known from the past, so it bares watching. **Elongate hemlock scale** can be a serious pest of hemlock and some other conifers (fir, spruce), but has only been found a few times in Maine over the last three years. Our hemlock woolly adelgid quarantine should help prevent movement of this scale pest as well since it is found

primarily in states that are infested with the adelgid. However, growers should watch for needle yellowing on any hemlock or fir brought in. Look on the under side of yellowed needles for signs of scale. Females of the elongate hemlock scale are brown and shaped like short cigars with rounded ends and the more numerous male scales are whitish with a light brown tip. If you suspect an infestation of this scale, give us a call so that we can check it out. Badly infested trees should be destroyed or returned to your supplier.

Hosta for the Home Landscape

By Elton M. Smith, Ohio State University.
Reprinted from the Ohio Florists' Association, Bulletin No. 779, September 1994.

If you are looking for plants which have foliage in various sizes, colors, shapes and textures; are attractive in the garden from spring until frost; shade the ground so most weeds don't get started; can thrive for 20 or more years in one site without need for division or transplanting; and become more beautiful as the years go by, then *Hosta* is for you.

Nomenclature: Hosta was named for Nicolaus Thomas Host, a 19th century Austrian botanist. Hostas, pronounced hos'ta, also known as plantain lily or Funkia, have been in existence for centuries, but have been rediscovered in the last 20 years with an increasing number of cultivars becoming available. The increase is due to tissue culture introductions and the fact that many species are polymorphic, which means they readily mutate. Thus, nomenclature is in a state of confusion, and the parentage of plants is rarely well documented. Hostas are often sold with only the cultivar name, because there have been so many different species in the pedigree that it is easier to use a single name. There are more than 400 hybrids, cultivars, and species available, and the number is rapidly increasing.

Description: Hosta are mounded, clump-forming, rhizomatous, long-lived herbaceous perennials hardy to Zone 4, having many spirally arranged leaves radiating from the base of the crown. Hostas are grown for their foliage, often sold in bloom, but devoid of decorative fruit. The leaves may be shiny or dull, smooth or puckered, narrow or broad and wavy, entire or twisted. Foliage can be found in various shades of green, blue-green, yellow, and white, or edged with gold, yellow, or white.
The flower stalks are racemes up to 4 feet in height, depending on plant size and vigor, and they vary in color from pure white to shades of lilac and blue, often with white stripes. The individual florets on the flower stalk are trumpet-shaped and open from the base to the top over a period of three weeks.
The plants have a mounded habit of growth and when not in bloom, they range in height from 6 inches or less to 3 feet or more.

Culture: Light: Relatively few plants grow well in shade, but Hosta is an exception. Some green forms will grow well in full sun, but the majority require dappled or partial to full shade. Most Hosta have a large leaf surface from which to evaporate water, as well as plenty of chlorophyll to effectively utilize the small amounts of sunlight that filter through the overhead canopy of trees – the right combination to succeed in cooler temperatures and reduced light.

Generally, variegated and yellow-leaved forms require partial shade, blue-green forms require heavier shade and some green forms will tolerate more sun.

Soil: Hosta grow best in well-drained soil that is rich in organic matter to retain needed moisture. Amending soil may be a necessity, particularly if the plants are located under shade trees with large leaves such as Sycamore or Norway Maple that shed rainfall and if soils are often very dry. At planting, mix with the parent soil – to a depth of 6 inches or more – one-third or more of compost, potting grade pinebark, peat moss or similar material to enhance aeration, drainage, and moisture retention. If organic matter is not ample, growth of Hosta will be reduced, foliage will turn brown or paper colored along the edges, and plants will never grow to their full potential.

Fertilizer: Following planting, fertilize with a slow-release fertilizer with a 1-1-1 ratio at label rates. Continue fertilizing for several years or at least until the plants are fully established. Avoid excessive fertilizer rates.

Watering: Water newly planted Hosta regularly throughout the first two years following planting. Apply one inch of water per week between rainfall and irrigation, from the time of planting until the first frost.

Pests: Slugs are the major pest problem with Hosta, and if uncontrolled, can chew numerous holes in the foliage. Slugs hide under mulch or litter during the day, and feeding takes place at night. There are several bait products on the market which, if applied regularly, work effectively.

Propagation: Division and tissue culture are the two most practiced methods of propagation. Plants can be divided in early spring before the leaves emerge. Commercially, however, most Hosta are divided in late summer – early autumn. Hybridizers produce Hosta from seed, however, the majority of the newer cultivars available today are produced in tissue culture laboratories.

