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Circle No. 101 on Reader Inquiry Card

SAFETY FIRST: A List

■ *Being in the lawn care business isn't easy, especially if you follow all the rules of safe, common sense procedures.*

Here's a list of safety tips by Dr. Austin Frishman, well-known expert in the structural pest control profession. They all apply to the LCO.

SPILL CONTROL

1. Does each vehicle have appropriate spill control material, and does each technician know how to use it?

SPRAYERS

1. Has each applicator demonstrated to his or her superior how to apply control products properly with each piece of equipment you have issued ?
2. Do you have a working pressure gauge for the compressed sprayer?
3. Can the applicator make simple repairs on the compressed sprayer?
4 Does the applicator carry repair tools and spare parts for sprayers?

DATA SHEETS

1. Are all Material Safety Data Sheets (MSDS) up to date? Do you have a copy of a letter sent to your distributor requesting such?
2. Has each technician been given a written quiz on each pesticide label and MSDS sheet you have? Is the quiz in his or her file, and is it updated as needed?
3. Does each truck and each wallet carry the phone number of the local poison control center?

TRAINING

1. Are all applicators certified, even if not required?
2. Is there, in fact, an introductory training program at your company, including strong emphasis on safety storage?
3. Are technicians aware of state regulations that are stricter than the EPA label statement?
4. Are new employees who worked for other lawn care applicators mandated to compete your own training program before being allowed to do the work on their own?

EQUIPMENT

1. Do employees know how to properly use a respirator?
2. Ar you making at least monthly unannounced vehicle inspections, looking for safety features and proper storage?
3. Do all workers have the proper gloves, based on his or her duties? Are they checked weekly for holes and replaced as needed?
4. Have you issued the proper fire extinguishers and had one attached to each vehicle?
5. Does your required dress code include appropriate shoes?
6. Is there a policy on how often to clean the inside of your company vehicles, including the steering wheel?
7. Have you issued disposable hand towels for each vehicle?
8. Have you issued enough uniforms to allow for daily washing? Do employees know how to properly wash uniforms or work clothes?
9. Are you familiar with all Department of Transportation regulations as they pertain to your trucks? Do all vehicles have required Bill of Lading papers? Are you carrying the minimum amount of materials to be under the amount which requires extra paper work and safety procedures?
10. How's truck visibility when it comes to mirror placement?
11. Are vehicles cleaned and free of product odor before being sold or sent out for repair?

PUBLIC RELATIONS

1. Has the applicator been schooled in how to answer a customer's questions regarding pesticide safety?
2. Are accounts spot checked to see that the technicians have followed instructions and are solving control problems?
3. Are extra pesticide labels instantly available for customers as needed?
4. When you receive a call-back based on poor results, do you simply schedule an individual to treat again, or do you have your technician evaluate what went wrong? Maybe more product is not the answer.

CONTROL PRODUCTS

1. Do your control products have the highest LD_{50} values and present the least environmental hazard?
2. Are new control products given a trial run by key people, in selected accounts and locations before you decide to use it regularly?
3. Are all service containers properly labeled, in good shape, and replaced as needed?
4. Do you check the empty containers regularly to see that triple rinsing is practiced?
5. Have you developed a walk-about check list that technicians must review before applying control products? Example: areas frequented by children, pets; chemically-sensitive listings; wind conditions; non-target plants.

PERSONNEL

1. Are new applicators given a medical examination, including a check of their cholinesterase level?
2. Have you checked the recommendations listed by an applicant *before* you hire him?
3. Are you aware of workers on you crew whose health problems could alter your pest control procedures?
4. If applicators cannot identify a insect, weed or disease problem, do they bring a sample to the office for proper identification before applying a product?
5. Are office staff who speak to customers properly trained to answer technical problems?
6. Are key supervisors given refresher courses?
7. Do you check driver's licenses every year to make sure they're up to date?

