

does attempt to keep a pleasant color year-round, he is more concerned with texture, turf vigor, and playability. To accomplish this he strives for a constant, but moderate growth curve. "We're not in the business of growing grass," Gerry says. "We're maintaining grass, and we want to keep it healthy while keeping growth as slow as possible."

In his plans for a turf fertilization program, Gerry chose ureaformaldehyde (Nitroform) as his source for the slow, controlled release of nitrogen that he needed. After the first 18 holes were completed, he made applications of granular UF exclusively from late spring through the summer, and followed up in mid-September with an application of sulfate of potash.

Recently, however, Gerry installed a "fertigation" system so he could inject liquid fertilizer into his sprinkler system. His feeding program now goes something like this:

December 1st until April 1st.....20-0-0  
 April 1st until July 15th .....14-1-7  
 July 15th until overseeding (about  
 Oct. 1st) .....11-1-11

He makes supplemental applications of ureaform when needed. October and November are the months when no fertilizer, or "not much" is used.

Suppliers are important people in Gerry's profession since the superintendent is responsible for maintaining all property, except that belonging to private homes. Dependability and promptness of delivery are essential to keep an operation like Moss Creek moving on schedule. Fertilizer products are supplied by reliable sources, such as Bingham Seed Company of Jacksonville and Regal Chemical Company of Atlanta.

There is no golf course, public or private, that doesn't present problems for the superintendent. We asked Gerry about his.

Live oaks are a trademark of the Low Country, and Moss Creek has preserved theirs beautifully. But when a green is almost surrounded by trees it creates an awful lot of shade for sun-loving Bermuda. Gerry calls this his number one problem. In addition to the oaks, Moss Creek has a good population of palms, pines, and cedar. The ubiquitous palmetto grows close to the ground and usually does not produce problem shade.

Drought is not an annual problem, but is always a threat. Moss Creek has a sewage treatment plant and recycles effluent water for irrigation use. It can cope pretty well with the average dry spell, and if drought doesn't come again during the turf transition period, all should be well.

Cart traffic and unrepaired ball marks are probably Gerry's second biggest problem. He is certainly not alone when he mentions these. Working around play, perhaps, may be more tedious on a course like Moss Creek. Here, it may require a bit more tack, and cannot be hurried.

Turnover in help is another problem Gerry mentioned that is common everywhere. Twice during our tour of the course Gerry stopped to correct workers on some aspect of their routine. The care taken at Moss Creek is evident everywhere. Only walking mowers are used on the greens, since Gerry feels they give a better quality cut and leave a finer appearance.

One nice touch is the placement of granite markers on the men's tees, giving exact yardage to the center of

the green. These are a real help on the par 3 holes, although wind velocity indicators might be more appropriate.

While Moss Creek residents may cherish their privacy, they are still generous hosts to many golf events. In addition to the annual Women's International, Devil's Elbow South has been host to the USGA Boys Junior Championship, the Moss Creek Seniors Invitational (a men's amateur test), and the Carolinas-Virginias Cup matches. It has scheduled the Women's Western Amateur (in 1981), the Southern Amateur in 1982, and the USGA Seniors Amateur in 1983.

So, if you're eligible for any of these, don't hesitate. You'll never forget your experience at Devil's Elbow!

WTT



NOW PLANT  
**Husky Young  
 TREES**  
 AT  
 Wholesale Prices

Colorado Blue Spruce plus 26 other evergreen varieties; Black Walnut plus 28 other deciduous trees including many hardwoods. Ideal for forestation, windbreaks, wildlife shelter and food, soil conservation . . . increase property value. Low quantity prices.

Send for Free Catalog

**VANS PINES** INC.



Box 768, West Olive, Mich. 49460

Phone 616-399-1620

Write 152 on reader service card

**FLAIL SAFE**

When your job is grounds maintenance year around, you need a mower for all seasons.

With one **VERSATILE** Mott mower, you can mow fine lawns, shred high grass and weeds, mulch leaves and renovate.

Flail type mowers have a reputation for being **SAFER** than rotary type mowers. Mott mowers . . . with their lightweight knives . . . are the safest of the flails.

Mott mowers also offer **COST EFFECTIVE PERFORMANCE** because they last longer and are more reliable to operate.

Write or call for information about **YOUR MOWING REQUIREMENTS**. This season and every season, mow Flail Safe . . . with Mott mowers.



"Tell me more about FLAIL SAFE mowing."

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

PHONE \_\_\_\_\_



**MOTT CORPORATION**

514 Shawmut, La Grange, Illinois 60525 (312) 354-7220

Write 132 on reader service card

# PROFESSIONAL PEST CONTROL: PART OF THE DISNEY MAGIC

For Bill Tanner, pest control supervisor at Walt Disney World's Lake Buena Vista Communities, maintaining the area's beautiful appearance is anything but magical. "We've got at least 76 different types of trees, five different grasses and over 300 varieties of ornamentals," he states, "and they all require a great deal of care."

A unique vacation community located on approximately 4,000 acres of Disney's expansive property in central Florida, Lake Buena Vista combines resort hotels, vacation villas, an office park, outdoor recreation, and a shopping village in a setting of grass, gardens, lakes and forests. Like all Disney World facilities, it is kept in top-notch condition all year round.

"Disney's concept was to create a total destination resort where we could house guests and provide them with all their needs, from the theme park itself to evening entertainment and tourist shopping," says Tanner, who came to Lake Buena Vista in 1978.

