

SUPPLIERS

CORNER

■ **Dan Murray**, CGCS, showed his boss a little appreciation in June. Murray, construction manager at Lohmann Golf Designs, Inc., Marengo, won a 3-day trip to Shinnecock Hills, Long Island, site of the 1995 U.S. Open. The prize, offered by **Lofts Seed**, allowed for two persons to get all expenses paid, so Dan took his boss, Bob Lohmann. Murray earned the trip by correctly identifying Lofts' turfgrass varieties in an advertisement. His name was selected through a random drawing since his was not the only entry with the correct answers.

■ **Nibco Inc.** purchased the assets of **Pepco Water Conservation Products, Inc.**, Fresno, Calif., on June 9. Nibco, Elkhart, Ind., adds low-flow water conservation products to its traditional irrigation product line.

■ **Wade Rain**, Fresno, Calif., relocated

the manufacturing and distribution facilities of its micro-irrigation division to 2851 E. Florence Ave., Fresno, CA 93721. Wade Rain bought a 206,545 sq. ft. building there, more than doubling the size of its previous facility.

■ **Garry Hargrove, PhD**, joins **Pursell Industries**, Sylacauga, AL. Hargrove was formerly director of product development at Grace-Sierra, Milpitas, CA. Pursell is a leader in controlled-release fertilizer.

■ **DowElanco** stepped up production of oryzalin, the active ingredient in **Surflan** pre-emergence herbicide. Oryzalin worldwide sales have increased 15 percent over the last year, says Indianapolis-based DowElanco.

■ **Kubota Tractor Corporation** launches a new safety campaign promoting the use of roll-over protective structures

(ROPS) and seat belt with agricultural tractors. Kubota dealers have been provided with ROPS safety promotion materials including in-store videos, posters and brochures.

■ **Jim Mitchell** was appointed marketing technologies coordinator for **James Hardie Irrigation**, Laguna Niguel, CA. He joined Hardie in 1993.

■ **If you get a hankering for a bratwurst** at the 1995 International Lawn, Garden and **Outdoor Power Equipment Expo** in Louisville, check out the outdoor demonstration area manned by **Kohler Engines**. The Wisconsin-based firm will again be providing free brats and soda each day of the show.

■ **Congratulate Bill Bedford**, superintendent at La Cantera Golf Club, San Antonio. He won the "War Bird Special" Calloway driver featured in the **CoRon Corporation** booth during last winter's GCSAA Conference. CoRon, of Souderton, PA, manufactures liquid controlled-release nitrogen fertilizers.

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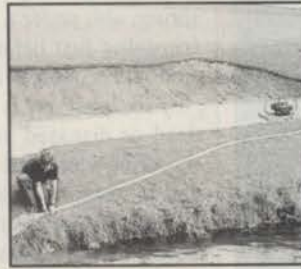
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Pointers for perfect pruning

When and how to prune all plants—from small flowers and shrubs to mighty oaks—and what tools to use.

■ The three primary reasons to prune plants are (1) to remove dead and diseased branches, (2) to control size and shape, and (3) to stimulate growth. Because it's a maintenance activity, the longer you put it off, the harder and more time-consuming it becomes.

Shade trees can be pruned high with thick crowns, so activities can take place under the shade. Windbreak trees can be pruned at the top to keep their fullness. Specimen trees can be pruned every year to maintain a thin, open crown and easily-viewed artistic form.



Young trees deformed by wind may be corrected by cutting back the leader and laterals on the downwind side (direction of lean) to more upright branches.

To make pines and other whorl-branched conifers more dense, you can pinch new growing tips (candles) in half, by hand, as they expand in the spring.

Pruning for size, however, is not acceptable, according to horticulturist Charles Owen of the Holden Arboretum, Mentor, Ohio. "It is infinitely better to select a plant for the available space than to select the wrong plant and to spend hours every year to keep the plant in bounds, a job which just gets more difficult and time-consuming every year," he says.

When to prune—Pruning to stimulate growth will be determined by the plant's characteristics and growing season. Spring-bloomers produce flowers on wood from the prior season. If you want a heavy flower growth next year, prune plants such as forsythia and azaleas, after the glory of their flowers have faded.

Summer-bloomers follow the opposite theory. Their flowers grow from new wood produced the same season. A late-winter pruning will encourage the growth of new wood and abundant flowers.

Evergreen trees generally need less pruning than deciduous trees. But when necessary, needle evergreens, such as pine and spruce, also prefer a late winter/early spring trimming just before their growth spurt. Avoid fall pruning of these evergreens.