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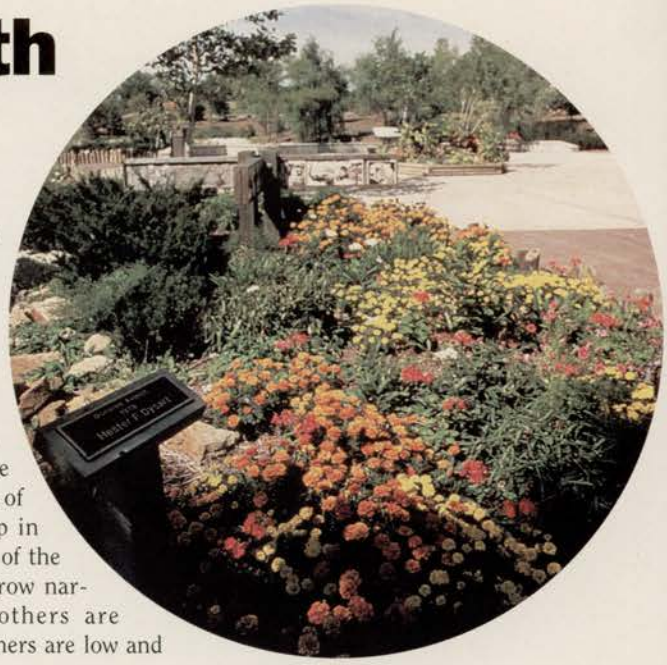
Circle No. 115 on Reader Inquiry Card

Color harmony with bedding plants

The end result should be as a living tapestry of pleasing, harmonizing colors and forms.

by James C. Schmidt



■ To successfully design a flower bed, you must be familiar with your plant materials. Evaluate the plants on the basis of their form, contrast, texture and color. Here are some considerations to help you plant a flower bed:

Form. The form of a flower is a basic element in designing a flower bed. The three major forms are spike, round (either individual or flower clusters) and intermediate. Spike flowers should be used as accents, similar to using pyramidal evergreens in the landscape. Used excessively, they become a disturbing force that breaks up the entire composition. Using no spike flowers runs the risk of monotony. Also, keep in mind the entire form of the plant. Some plants grow narrow and upright, others are mounded, and still others are low and sprawling.

Contrast. Contrast is using opposing elements close together to produce an intense or intriguing effect. Compositions with contrast get noticed. Many of the most striking gardens contain plants that look more dissimilar than alike. You can contrast textures, darks, lights, colors, shapes, lines...any design element. Flower forms and heights offer more opportunities for contrast.

Color. This is probably the most important consideration when designing bedding plant schemes. Color expresses individual tastes; no one can tell you which colors should dominate your compositions. The most important thing is that color should please the eye. A good guide for obtaining pleasing color combinations is a color wheel similar to what an artist uses. Red, yellow and blue are primary colors; orange, green and purple are secondary colors. A warm color is always opposite a cool color on the color wheel.

Warm colors are the boldest and tend to be strong in the landscape. They can be used to create vivid color combinations. As a general rule, you should use them in sequence. If space is ample, the sequence should be smooth and gradual, such as red to orange-yellow, to yellow, to cream and finally to white. A jump from red to orange, to yellow to white is too abrupt.

Combining colors—There is no rule of thumb for how much warm or how much cool color to use. But the smaller the area, the fewer warm colors you should use. Cool colors should be used in small areas as they give the illusion of depth.

Effective combinations can be made using complementary colors (those opposite on the color wheel). Orange and blue, yellow and violet, and red and green are complementary colors. Such compositions work best when one color is allowed to dominate the display and the other is used as an accent. Be careful with contrasting color schemes, because some of the combinations can be unpleasantly jarring. As a rule, avoid putting strong colors next to each other if the planting will be viewed at close range.

Other tips—Too often too much emphasis is placed on flowers. Pairing plants with non-green leaves, diverse variegation, glossy leaves, or blue tones ties a planting together and the assortment creates a mosaic backdrop that can enhance other flowers.