Of the community's 4,000 acres, 500 are what Bill refers to as high maintenance landscape areas. These are highly visible sites around Lake Buena Vista Village itself, and all areas developed for rental units or hotel sites.

"The village was designed like a New England seaside village, where everything surrounds an inlet," Bill explains. "There are 27 unique shops and a variety of places to eat."

## Chinch Bug Resistance

"Because grass areas in the village are heavily trafficked, we elected to plant a certified, blue tag variety of St. Augustine Floratam." Developed by Florida State University and Texas A&M, Floratam is resistant to chinch bugs, a real menace to St. Augustine strains in Florida. "We try to keep a handle on factors that might stress our grass in any one area," Tanner points out, adding that they choose between Floratam, Ar-



**Lake Buena Vista** Village gives Bill Tanner a wide assortment of vegetation to pamper under heavy traffic conditions.

gentine Bahia, Zoysia, Bermuda and Centipede in selecting a variety to suit the theme and growing environment of each area. "The traffic in the village and the resulting stress make the area weed prone. This causes enough problems without adding chinch bugs."

All grass areas are under irrigation, a program Tanner feels is necessary to maintain the high quality appearance Disney is known for, but the beauty is also accompanied by a healthy dose of complications. "We are on a timed pop-up irrigation system all year round," Bill explains. "But we also get more than our share of rain. In September of 1979, for instance, we got 17 inches in 30 days and were forced to shut the system down, but that still didn't solve our problems."

Most of the landscaped areas Tanner works with are land fill created from soil dredged out to create the lakes. "It is a morrow clay or loose sand, so the water either runs down to the bedrock or hangs in the morrow. This keeps the root systems too wet too long," he laments, noting that defoliation often results.

This situation, coupled with Florida's warm days and cool nights, also sets up an almost ideal environment for the development of fungi such as pythium, leaf spotting and bacteria wilt in the annual flower beds, not to mention various insect problems. "We get leaf miners in our marigolds, cutworms and large green hornworms in our poinsettias, and webworms, thrips and aphids everywhere," Tanner complains.

## Prevention Best Cure

To protect the annual plants which cost anywhere from 65 cents to \$4 each, Bill again relies on preventive measures. "We will often have 2,000 plants in one bed for up to 2 months, so we try to nip these problems in the bud. We apply fungicides on a 4- to 7-day schedule and rely primarily on systemic-type insecticides, going to contact killers only on an as-needed, symptomatic basis," says Tanner, a certified pesticide applicator in the State of Florida.

Bill tries to base all his pest control programs on the theory that dealing with a problem before it manifests itself is the best approach. "When it comes to weed control, we feel pre-emergent treatment is the best management tool," says Tanner, a member of the Florida Turf Grass Association. "Our goal is to prevent the weed from germinating in the first place. Once it does come up, due to excessive rainfall or chemical leaching caused by heavy irrigation, we make use of postemergent herbicides, as well."

Pre-emergent chemicals are applied to each annual plant bed as needed. "Our first mission is to prevent seeds from an old variety or weed seeds brought in by the wind from germinating in the high-quality growing medium we create for the desired annuals," Tanner explains. The bed also receives a preplant application of insecticide and fungicide so the plants will take up these chemicals as they grow. Bill feels this gives him a head start on pest control.

## Mulch A Problem

Despite these efforts, Tanner still experiences his worst weed problems in established ornamental beds. "These beds are planted and then mulched over," Bill



observes. "We get re-introduction of weeds from the mulch, and it also works against the preemergent chemicals as it decomposes."

To control the resulting weeds, Tanner often uses glyphosate (Round up) herbicide. "We need to use a non-selective chemical, but can't risk any residual soil activity whatsoever. The best answer we've found to this predicament is to apply a 2 percent solution of glyphosate in water using a 2-gallon compressed air sprayer. Our control has been excellent," he says.

Tanner also uses glyphosate to control weeds growing in concrete expansion joints, or to eliminate existing growth in areas slated for total renovation. "We had one bermudagrass lawn surrounded by shade trees," Bill recalls. "The trees had grown so large the grass was no longer getting adequate sun. It was under constant stress."

Applying the same 2 percent solution of glyphosate to the area, Tanner waited seven days and then came in with a sod cutter to take off the top inch of the soil. "We started with glyphosate because we had to be sure the bermuda was dead, roots and all. We knew just removing the top inch of soil could not get that job done. Then we replanted that lawn with St. Augustine Floratam. It's been more than a year now, and we still haven't seen a trace of bermuda yet."

Tanner has assigned one of his six staff members to full-time duty making spot treatments with the "translocated" herbicide, but has by no means left himself shorthanded in carrying out other responsibilities. "We have an extremely experienced staff," he boasts, with good reason. "One man is a graduate entomologist and another is a graduate horticulturist." While their specialties are not ignored, Bill insists each staffer be well-versed in every area of pest control.

### One Man, One Area

In fact, Tanner's management system assigns each man total responsibility for a particular area. "Each man has to be able to function in any pest control capacity, so we don't just hire anybody. An applicant has to have a great deal of experience under his belt," Bill states, pointing to insistence on following label directions for the products he uses to the letter. "We can't afford to have someone go out and do the wrong thing in the wrong place. That can be very costly, and it's not what we want our guests to see."

According to Bill Tanner, a great deal of the success and beauty of Disney World has to be attributed to the people who work there. "Our employees are treated very well, and I think they project that to the guests," he explains. "There's a feeling you can't put a name to, but the guests get it everywhere they turn—from the person that helps them park, to the person who drives them back to the lot that evening. Disney's concept was a park that would appeal to the kid in everybody," he says proudly, adding that he visits the facility twice a month himself.