Landscape Value: Selected Hosta of the right size and habit, make excellent weed-free ground covers and superlative edgers to delineate beds and walks. Larger plants serve as background plants in the design, to hide undesirable objects and soften harsh architectural features such as foundations and walls. Use the white or yellow foliage forms to lighten dark corners or to be enjoyed during early evening hours from a patio or deck.
Hosta can be effectively planted with companion plants that also tolerate shade such as fern, *Astilbe*, *Polygonatum*, and broadleaved evergreen shrubs.

Merchandising Tips:
In the retail center, display most Hosta under lath or fabric shade cloth. If a shaded area is not available, choose carefully for sun-tolerant selections. Hosta should be offered for sale from May through flowering in late summer, depending on species or cultivar. Group Hosta with Astilbe and ferns which also require shade. Create display beds with low Hosta selections around the perimeter and larger plants inside. Locate blue flowering annuals or perennials with blue-leaved Hosta and similar combinations in gold or yellow. Have soil conditioner and slug bait available for tie-in sales.

Pythium Root Rot

By Gary W. Moorman, The Pennsylvania State University.
Reprinted from the Long Island Horticulture News, May 2001

Pythium root rot can be caused by several different species of the fungus Pythium. These fungi are common in field soil, sand or sediment of surface water supplies, and dead roots of previous crops. Pythium has also been found in some commercially available soilless potting mixes. Pythium is easily introduced into pasteurized soil or soilless mixes by using dirty tools, dirty pots or flats, walking on or allowing pets to walk on the mixes and by dumping the mixes on benches or potting shed floors that have not been thoroughly cleaned. When introduced into pasteurized soil or soilless mixes, Pythium can cause severe root rot because it has few competitors to check its activity. This fungus poses a threat to crops grown in ebb and flow systems. If the reservoir is heavily contaminated with debris or a soil harboring Pythium, the fungus can spread to a large number of plants quickly. If the fungus infests a cutting bed or if contaminated water is used in propagation, large losses usually occur.

Almost all plants are susceptible to Pythium root rot. Root tips, which are very important in taking up nutrients and water, are attacked and killed. Pythium also can rot the base of unrooted cuttings.

Symptoms

- Plants are stunted.
- Root tips are brown and dead.
- Plants wilt at mid-day and may recover at night.
- Plants yellow and die.
- Rot may proceed up the stem.
- Brown tissue on the outer portion of the root easily pulls off leaving a bare strand of vascular tissue exposed.
- The cells of roots contain many microscopic thick-walled spores.

Management

Pythium root rot is difficult to control once root rot has begun. Every effort should be directed toward preventing the disease before it begins. Pasteurize soil and sand with heat or chemical fumigant treatments. Be certain the intake pipe of an irrigation system using surface water is well above the bottom of the reservoir, stream or river so that sediment is not drawn in. If the water supply is suspected of being the primary source of Pythium, it may be necessary to treat the water before use. Slow sand filtration has been shown to be an effective, simple, and inexpensive method for removing Pythium from water.

Cover the treated soil and store it or the soilless mix in an area that will not be contaminated through the introduction of nontreated soil. Likewise, cover ebb and flow system reservoirs.

Disinfest all surfaces, tools, and equipment that will contact the potting mix. In a greenhouse operation with a history of failing to prevent Pythium root rot, apply a fungicide at planting and repeat the application at appropriate intervals. The following chemicals are effective in controlling Pythium. Be certain the crop to be treated is listed on the product label before treating the crop.

Fungicides used for Pythium control:

Common Name	Trade Name
Etridiazole	Truban, Terrazole; also in Banrot
fosetyl-Al	Aliette
metalaxyl	Subdue
propamocarb	Banol
Mefenoxam	Subdue Maxx

Screening to Exclude Insects

By Karen L. Robb, University of California.
Reprinted from the Ohio Florists' Association Bulletin, No. 793, November 1995

I had an interesting experience the other day. A grower explained to me that he had been trying to use integrated pest management (IPM), but the predators couldn't keep up with the pests migrating into the greenhouse. So he had "abandoned IPM and installed exclusion screening" to control his thrips population. Of course, what he overlooked was that he had not abandoned IPM, he had simply opted for a different tool!

Integrated pest management is the utilization of several control strategies to achieve effective and economical suppression of pests while reducing or eliminating the use of pesticides. The most effective strategy for insect control is prevention. One IPM strategy particularly suited to prevention in greenhouses is the use of physical barriers to exclude insect pests in areas where pest populations occur naturally in large numbers outside the greenhouse.