Don't spot a few flowers here and a few there. Group the plants in a staggered or irregular pattern that allows the mass of one plant to overlap or drift into the adjoining group.

This technique also eliminates the spottiness typical of many flower beds. Also, limit the number of varieties. This keeps the drifts simple but bold, and the border will have a strong visual framework that shows up from a distance.

Too many small drifts make the pattern too "busy," like a patchwork quilt.

By the same token, don't use many colors of the same variety. This will also result in a patchwork look.

View your arrangements from a distance, or consider how the planting will be

Color guide

- ❑ Use the darkest shades or the pure intense color at a point of principle interest.
- ❑ Never place two reds close together.
- ❑ Never use two strong colors together except for blue and yellow.
- ❑ Pastels are easy to blend but they lack vitality and won't show up from a distance. Dark colors won't show up either.
- ❑ Blue and white flowers are good colors to emphasize the color of other flowers. Using white as a contract color deepens and strengthens the color(s) next to it.
- ❑ In general, avoid using bi-colors. Flowers in solid colors will usually produce a more sophisticated look and are easier to work with. It takes time to become aware of the subtleties of flower color and to become familiar with varieties that can supply the tints and shades you want. Although there's no substitute for experience when it comes to combining colors, your own taste will always be your best guide. Don't be afraid to experiment.

Eye-catching combinations

- Purple or violet petunias/yellow marigolds
- Lavender petunias/blue salvia/clear yellow French marigolds/dusty miller
- Blue salvia/Cosmos suphureus
- Red salvia/white petunias
- Deep purple petunias/bright white fibrous begonias
- A rainbow of impatiens, one color fading into the next
- Pink fibrous begonias/dusty miller
- Red or salmon geraniums/dusty miller
- Yellow marigolds/purple alyssum
- Mixed blue, pink and white petunias/white sweet alyssum
- Cleome/white and pink petunias

seen. If it is most likely to be viewed up close by pedestrians, then an intricate pattern may be right. The same design may be "lost" by people driving by at 40 mph.

When viewed as an entire design, it should stimulate—by using warm and contrasting colors—or appear restful and soothing—by using cool, harmonious colors.

Remember that you need a large mass of cool color to catch the eye, and a smaller mass of a hot color.

There is no limit to the size of the beds. Truth is, they don't need to be large to be effective. Rely on the interplay of colors and shapes rather than the expanse of the display.

—James C. Schmidt is with the Department of Horticulture, University of Illinois.

The value of trees in your landscapes

by James E. Guyette,
Contributing Editor

■ Retaining existing trees at a construction site can bring added value to a developer's plans. But a builder may not be immediately aware of that opportunity—and mostly it's up to landscape managers and tree care operators to point out the advantages.

"Most people don't have the expertise to approach developers to convince them to spend money on saving trees," says Randy Christian, an arborist and landscape designer at JTO in Mentor, Ohio.

"It's really an inconsequential amount of money" involved, says Christian. The extra cost of saving trees, he says, often amounts to only one percent of a project's total budget. Yet having trees on a property can increase its selling value by dollar figures ranging from 10 percent to close to 30 percent, depending on location.

According to the National Association of Home Builders, developers and builders can get a premium of $3,000 to $15,000 per lot, depending on the type of trees involved and whether there are other wooded lots in the area.

And it's much cheaper to keep existing trees than to purchase new ones for planting as a site. "The more trees you save, the fewer you have to buy," Christian observes.

When talking trees to a developer, "image is the best selling point," says Christian. "They'd better have something to bring people in." Public acceptance of this type of curb appeal continues to increase, and developers can see that reflected in money figures.

"Once the developer sees the benefits, the others [engineers and others on the project's planning staff] will be included," says Christian. "You have to get the subcontractors involved, too.