"The number one priority of every Disney employee is the comfort and safety of the guest," Bill Tanner concludes. "My responsibility is to see that Lake Buena Vista is maintained as close to perfectly as possible. At Disney World we do everything 100 percent. I guess that's the real magic behind the magic." **WTT**



## TWO GREAT GAMES ONE GREAT GRASS

Super Bowl XIV and the Rose Bowl classic were the great games. The turf? That was Derby Turf-type perennial ryegrass.

Derby was selected by George Toma, the man responsible for the Super Bowl XIV turf and Gus Huntly, turf manager for the Rose Bowl game, because of the special requirements for these special games.

Toma and Huntly wanted a fast-germinating, dark-green, handsome grass as well as one tough enough to take a pounding and still look great for the television cameras:

And Derby did it all. Of course, it will do more. It mows beautifully and thrives when cut at 1½ inches or at 3/16 inch on golf greens. In Southern areas it's a top choice for winter overseeding of golf greens.

Derby is also a great mixer, combining with the fine fescues and bluegrasses to form an outstanding turf.

### HERE'S WHAT DERBY WILL DO

- *Persists in heavy, compacted, poorly drained areas where traffic is not intense*
- *Tolerates a wide range of soil types from heavy clay to sandy*
- *Retains its deep green color during chilly Southern winters*
- *Germinates in less than a week under ideal conditions*
- *Thrives when cut to 3/16, 1 inch or 1½ inches*
- *Mixes nicely with fine fescues and bluegrass*

A Product of:



## INTERNATIONAL SEEDS, INC.

P.O. Box 168, Halsey, Oregon 97348  
Telephone (503) 369-2251 • TWX 510/590-0765

Write 116 on reader service card

JANUARY 1981/WEEDS TREES & TURF



# LOW MAINTENANCE VIBURNUMS CREATE COLORFUL ENVIRONMENT

By Douglas Chapman, Horticulturist, Dow Gardens, Midland, MI

Viburnum composes an outstanding group of low-maintenance shrubs that are under-used. Every landscape would be enhanced by the addition of a few. Each species is quite different, but contains a thread of commonality. Similar landscape characteristics include flowers, fruit, and outstanding fall color. The flowers are borne terminally, usually white or creamy-white in color. The fruit are in single drupes, ranging in color from red to yellow, blue, and blue-black. Often Viburnum fruit is edible and serves as a secondary source of food for birds. The fall foliage color is another characteristic which can't be over-emphasized. It ranges through red, scarlet, yellow, and purple. Viburnum should be broken into two groups—native and imports from Europe and Asia. The native Viburnum include *Viburnum acerifolium*, *V. dentatum*, *V. lantana*, *V. lentago*, *V. prunifolium*, and *V. trilobum*.

**Mapleleaf Viburnum** (*V. acerifolium*) is native from Minnesota in the north to North Carolina in the south. It is a rounded shrub, 4 to 6 feet in height and 3 to 4 feet in width at maturity. *V. acerifolium* will grow as an understory shrub or will persist in sun, but thrives in shade. Mapleleaf Viburnum grows best in a sandy, well-drained soil but will stand a fairly high water table. Its landscape effectiveness is in native plantations, e.g., screens, border, or mass plantings. Pruning should be done at the base to encourage additional stems, but little pruning is needed. The small, maple-shaped leaf is a bright green throughout the summer, becoming a reddish-purple in the fall. Flowers are very effective during late May through early June, being 1 to 1½ inches in diameter and creamy-white in color. The fruit is ¼ inch in diameter and bluish-black when ripe (during mid-September). Insect and disease problems are almost nonexistent. Mapleleaf Viburnum requires the least maintenance of all the Viburnums.

**Arrowwood Viburnum** (*V. dentatum*) is a 5 to 9-foot upright oval shrub with a spread of 6 feet at maturity.

This plant suckers readily; thus frequent spring basal pruning will help contain this woody native. *V. dentatum* thrives in partial to full sun. Optimal soil is a well-drained, sandy loam. Flowers are effective for ten to twelve days during late May. The 2 to 4-inch terminal creamy-white flowers can be outstanding in an intimate garden situation. The leaves are small (1 to 3 inches long), oval, and coarsely dentate. Summer foliage is a clear yellow-green with fall color varying from nonexistent to scarlet-yellow or purplish-red. Often the entire range of fall color can be seen on the same plant. Arrowwood is one plant that should be selected for fall color. The bluish fruit is effective through September and October or until the birds have eaten it. Its landscape value is obvious as a hedge.



**Blackhaw viburnum leaves** (left) are a clear dark green in the summer and scarlet to purple in the autumn.

**American Cranberrybush viburnum** (above) displays white flowers, up to four-inch cluster, in May.







## When it's Time to Reseed...

Fairways and tees take quite a beating from golfers, weather and summertime diseases. That's why **Certified Manhattan** "Turf-type" perennial ryegrass is a favorite for overseeding those areas.

**Certified Manhattan** is fast growing and has a beautiful dark green color. It stands up well under heavy traffic, and is one of the most cold tolerant of all fine leafed ryegrasses.