Greenhouse structures that have open sides or vents for ventilation offer no impediment to the movement of insect pests. A significant proportion of pest infestations result from insects moving into greenhouses from surrounding areas. In fact, research in rose greenhouses demonstrated a direct correlation between the number of insects caught on sticky traps at vents and the number of thrips found in the flowers the following week. Screening vents and doorways can greatly reduce the movement of insects into greenhouses, reducing or eliminating the need for insecticide applications. Exclusion screening is being used by growers in Europe, Israel and North America. Growers have reported 50 to 90 percent and greater reductions in insecticide use as a result of screening.

There have been several laboratory studies evaluating the efficacy of selected screens for control of target pests with promising results. However, screens have been shown to be even more effective at excluding insects than laboratory tests suggest. For example, although a few small male western flower thrips (4 percent) managed to pass through the Vispore Barrier screen in a 24-hour period during caged studies, no thrips were ever trapped or found in a small greenhouse

trial evaluated for six months. The use of screens has resulted in reduced arthropod populations and in reduced incidence of virus transmission with a concomitant reduction in pesticide use.

Clearly the most effective strategy for insect control is 100 percent exclusion. This is difficult to achieve, however, because it requires strict adherence to stringent sanitation and operating procedures. For some growers or operations, these stringent requirements may be too restrictive to fit into current production practices. However, some situations do require 100 percent exclusion methods for satisfactory control of insects and diseases.

The level of exclusion required is primarily a function of the growing situation. Plant propagators need to be especially stringent in their exclusion efforts to ensure that they do not ship insect- or disease-infested plant materials to other growers.

On hundred percent exclusion is especially warranted when virus-susceptible propagative material is being produced. For example, infectious, adult western flower thrips can transmit the tospoviruses, Tomato Spotted Wilt Virus or Impatiens Necrotic Spot Virus, to sensitive crops within 30 minutes of feeding. There is no cure for these viruses; the control recommendation is to rogue (weed out) infected plants and control thrips. There are no pesticides available which provide continual protection from one pesticide application to the next. Thus, exclusion is a more effective virus control strategy than chemical control of western flower thrips. This is true for commercial propagators and for growers who propagate their own material.

Exclusion Standards

One of the most important factors in managing insect populations in ornamental crops is to start with clean plant material. This is virtually impossible, however, because insects move from production areas to stock and rooting areas. Therefore, although not every grower can adapt to the stringent requirements for 100 percent exclusion of entire greenhouses, many growers can still use 100 percent exclusion in crucial propagation areas.

The strictest standards of exclusion include limiting greenhouse access to only key personnel. Attention to production procedures in planning the physical design of the screening is important. For example, at the Ecke Ranch, the packing area was included within the screened environment to allow packing ease without compromising the exclusion system.

Additional steps that are taken to ensure the integrity of a 100 percent exclusion program include the use of double-door entry systems with positive air flow and disposable clothing to reduce the risk of insects “hitchhiking” into the greenhouse.

Growers who are using screening for insect management on finished crops will not need to give the same attention to detail as do plant propagators. For example, they will not need disposable clothing, but they will want to ensure that the doors remain closed, even during packing.

Many growers have achieved significant reductions in pest problems and reduced pesticide applications without 100 percent insect exclusion. For example, several growers with naturally vented greenhouses, which could not easily be retrofitted for complete exclusion, screened only the side of the greenhouse facing the prevailing wind. These growers effectively restricted the migration of a majority of insects. Certainly this strategy does not exclude all insects from the greenhouse; monitoring and some insecticide applications are still required. However, growers using this technique have reported significant reductions in pest levels. These smaller

populations are easier to manage and require fewer pesticide applications. In fact, one grower reported a 90 percent reduction in insecticide application after screening only one side of his greenhouse.

Exclusion screening is often considered a stand-alone technique for controlling insect pests. In fact, as with all IPM techniques, it is just one of several tools in pest management. Exclusion screening is also used in combination with biological control agents.

The need to use multiple tools in an IPM program has been illustrated in several biological control trials. For example, in a previous demonstration project on chrysanthemums, screening was not used at any of the three demonstration sites. Migration of pests into the demonstration greenhouses posed a serious problem in controlling leafminer damage. The parasites used preferentially parasitized the later stage larvae with more visible mines. The leafminer parasites were effective in the sense that all leafminer samples returned to the laboratory for evaluation revealed only parasitized leafminer larvae. However, constant leafminer migration into the greenhouse resulted in continued egg deposition and visible damage on the leaves by earlier stage larvae. Subsequent biological control trials on chrysanthemums and poinsettias have demonstrated increased efficacy and reduced damage when screening is incorporated into the program.