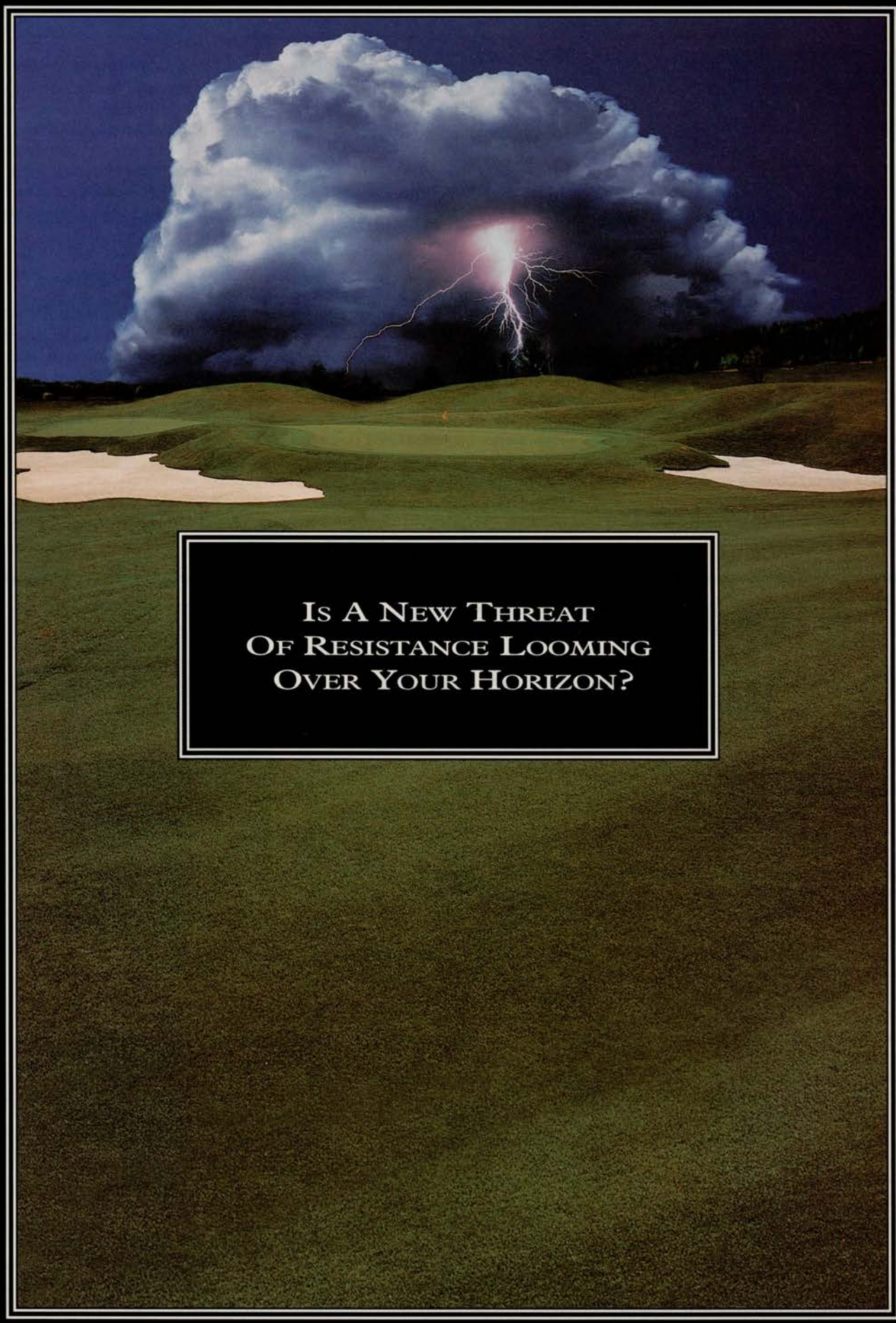
An educated tree care operator is best suited to point out why it's important to save existing trees. "The developers are not aware of the services we can supply," Christian says.

Tree care operators can handle everything from mulching, fertilization and watering to supervising protection techniques during construction. This can mean long-range benefits for the savvy developer.