Get on a regular springtime overseeding program with **Certified Manhattan** and discover the secret of beautiful tees and fairways throughout the summer. When it's time to reseed . . . it's time for **Manhattan!**



Distributed by:  
**Whitney-Dickinson  
Seeds, Inc.**

52 Leslie Street, Buffalo, NY 14240  
716/896-1111

Co-Marketer:  
**Turf-Seed, Inc.**  
P.O. Box 250, Hubbard, OR 97032  
503/981-9571

Write for free tech sheet on  
planting and maintaining Manhattan

**Manhattan Ryegrass  
Growers Assn.**  
1349 Capitol St., N.E.  
Salem, Oregon 97303

screen, or in native plantations in the understory plant rather than sunny-open situations.

**Wayfaringtree Viburnum** (*V. lantana*) is a naturalized native of Europe. It is a multiple-stemmed shrub or a rounded tree, 10 to 14 feet in height, with a spread of 10 feet. Summer leaves are coarse texture while being dull green in color. Fall color in the mid-West is nonexistent or a dull maroon. *V. lantana* flowers during early May. The 3 to 5-inch terminal cream-white flowers create an exciting addition. Fruit is 1/3 inch in diameter and ranges in color from yellow to red and finally black at maturity. As a landscape feature, fruit is considerably more effective and colorful during summer than at maturity. This multiple-stemmed shrub should be planted in full sun or partial shade. It thrives in high organic, well-drained soils. Pruning is a task which should be considered every two to three years. Basal spring pruning, which is similar to the treatment of forsythia or lilac, removes the oldest canes first, renews the shrub, and keeps it from becoming too dense. In commercial landscapes, it is effective as a specimen or in mass plantings.

**Nannyberry Viburnum** (*V. lentago*) is an outstanding specimen shrub or small tree. It has an upright oval habit of growth, reaching 15 to 18 feet in height and 6 to 8 feet in width at maturity. Wyman has reported speci-

mens of *V. lentago* reaching 25 feet in height. This plant prefers to be grown in full sun with well-drained soils. Specimens grown in partial sun or shade often get mildew. The 3 to 8-inch creamy-white flowers are effective mid through late May. The 1/2-inch drupe of blue-black fruit are an interesting addition while being quite effective during September. The summer foliage is a glossy yellow-green, becoming a dependable purple or scarlet in the fall. The 2 to 4-inch long leaves give a somewhat medium texture. In the landscape, individual specimens, shrubs, or trees can be particularly effective, while in large area landscapes, mass plantings have been desirable.

**Blackhaw Viburnum** (*V. prunifolium*) is indeed an outstanding native Viburnum. It can be grown in full sun or partial shade. This oval shrub or specimen tree reaches 15 feet in height and 8 to 12 feet in width. It flowers about mid-May. The creamy-white, 2 to 4-inch terminally borne flowers contrast well against the summer foliage. The leaf is a clear dark green during the summer with fall color ranging from scarlet to purplish-red. In fact, the fall color of Blackhaw is outstanding and dependable. The fruit is equally exciting. It ranges from yellow to pink and finally blue at maturity. Blackhaw is edible, having been used by early settlers in jellies and jams. Although *V. prunifolium* prefers well-drained soil, it will tolerate heavy clays as well. Blackhaw is extremely low maintenance, requiring little or no pruning. It can be equally enjoyed as a specimen or in mass plantings for the home or commercial landscape. Insect and disease problems don't exist. *V. prunifolium* is the aristocrat of native Viburnums.

**American Cranberrybush Viburnum** (*V. trilobum*) is a regal native. Its habit is an upright oval, reaching 8 to 12 feet in height with a 5 to 8-foot spread. It is considerably more effective than European Cranberrybush Viburnum (*V. opulus*). *V. trilobum* suckers freely, thus annual pruning is important. This annual spring basal pruning is again similar to treatment of lilacs, removing old diseased canes, reducing the overall height, and, of course, improving the vigor of the plant. The white flowers are 3 to 4 inches in diameter and extremely effective during mid-May. The large reddish fruit often hold on and are effective from September through February. Foliage is rich green throughout the summer, becoming scarlet in the fall. American Cranberrybush should be planted in full sun but will tolerate light shade. It is effective as a specimen, shrub, and screen planting. American Cranberrybush is considerably more effective with fruit and fall color than is *V. opulus*, but it is more difficult to obtain in the trade. It should be propagated and used more often as it has a more narrow upright habit, is cleaner in appearance, and certainly has outstanding fall color.

These native Viburnums have few insect and disease problems, require minimal pruning, and fit in almost any landscape, resulting in a natural-woody feeling. Good companion trees for many of these Viburnum include Scarlet Oak, Red Oak, White Ash, Green Ash, Red Maple, Sugar Maple, Silver Maple, Paper Birch, and American Beech.

**WTT**

# **KEES 48"**

HEAVY-DUTY  
**Commercial  
MOWER**



Model  
481100

For large residential  
and commercial  
grounds use.

**CHECK THESE  
PERFORMANCE FEATURES:**

- Powerful 11 h.p. Briggs & Stratton synchro-balanced engine
- Fingertip clutch, brake and power turning control levers on each handle
- Sleek deck design and drum wheel brakes for positive, close quarter mowing
- Unique V-flanged front deflectors help prevent damage to yard decorations, monuments, etc.
- Baffled design for clean and safe grass discharge.

OPTIONS:  
Riding sulky and large grass catcher.

For more information, write P.O. Box 959  
or phone (402) 223-2391.

Since 1874

**F. D. KEES MFG. CO.** Beatrice, Nebr. 68310

Write 126 on reader service card



# The Front Line™

## Proved tough enough to be a Cushman.

People in your profession naturally expect a mower from Cushman to be something special. In its first year, the Front Line proved it is just that.