Screening Performance

The use of screening for exclusion of insects has been widely demonstrated to be an effective IPM tool. Screening greenhouses to exclude insects is no small undertaking, but there are several measures which will help ensure success. The first, and extremely important, factor is the design of the exclusion system. This aspect was described well by Dr. James Baker in the April 1995 *Bulletin*. Other factors include starting with clean, insect-free greenhouses, selecting the proper screen size for the target pest, and assuring adequate air flow.

Maintaining the exclusion system after it has been installed in the greenhouse is also very important. Regular cleaning of the screens to prevent buildup of dust, insects, or debris is essential to the performance of the system. Debris accumulation will result in reduced air flow through the structure and higher greenhouse temperatures, and it can ultimately reduce motor life and increase electrical consumption. Follow the screening manufacturer's recommended methods for cleaning. Do not wash screens while fans are running. The capillary action of water on the screen will effectively block air flow.

Good sanitation and maintenance practices should be followed closely. Any holes in screens should be identified and repaired in a timely fashion. Reduce the likelihood that insects will hitch a ride into the greenhouse by limiting access, incorporating a positive air flow system at the greenhouse entry, and educating employees.

Monitoring Exclusion

Plant material is another source of pest entry. All plant material should be checked for infestations and treated with pesticides, if necessary, prior to introduction into the screened area.

As in all IPM programs, sticky traps should be used to monitor insect populations on a weekly basis. Monitoring provides a rapid and needed assessment of this pest management strategy, allowing time for remedial action if necessary.

Screening for exclusion of insect pests is but one tool in an overall IPM program. In areas where significant numbers of pests migrate into the greenhouse from the surrounding areas, this tool can be extremely important and useful, as an increasing number of growers can attest.

Think of Water from a Plant Disease Perspective

Dr. Ann Brooks Gould, Rutgers University and Ms. Margery Daughtrey, Cornell University
Long Island Horticulture News, Feb. 2002

The balance among the microorganisms that cause disease (called pathogens), their host plants, and the environment ultimately determines whether a disease will develop. The environmental factor that has the most impact on plant disease development is moisture. Living organisms consist chiefly of water, so the uptake of water is critical if organisms, both plant pathogens and their hosts, are to grow.

The role of Water in Plant Disease Development

From a host perspective, too little water in the soil (drought stress) or too much soil moisture (which leads to oxygen deprivation) places plants under stress, and plants with water stress are more susceptible to disease. Water is also important to facilitate movement of nutrients from the roots to aerial plant parts, as well as sugars, made in the leaves during photosynthesis, to the roots. Thus, any environmental condition or disease (such as a vascular wilt or root rot) that impedes the flow of water in the vascular system also places undue stress on the host. Symptoms of plants with long-term water stress (at either extreme) include leaf wilt, yellowing, scorch, or premature drop, a decline in vigor, progressive branch dieback, and eventual death.

From a pathogen perspective, moisture extremes have a similar impact. Although too much water in the soil deprives pathogens of oxygen, too little water impedes pathogen survival and the infection process. Free moisture on leaf or root surfaces is necessary for germination, penetration, and dispersal of fungal spores to new hosts. Indeed, most pathogenic fungi grow best in a damp environment. Powdery mildews are a notable exception, thriving in humid rather than wet conditions.

Pathogenic fungi secrete enzymes into leaf or root tissues to macerate, or soften up, host cells, releasing nutrients that are taken up by the fungus as food. Free moisture is needed to help move the enzymes out of the fungus and to let the nutrients flow back in. Some species of fungi with very thin walls require a continuous supply of water to prevent desiccation.

Water is also important for the infection process, which is a series of steps that includes spore germination, penetration through the host epidermis, and fungal growth within the plant tissues. The pathogen can be particularly vulnerable to drying while it is in the process of trying to infect the plant. For aerial plant pathogens, free moisture and high relative humidity is important for infection of leaf and other above-ground tissues (such as petals, stems, branches, or fruit). This process requires a period of continuous leaf wetness, and this “duration of leaf wetness” varies

with the fungus. For example, spores of *Venturia inaequalis*, the pathogen that causes apple scab, require 9 hours of continuous leaf wetness to infect leaves and fruit. It stands to reason, therefore, that irrigation strategy and amount of natural rainfall would have a great impact on the development of this disease.