"It's a huge advantage when a developer can take a client through a development he did eight or 10 years ago and the trees are still standing," Christian explains. "Then he [or she] can take them through another [competing] development where the trees are all dead or dying."

Existing trees can make a development look much sharper.

When sizing up a potential wooded site for a developer, it's important to see the big picture, according to Christian. "I'm not a tree-hugger. I don't try to save every tree. In a particular situation, you may save one tree, but mostly you want to save groups of trees. I try to get involved before the engineering is done, and get the engineer to walk the site with me."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FUNGICIDE

Circle No. 119 on Reader Inquiry Card

Diagnosing problems of ornamental plants

Look, look and look some more, says this Cornell pathologist. Then begin to ask questions.

by Jerry Roche, Editor-in-Chief

■ A plant disease, by definition, is any disturbance of a plant that interferes with its normal structure, function or economic value, according to Richard Buckley of the Cornell University Plant Pathology Department.

But a plant disease is a lot more than its definition, he says, adding, "You need three components: a host, a causal agent and a favorable environment."

Buckley believes that the favorable environment is the most important part. "I can find *Rhizoctonia solani* (brown patch) in almost any turf that comes into my lab," he notes, "but the environment stimulates that pathogen."

He classifies **causal agents** into two types: biotic (living) and abiotic (non-living).

Biotic agents include pathogens like fungi, bacteria, viruses, nematodes and MLOs; and pests like insects, mites, mollusks, small animals and deer.

Mechanical abiotic agents include mowing injuries, construction, hail, perched water tables, compaction, planting too deep, girdling roots and mice chewings. Typical symptoms of mechanical agents are breaks, bruises, punctures, cracks, chewing marks, girdling and root pruning.

Physical abiotic agents include temperature, light, moisture, winter injury, winter sunburn blisters or cracks, drought stress, rain and dampness. Typical symptoms of physical agents are tip and edge burn, intervenal necrosis and loss of older leaves.

Chemical abiotic agents include: the misapplication of pesticides (either by contact injury or translocation), ozone injury, sulfur dioxide pollution, fluoride injury and salt damage. Typical symptoms of chemical agents include patterned tip and edge burn, interveinal necrosis and loss of older leaves.

Volutella blight on a boxwood plant.

'It's often wiser to sacrifice one [plant] to save many.'

Symptoms, Buckley says, are plant abnormalities. "We use symptoms as one of the cues to diagnose a disease, but in many cases they are a deception so we need more cues," he notes.

Typical symptoms of disease are: leaf spot, blight, dieback, chewed leaves, wilt, distorted growth, stippling and abnormal color.

"Signs of disease are other visual cues that we can examine to determine the presence of disease," says Buckley. They include: fruiting bodies, resting structures, mycellium, bacterial ooze, eggs and/or cysts, chemical residues and cultural records like spray records and weather logs.

Diagnosis—The Cornell pathologist has a systematic approach to decision-making. His eight steps to diagnosing a disease, in order, are:

1) Identify the plant—To identify the plant, you must examine the entire plant and the plant community. Most living organisms are very specific to their hosts. Start at the top of the plant and identify each part individually. "You have to keep searching, and it's a difficult thing to do in the landscape," Buckley says. "It's often wiser to sacrifice one [plant] to save many."

2) Define the problem—To define the problem, you must determine the number of species affected. If it's a wide range, it's probably an abiotic problem.

3) Determine patterns—When determining patterns, you must identify both uniform and non-uniform patterns.

4) Delineate the progression of the symptom(s)—Progressive symptoms are generally caused by living organisms; non-progressive symptoms generally are not. "You have to be real careful, though," he adds.

5) Ask questions—Here are some key questions to ask, of either the client or the crew that works at the site. Communication is very important, Buckley notes: "What is the distribution of the problem? What are the site conditions? What kind of weather prior to symptoms appearing? What are cultural practices? What are the chemical inputs? When did the symptoms appear? What is the age of the plant?"

6) Observe typical symptoms and signs—Use all your senses to diagnose:

sight, smell, touch and hearing (ask questions).