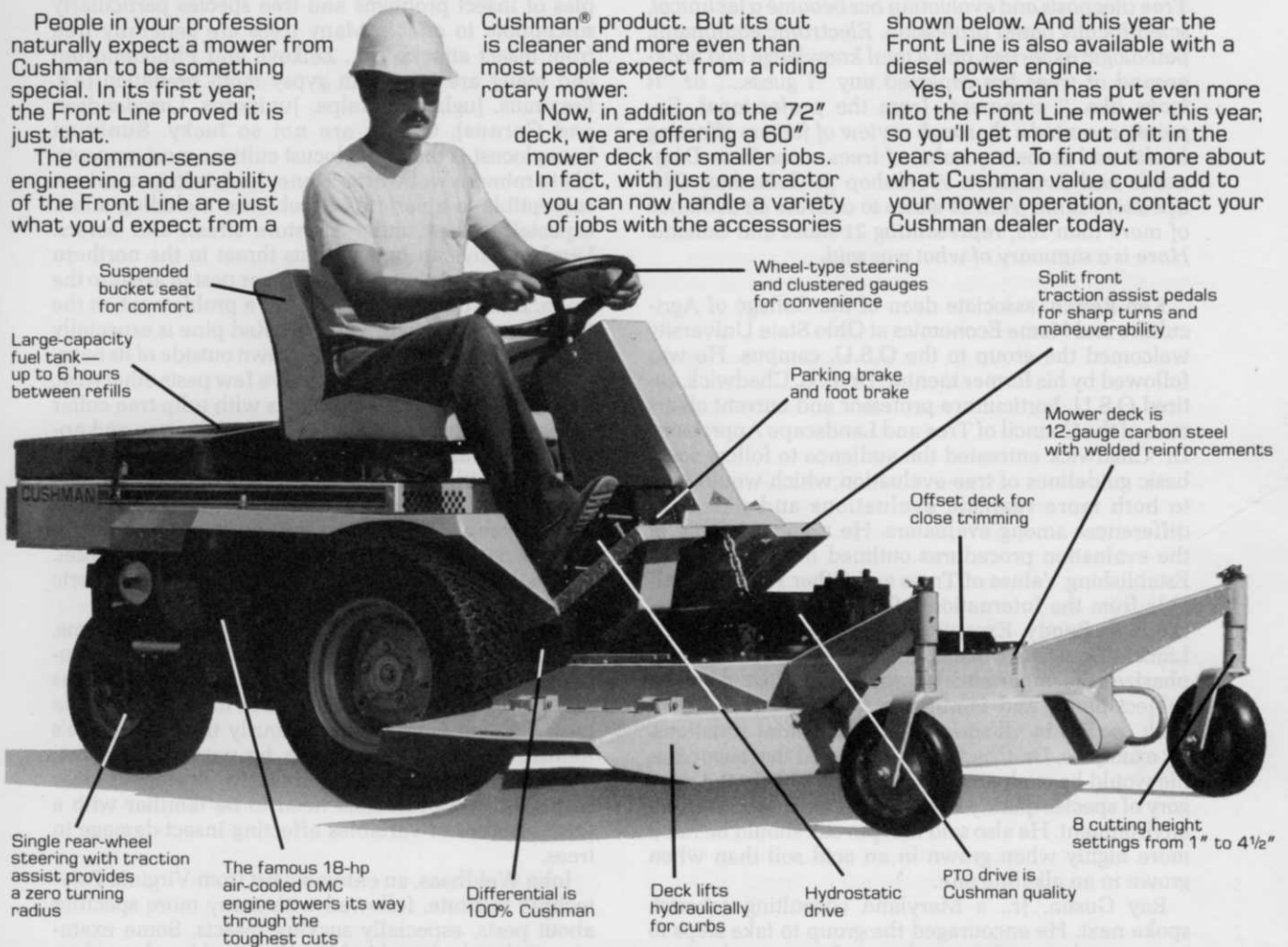
The common-sense engineering and durability of the Front Line are just what you'd expect from a

Cushman® product. But its cut is cleaner and more even than most people expect from a riding rotary mower.

Now, in addition to the 72" deck, we are offering a 60" mower deck for smaller jobs. In fact, with just one tractor you can now handle a variety of jobs with the accessories

shown below. And this year the Front Line is also available with a diesel power engine.

Yes, Cushman has put even more into the Front Line mower this year, so you'll get more out of it in the years ahead. To find out more about what Cushman value could add to your mower operation, contact your Cushman dealer today.



Suspended bucket seat for comfort

Large-capacity fuel tank—up to 6 hours between refills

Wheel-type steering and clustered gauges for convenience

Split front traction assist pedals for sharp turns and maneuverability

Parking brake and foot brake

Mower deck is 12-gauge carbon steel with welded reinforcements

Offset deck for close trimming

Single rear-wheel steering with traction assist provides a zero turning radius

The famous 18-hp air-cooled OMC engine powers its way through the toughest cuts

Differential is 100% Cushman

Deck lifts hydraulically for curbs

Hydrostatic drive

PTO drive is Cushman quality

8 cutting height settings from 1" to 4 1/2"

## Now versatile enough to pay off all year.

These specialized accessories make the Front Line even more productive for you.