For fungi that attack roots, free moisture is also required for the infection process. In addition, water in soil pores is needed for the motile spores (called zoospores) produced by a group of common soil pathogens (the water molds) to swim toward healthy roots. Finally, moisture, in the form of rain, splashing, and running water, is important for the dispersal of spores of all kinds of fungi to the roots or foliage of new hosts.

Managing Water in the Nursery: The clue is to think like a plant and think like a spore!

Moisture management in the nursery is important from both a plant health and a pathogen point of view. Too much or too little moisture during production can have equally devastating results. Some points to keep in mind include:

- As a rule, avoid prolonged periods of leaf wetness. If using overhead irrigation, water to minimize the length of time foliage stays wet. Water during early morning hours or water during warmer, breezier periods when rapid drying is likely to occur. Consider using drip irrigation or aimed microemitters which do not place moisture on foliar surfaces.
- Avoid excess moisture in potting mix. In addition to its harmful effects on the host, too much water promotes the activity of both water mold (e.g., Pythium and Phytophthora) and non-water mold (e.g., Rhizoctonia, Fusarium, and Thielaviopsis) soil pathogenic fungi. Excess water is also conducive to the growth of anaerobic bacteria which produce by-products that are toxic to plant roots.
- Use a balanced potting mix with properties of aeration and moisture retention that are appropriate to the size of the container. In mixes that do not drain well, a perched water table is created at the bottom of the container, which encourages the growth of microorganisms and pathogens and deprives roots of oxygen.
- When using hydrophobic components in mix, such as ground bark or peat, avoid extreme drying of the pot. Rewetting such mixes is difficult; water from overhead sprinklers simply channels around the rootball and drains away.
- Some woody ornamentals are prone to edema. Edema, or corky, blister-like outgrowths on the lower surface of leaves, occurs during cloudy periods with abundant moisture. In such conditions, when more water is supplied to leaf tissues than is lost during transpiration, the cells that line leaf stomates (where gas exchange occurs) become too full and burst. Ornamentals especially prone to edema are Camellia, Hedera, Hibiscus, Ligustrum, Pittosporum, and Taxus.
- Diseases (particularly Phytophthora root rot) can be spread when pathogen-infested pond water is used for irrigation. Avoid using pond water if possible, and do not allow runoff water from growing areas to drain directly into irrigation ponds.

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S T O C K E X C H A N G E

For Sale -- Northern grown B&B evergreens--arborvitae, fir, pine and spruces. Also available, a complete line of B&B and container shade trees, flowering shrubs, and trees. Call for availability.
- - Dutton's Nrsy, Ghse & Landscaping - 155 North Main St., Morrill 04952
Tel: 207-342-5677

For Sale -- Conifer seedlings, transplants and plug stock. Over 20 varieties of spruce, fir and pine available for spring and fall planting. Woody Ornamental Liners in 3" pots, 32 per tray. 300 varieties of hardy northeastern native plants, shipped as available year round. Evergreen Brush for wreath making, you cut.
- - Western Maine Nurseries, Inc., 1 Evergreen Dr., Fryeburg 04037
www.westernmainenurseries.com **Tel:** 1-800-447-4745 **FAX:** 207-935-2161
e-mail: wmntrees@nxi.com

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- - Robbins Lumber, Inc., POB 9, Searsmont 04973 Attn: Jim Robbins
Tel: 207-342-5221 **FAX:** 207-342-5201 **e-mail:** jlrobbins@rlco.com
website: www.rlco.com

For Sale -- Quality Grown Perennials, Herbs, Topiaries, Potted Plants, Proven Winners®, Proven Selections™, Garden Mums, and Hanging Plants. We specialize in Holiday Plants. Call to get delivery times to your area.
Open: Mon. – Fri. 8AM – 5PM Sat. & Sun. 8AM – 2PM
- - Grey Barn Nursery & Ghses, Inc. Route 160, RR 1 Box 100, Cornish 04020
Tel: 207-793-2543 **FAX:** 207-793-3400 **e-mail:** greybarn@psouth.net

For Sale -- Available daily: variety of flowering plants, assorted sized foliage plants & dish gardens, hanging baskets - 6",8",10". Specializing in Holiday Plants.
- - Barrow's Greenhouse, 312 Main St., Gorham 04038 **Tel:** 207-839-3321

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