7) Check references.

8) Sample and test.

Fungal diseases—Buckley observes that fungi cause 80 percent of all diseases. "Fungi growth generally starts at the central point and grows in circles," he says. "There is often a distinct line between healthy and non-healthy tissue, often with a colorful border. Tissues are often very dry. Look for the presense of fungal fruiting bodies, too."

Bacterial diseases—Bacteria cause a lot of leaf spots with "halos" (diffuse margins). The spots will be angular, irregular and water-soaked. Polysaccharide ooze and fishy or rotten odors are typical, too.

Virus diseases—They work on the cell level with the genetic make-up of the plant. They often cause ring spots, abnormal growth and abnormal color. Viruses need a way to spread, though, and in most cases it's a gnawing, sucking insect. One of the tactics to control virus diseases is to control the vectors.

The bottom line: "If you don't know the answer, seek professional help," Buckley suggests. "Collect samples during the investigative process and submit them to your cooperative extension agent or a private testing lab. Quick-test kits are also excellent tools."

—Richard Buckley is a plant pathologist for Cook College, Rutgers University. The preceding information was given during a speech he gave at the New Jersey Turf Expo.

Possible causes of nutrient deficiency in ornamental plants

SYMPTOM	POSSIBLE CAUSE
Chlorosis	
entire plant	nitrogen deficiency; high light
young leaves	poor soil aeration; salinity; iron or sulfur deficiency
older leaves	nitrogen or magnesium deficiency; overwatering; poor soil aeration
leaf margins	salinity; magnesium deficiency
intervenal	iron or manganese deficiency
irregular spots	cold temperature
Necrosis	
water-soaked areas	cold temperature
tips or margins	potassium deficiency (old leaves); boron toxicity (old leaves); salinity; temperature extremes; desiccation; low humidity; root damage
center of leaf	sun scorch; cold; nutrient toxicity
Leaf deformation	
leaves abnormally small	micronutrient deficiency; salinity; high light; root-bound or -damaged plants
petioles elongated	low light
holes in leaves	mechanical injury; slugs, snails; insects
new leaves stunted	manganese or other micronutrient deficiency; salinity; poor aeration; overwatering
Stem deformities	
rot at soil line	salinity; fertilizer placed against stem; overwatering; poor aeration
wilting	salinity; high temperature; desiccation; low humidity; low soil moisture; root damage
thin, spindly, weak	low light; crowding of plants
Root abnormalities	
slow development	salinity; soil temperature extremes; planted too deep; poor aeration; overwatering
poor/rotted roots	salinity; overwatering; poor aeration
Stunted plants	fertilizer extremes; nutrient deficiencies; extremes of light; overwatering; poor aeration; poor roots

Source: Pacific Coast Nurseryman and Garden Supply Dealer, May 1992

Weather can lead to damage of some shrubs

■ Wet weather is directly tied to the development of *Phytophthora cinnamomi*, a deadly fungus of yew or taxus plants, according to Jim Chatfield, an extension agent in Ohio.

Roller-coaster-type weather takes a toll on older shrubs, even if they planted in reasonably good sites, Chatfield observes.

"We've known for a long time that taxus can't tolerate wet soil. It must be planted in well-drained sites."

Phytophthora root rot symptoms include yellowing foliage, reduced growth, brown to brick-red root lesions and dieback of branches. The disease gradually cuts off the flow of water and nutrients in plants. Infected taxus usually decline slowly over ont to three years before dying.

East of the Mississippi River, *Phytophthora cinnamomi* has been reported only in Ohio and Indiana.

"If you remove a taxus that appeared to have died from Phythophthora root rot, you might want to wait a while before replacing it," says plant pathologist Mike Ellis. "It's not a good idea to immediately replace a dead shrub where soil is heavy and wet and where disease is present."

Wet weather can also hurt yews by prompting harmful feeding onthe shrubs' roots by black vine weevil grubs. Symptoms are similar to Phytophthora root rot.