 <p><b>Roll-Over Protection Structure (ROPS) and Cab</b></p> <ul style="list-style-type: none"> <li>• Weather-proof</li> <li>• Meets OSHA requirements</li> </ul>	 <p><b>60", 72" Mower Deck</b></p> <ul style="list-style-type: none"> <li>• 12-gauge carbon steel</li> <li>• Smooth-cutting</li> </ul>	 <p><b>New! Diesel Power</b></p> <ul style="list-style-type: none"> <li>• 4-cycle, 2-cylinder engine</li> <li>• Water-cooled</li> <li>• Economical</li> </ul>
 <p><b>60" Rotary Broom</b></p> <p>(not available for diesel)</p> <ul style="list-style-type: none"> <li>• PTO-driven</li> <li>• Long-life Bristles</li> </ul>	 <p><b>48" Snow Thrower</b></p> <p>(not available for diesel)</p> <ul style="list-style-type: none"> <li>• PTO-driven</li> <li>• Adjustable chute</li> </ul>	<p><b>CUSHMAN®</b></p> <p>3030 Cushman, P.O. Box 82409 Lincoln, NE 68501</p> <p><b>The Front Line™</b></p> <p>Tough enough to be a Cushman. Call: 402-435-7208</p>

# EXPERTS DISCUSS NEW FINDINGS, TECHNOLOGY TO DIAGNOSE TREES

By Alan D. Cook, horticulturist, the Dawes Arboretum, Newark, OH

*Tree diagnosis and evaluation has become a technical, scientifically based profession. Electronic equipment, pathologic expertise, and a total knowledge and background of trees has replaced any "I guess..." or "It looks like..." comments from the professional. Experts presented a thorough review of factors affecting health and monetary value of trees at the Tree Diagnostic and Evaluation Workshop in Columbus, OH. Speakers came from 11 states to address an audience of more than 100, representing 21 states and Canada. Here is a summary of what was said.*

Ken Reisch, associate dean of the College of Agriculture and Home Economics at Ohio State University welcomed the group to the O.S.U. campus. He was followed by his former mentor, Dr. L. C. Chadwick, retired O.S.U. horticulture professor and current chairman of the Council of Tree and Landscape Appraisers. Dr. Chadwick entreated the audience to follow some basic guidelines of tree evaluation which would lead to both more realistic evaluations and narrower differences among evaluators. He reviewed some of the evaluation procedures outlined in the Guide for Establishing Values of Trees and Other Plants (Available from the International Society of Arboriculture, c/o E. C. Bundy, Executive Secretary, P. O. Box 71, 5 Lincoln Square, Urbana, Illinois 61801). He also emphasized the importance of proper identification of the subject plants and familiarity with the suitability of each species in all sorts of environmental situations. As examples, Dr. Chadwick mentioned that sugar maple would be evaluated much more highly in the category of species quality when it is grown in a non-urban environment. He also said that pin oak should be rated more highly when grown in an acid soil than when grown in an alkaline one.

Ray Gustin, Jr., a Maryland consulting arborist, spoke next. He encouraged the group to take steps to improve the professionalism of tree evaluators. Among the recommendations made by Mr. Gustin were suggestions that arborist consultants should be accredited and full-time evaluators and should improve their skills in the most difficult category of tree evaluation—condition. He encouraged the development of state-by-state evaluations of each tree species in each state.

Erik Haupt of Massachusetts shared with the group a review of the elaborate array of accessories he carries to tree evaluation jobs. A few of these include telephoto and wide angle camera lenses, binoculars, increment hammer and borer, Shigometer, pH and moisture meters, reference books, compass, hand saw, soil profile tube, paint, disinfectant, and pruners.

The workshop was particularly blessed by a pair of entomologists and a pair of plant pathologists who discussed a wide variety of specific tree ailments and their opinions of how the ailments would affect the value of the trees.

Don Shuder, an entomologist at Purdue University, was the first to speak. He listed many specific exam-

ples of insect problems and tree species particularly susceptible to attack. Many trees are generally free from insect attacks (e.g., Zelkova and Philodendron) and many are free from gypsy moth predation (e.g. Fraxinus, Juglans, Catalpa, Juniperus, Liriodendron and Cornus). Others are not so lucky. Sunburst honeylocust is the honeylocust cultivar most susceptible to mimosa webworm. Honeylocusts in general are susceptible to a variety of problems, including mites, especially when under moisture stress, and borers. Larch sawfly can be a serious threat in the northern parts of its range but is only a minor pest in areas to the south. Lilac borers are especially a problem when the lilacs are grafted to privet roots. Red pine is especially susceptible to scale when it is grown outside of its natural range. Tulip trees, which have few pests otherwise, will occasionally have problems with tulip tree collar borer (tiny round holes at the base of the tree and apical dieback are symptomatic). Pin oak can have severe problems with obscure scale. Spruce budworm can be a severe problem when they venture away from their normal range. European pine shoot moth is a real problem on two needle pines north of the 40th parallel. Nantucket pine moth is often found on pines in xeric sites.

High nitrogen fertilization, especially ureaforms, can promote the growth of mites. Monocultures promote tremendous population growth of pests, such as walking stick in pure stands of oak in Indiana. While most galls on oaks do not seriously threaten a tree's health, horned oak gall can be very destructive. Through these few topics discussed, it seemed clear that good tree evaluators need to be familiar with a great number of variables affecting insect damage in trees.