More research is needed it determine the extent fo the disease and of other taxus pests and disorders, Ellis says.

"The key here is to remember that Phytophthora can thrive in (wet) conditions," he concludes. "Under normal circumstances, it isn't as great a concern."

HOT TOPICS

2,4-D re-registration progressing slowly

A special Task Force's six-year testing effort should wrap up by year's end. Data shows no evidence linking the herbicide with ill health.

by Ron Hall,
Senior Editor

WASHINGTON—The widely-used herbicide 2,4-dichorophenoxy-acetic acid (2,4-D) is going to be around for a while longer, possibly a long while longer.

Although nobody on the 2,4-D Task Force (certainly nobody with the U.S. EPA) came right out and said so at a recent, one-day 2,4-D status briefing here, that's the feeling that the 65 participants left with at afternoon's end.

The reason for this guarded optimism is based on what researchers have found regarding 2,4-D.

More accurately, it's based on what they *haven't* found: 2,4-D produces no significant adverse effects to human health or the environment, emphasized Task Force researchers.

By year's end, the Task Force should complete tests required for the molecule's re-registration, according to Larry E. Hammond, chairman of the Task Force's Technical Committee. Testing is about 85 percent complete.

"Are we serious about this?" asks Hammond rhetorically. "Yes, we are. The cost for data development is going to be in the range of $22 million."

Task Force members are: Agro-Gro, DowElanco, Nufarm U.S.A. and Rhone-Poulenc. They all produce 2,4-D. They're supporting three forms of the compound: 2,4-D acid, 2,4-D dimethylmine salt (SMAS) and 2,4-D ethylhexyl ester (2EHE).

The EPA is wading through the data. It will probably take the Agency until 1997 or 1998 to issue a Re-registration Eligibility Decision (RED) on 2,4-D, says Hammond.

Only then will the EPA begin looking at 2,4-D, product by product. That's because it is usually used in combination—especially on turf—with fertilizer or other herbicides.

In one form or another, 2,4-D is used by farmers, turfgrass managers, and more than a dozen other user groups (including homeowners) to control broadleaf weeds. Actually, it's use on turfgrass is tiny compared to its use in crops such as wheat, corn and soybeans.

Larry Hammond, left, and William Mahlberg said EPA-mandated toxicological studies showed no problems with 2,4-D.

It's believed to be the most widely used herbicide in the world, and the third-most popular in the U.S. More than 45 million pounds of 2,4-D were applied in the United States last year alone. And its use is still growing, partly because of increased no-till (or low-till) farming, and partly because no weed resistance has as yet been recorded for 2,4-D. Because of this, and because of cost, it's commonly combined with other herbicides.

Dr. Philip Szmedra, an agricultural economist with the USDA, says losing 2,4-D in field crops and fruit and nuts would cost U.S. farmers about $1.1 billion a year, and banning all phenoxy herbicides would cost about $1.4 billion. (A study in Canada estimated the loss there at $500 million.)

The losses reflect factors such as reduced yields and the cost of alternative weed controls. Economic losses from turf and some other so-called minor uses aren't yet calculated, Szmedra says.

Cancer studies still draw fire

WASHINGTON—Dr. Rebecca Johnson thinks peoples' memories generally aren't accurate enough to drive cancer studies.

She came to that conclusion after re-examining a 1993 National Cancer Institute (NCI) Iowa/Minnesota Case Control study that suggested a link (albeit a weak link) between farmers' exposure to 2,4-D and non-Hodgkins lymphoma (NHL).

Johnson says studies relying so strongly on the memories of victims lend themselves to miscalculations. The data becomes even more suspect when the memories of victims' families are relied upon. Relatives, in fact, tended to report more exposure to 2,4-D, than the cancer victims themselves had in earlier surveys.

Also, the records of cooperatives where farmers bought their pesticides often did not match up with the farmers' or their proxies' recollections of what products had been purchased and used. There was agreement only 60 percent of the time in the use of 2,4-D.

continued on page 32