John Weidhaas, an entomologist from Virginia Polytechnic Institute, followed with many more specifics about pests, especially sucking insects. Some examples: Oak red mites should not be considered a serious problem because they don't build up in population until late in the season and they confine themselves to the lower branches. Honeylocust plant bug injures the leaves as they emerge from bud. White pine aphid can cause bark and phloem injury that become noticeable after the aphids are gone. The damage can easily be mistaken for a canker disease. Rhododendron twig beetle is a borer which attacks only the twigs on rhododendron, leaving tiny pinholes in the bark and causing damage which can easily be mistaken for Phytophthora twig blight. Bark beetles detect and invade weakened pines before visible stress signs appear on the trees. It is therefore necessary to control the insects before a tree is obviously stressed or carefully monitor potential stresses in important trees. While peach scale has a wide range of hosts, it has become especially severe on Kwanzan cherry. Dr. Weidhaas summarized by stating that the ultimate aim is to evaluate pests before they are a problem.

Pathologists were next on the program with Spencer Davis of Rutgers being the first to speak. Dr. Davis initi-



ated his talk by pointing out a general rule of thumb concerning the degree of severity of disease problems. He noted that rusts, leaf spots, and powdery mildews are not nearly as severe as are leaf problems caused by abiotic factors. Diplodia tip blight on Austrian pine, at least in New Jersey, was one exception to his rule. Unless there was selection for resistance he would give Austrian pine a very low rating. On the other hand, disease is a much more serious problem on trunks and branches than is mechanical injury.

Concerning trunk ailments, several examples of mechanical injury to trunks (such as parking lot damage) were cited which were not considered serious, especially when the trees were callusing well. On the other hand, trunk diseases were considered to be more serious. He stated, however, that it is important to distinguish between diseases as causes of tree maladies as opposed to secondary invaders. Whether the disease is primary or secondary, many are indicators of terminal illness in trees. A tree with *Fomes* or *Polyporus sulphureus* or most any tree with bracket fungus with the possible exception of black locust has a real problem.

Eugene Himelick, a pathologist with the Illinois Natural History Department, spoke about wilt diseases and root problems. He outlined some of the methods of distinguishing oak wilt from other problems such as scorch. The fact that the fungus doesn't survive trips to the laboratory for culturing makes positive identification difficult. Fortunately, oak wilt is not common in urban areas and is confined primarily to the red oak subgenus. Among the other wilt diseases discussed, *Verticillium* wilt was given a good deal of attention. He cautioned that other problems can be confused with the disease and that only laboratory culturing can give a positive identification of the disease. For example, *Phomopsis* on Russian olive can be mistaken for *Verticillium*. *Phomopsis* can be pruned out, but *Verticillium* cannot. When discussing root problems, Dr. Himelick laid heavy blame on land developers for improper care of the soil. He noted that most root problems are symptoms of some sort of physical damage or improper care of the tree.

Next on the agenda, Bob Felix, executive vice president of the National Arborists Association, noted examples of how proper pruning and cabling can increase the value of trees while poor pruning and cabling can reduce a tree's value.

At the evening program, Elton Smith, an extension agent with The Ohio State University Department of Horticulture, discussed nutritional deficiencies and herbicide damage. On the topic of nutrition, he was mainly concerned with species which are chronically deficient and cited some species as potentially problem trees. Red and sometimes silver maple can have chronic manganese deficiencies that appear to be nitrogen problems. White oak and pin oak are notorious for iron chlorosis but river birch, star magnolia, sweetbay magnolia, sweetgum, flowering dogwood, kousa dogwood, and European birch are also susceptible to the problem. Several potentially damaging herbicides were discussed, including soil sterilants, simazine, Casoron, 2,4-D, and related products, such as dicamba, Amino Triazole, Dowpon, paraquat, and Roundup. Injury from dicamba was given special attention due to the increase in its use and the increased rate at which it is applied. Little leaf linden and sycamore were two plants listed as particularly suscepti-

ble. Cupping of the leaves and brittle margins were said to be symptomatic of dicamba damage. Taxus is perhaps the most susceptible to dicamba. On that shrub the damage looks like a late frost. Dr. Smith warned that dicamba persists in the soil and can move to and accumulate in low areas. This could be a problem particularly for golf courses. While lauding Roundup, Dr. Smith warned that if it is sprayed on basal suckers or on trunks of green barked trees it can cause damage.

The evening program was concluded with an interesting series of case histories of consulting jobs performed by Frederick Micha, consulting arborist. Mr. Micha was primarily involved in establishing the value of the damage done to trees and shrubs. In addition to reviewing the procedure he followed in each case, potential pitfalls and problem areas in the business were discussed.

The second day of talks was initiated by the return of Spencer Davis to the podium to discuss pollution damage. While noting the many types of damage done by various air pollutants, Dr. Davis felt that soil pollutants posed a more acute threat to plant material. Among the comments made about air pollution, he said that often a small percentage of trees in a population (about 7 to 10 percent) will be especially susceptible while the others are not. He recommended the removal of the susceptible members and selection of non-susceptible forms. In attempting to establish the cause of pollution damage he recommended the interesting technique of finding indicator plants. For example, when hydrogen fluoride is suspected as a cause of damage, gladioli, which are extremely susceptible, could be used to help with the investigation by serving as indicator plants. Soil pollution, unlike most air pollution, often causes the death of the affected plants. Veinal chlorosis is often evident in contrast to interveinal chlorosis in nutritional problems. On conifers the base of the needle is damaged, unlike tip damage caused by air pollution. Oil, natural gas, methane from landfills, and pentachlorophenol were some of the soil pollutants mentioned.

The conference was particularly fortunate to have Walter Shortle, a pathologist and research associate of Alex Shigo of the Northeast Forest Experiment Station in Durham, New Hampshire. Results of research done on tree wounding and the use of the Shigometer were discussed. Concepts of tree wound healing revolved primarily around the idea that trees have four types of barriers that can be established to block the progress of rotting. Ray cells which are aligned throughout the trunk of a tree in radial patterns provide one line of defense. Another line involves the dense cluster of very small cells laid down by the cambium as the seasonal growth of the tree slows to a stop. The third line of defense prevents vertical penetration by plugging the vascular system, and finally there is a barrier zone in tissue which grows over wounds. Dr. Shortle emphasized the need to respect the zones when treating a tree. He particularly noted the danger involved in cutting through a barrier and thereby permitting the spread of decay along the area of penetration and into the rest of the tree.

Use of the Shigometer for diagnosis of a tree's condition, particularly the physical structure of the trunk, was discussed next. By using the Shigometer, the existence and/or location of sapwood, heartwood, decay,

*Continues on page 44*



# DROUGHT-STRESSED ORNAMENTALS: PROSPECTS FOR WINTER DAMAGE

By John Kerr, Associate Editor

The effects are not visible now, but by spring or early summer many plants will be showing scald and winter burn. The drought and high temperatures that hit many parts of the country last summer and fall have severely damaged ornamentals, especially evergreens. Some specimens, especially small or newly planted ones, are probably already dead.

Late autumn rainfall and cooler temperatures temporarily revived many drought-stricken plants, but research has shown the damage may be already done. A time-honored recommendation for trees, especially evergreens, has been to provide ample soil moisture prior to soil freeze-up. Work done by Dr. Harold Pellett, research director for the horticultural research center at the University of Minnesota, may prove however that fall watering after water stress is insufficient to restore plant vigor.

Dr. Pellett and his associates tested his theory on container-grown pyramidal arborvitae, *Thuja occidentalis* 'Pyramidalis.' They watered plants under a clear fiberglass roof in different increments from mid-August to early November, some at optimum conditions and others at drought conditions. Tests on freezing indicated that there were no major differences in hardiness level of plants subjected to different soil moisture treatments. In all cases, plants were incapable of tolerating temperatures which might occur on the dates tested.

In observation of visual effects, the tests showed that plants subjected to the water stress treatments suffered considerable injury, with the amount of injury proportional to the severity of the stress treatment. Rewatering of the stressed plants did not reduce the amount of visible injury exhibited regardless of date of watering. "We feel that the injury was caused as a direct result of the moisture stress, and cold temperatures contributed little if any to the injury," according to the report.

Dr. Pellett did note that late fall watering will prevent the temperature of soil from dropping as low as dry soil and this could reduce winter injury to root tissues. Yet it does little to reduce winter injury of conifer

stems and leaf tissue following summer and fall droughts.

"We thought that the plants were more susceptible to cold injury," Pellett says. "Plants in the greenhouse still did as badly as the ones that were kept outdoors during winter."

Dr. Charles Dunham, University of Delaware extension horticulturist concurs. "Broadleaved evergreens like azaleas, andromeda, and Japanese holly were among some of the most severely damaged plants last summer," says Dunham. "You can expect them to show considerably more injury by spring."

Narrowed-leaved and broadleaved evergreens are particularly vulnerable because they keep their foliage all winter and prepare for the winter early. They must function at a high pace from late summer through fall. All plant roots need a proper amount of moisture in the soil as the winter approaches, but research has shown that evergreens require sufficient water in their foliage at this time of year to sustain the plant through the winter.

"We haven't seen the effect yet," says Richard Weir, III, cooperative extension agent-agriculture for Nassau County, Long Island. "It is taking place internally, but we will see it in the spring." The New York Metropolitan Area experienced its driest summer ever and its third hottest summer. Weir says there are no obvious characteristics to pinpoint to a particular plant, but scorching, blotching, twig die back, and a mixture of these could appear. This causes concern among nurserymen.

Leslie Hobbs, owner of Warren County Nursery in McMinnville, TN, says the combination of drought and particularly the heat in his area hurt his stock this past year. "Evergreens were the hardest hit; the heat cooked them. It hit the viburnums, pines, spruces, and hemlocks—we lost all our one-year-old hemlocks," Hobbs says.

He doesn't think he can do much for his stock through the winter. He dug the subsoil to at least 2 feet wherever it was possible. Breaking the hardpan this deeply allows moisture to come up. He is also considering irrigating for the first time.

Nurserymen with irrigation systems have certainly fared better through the drought and heat. Wayne Lovelace, general manager at Forrest Keeling Nursery, Elsberry, MO, says his stock hasn't suffered too much. A hard ground and digging in the fall forced him to up costs of balled and burlapped stock, but shaker diggers which dig the bare root worked better in the dry ground. Weather conditions caused a slowdown in sales more than economic conditions since many customers did not feel like planting this past summer.

Lovelace warns that he is not assured yet of a good crop next spring. Much depends on the winter. "The worst thing would be severe cold with no moisture," he says. "That's what causes winter burn."

Also wary of the winter is Bill Flemer, of Princeton Nurseries, Princeton, NJ. "If the ground freezes hard, there will be serious damage," he says. "Deep freezing, cold weather, and high wind would be a bad combination."



Injury was proportional to the severity of water stress, with cold temperatures contributing little if any to the injury. Without adequate summer moisture, late fall watering does little to reduce winter injury of conifer stems and leaf tissue.