Fall, however, is a good time to prune dead or diseased branches from spring-flowering trees and bushes. Late summer and fall blooming shrubs and perennials should also be trimmed once their flowers have fallen. If trees or shrubs are transplanted during the fall, cut back their branches to compensate for the roots that have been damaged. This will create less of a drain on the remaining root system and allow it to rebuild.

Heavy pruning is generally best done in late winter, when the plant is dormant and temperatures are above freezing.

"Pruning during the dormant season makes it easier to spot problem areas and place pruning cuts in trees that have lost their leaves," says Trevor F. Vidic of the Davey Tree Expert Co. "When new leaves sprout in the spring, they mask winter cuts."

There is some disagreement as to when trees that extensively bleed (exude sap) should be pruned. While Davey advocates

winter pruning of conifers, maples, horse chestnuts, birches, walnuts and cherries, the American Horticultural Society suggests mid-summer pruning (after new growth has matured) because they bleed even toward the end of their dormant season.

Avoid topping—"Proper pruning should not be confused with topping," Vidic notes. "Topping removes a tree's main leader and branches, resulting in stubs." Topping severely disfigures trees and results in "watersprouts"—weak limbs that are susceptible to damage from high winds or other adverse weather. Topping may also harm the tree's natural defense system.

Pruning, on the other hand, doesn't harm trees, if done properly. However, a pruning cut is a wound, and it is important for it to close quickly.

The tools—One key is to use sharp tools that are large enough for the job.

Long-handled tree pruners are excellent for hard-to-reach branches. Loppers, which can extend your reach and leverage, should be used for larger branches up to two inches in diameter. Hand pruners can be used on stems up to 3/4-inch diameter, while hedge shears can be used on all hedges except larger woody branches.

Hand-pruners and loppers are available with either anvil or by-pass blades. Anvil blades have a more efficient cutting action and are used on dry, hard and old growth. By-pass blades give precise, clean flush cuts that are ideal for new green growth.

The cut—Never make a random cut along a branch. Cutting in the middle of a branch will cause it to wither beyond the bud, providing a home for insects and disease. Try to select a bud pointing outward or in the direction you want new growth to follow. Cutting back to a bud or branch will stimulate growth at this point.

On smaller plants, be careful not to cut too close or too far away from buds.

For trees, keep the cut as small as possible and avoid "tearing" the branch. Try to cut on a 45-degree angle with the lowest part of the cut directly opposite and

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A TIME TO PRUNE

LATE WINTER/EARLY SPRING

- Summer blooming bushes and shrubs
- Fruit trees (after dormant-before bloom)

LATE SPRING/EARLY SUMMER

- Spring blooming bushes and shrubs after bloom

FALL

- Maples, birch, walnut, poplar

ANYTIME

- Water sprouts
- Dead or diseased branches



ANATOMY OF A TREE

- LEADER BRANCH
- PRIMARY/MAIN SCAFFOLD BRANCH
- SECONDARY SCAFFOLD BRANCH
- LATERAL BRANCH

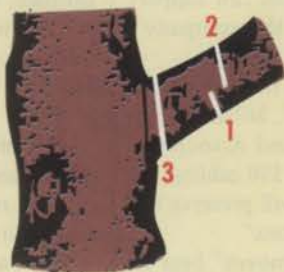
STRENGTH IN ANGLES



- WATERSPROUTS
- SUCKERS

1-2-3 STEPS IN PRUNING

LARGE LIMBS



"V" CROTCHES



- 1) UNDERCUT-1/3 WAY THROUGH LIMB
- 2) TOP OF LIMB CUT
- 3) FINAL CUT-REMOVE LIMB

THE PROPER CUT



CUT TOO LONG CAUSES DIEBACK.



CUT TOO CLOSE INTERFERES WITH BUD GROWTH



CUT TOO SLANTED EXPOSES TO DAMAGE



PROPER ANGLE AND DISTANCE PROMOTES HEALTHY GROWTH

PRUNING from page 22

slightly above the bud or branch of your pruning point.

On evergreens, do not prune into the inactive center of world-branched conifers because new branches won't form to conceal the stubs. When a leader is lost, replace it by splinting to a vertical position the upper lateral on the highest branch. Prune all laterals immediately below the new leader.

A thinning cut removes an entire branch at its base. When you remove a scaffold branch, make the cut at the main trunk; when you cut a lateral away, make the cut at a strong main branch.

Heading a branch back keeps the shoot attached but removes the terminal bud and reduces the branch's overall length by one-fourth to three-fourths. Heading back produces a more bushy, dense appearance than thinning cuts.

Dr. Alex Shigo, a recognized national authority on trees, cautions against making branch-removal cuts that are flush with the stem or the trunk. Instead, he

advises a pruning cut that leaves a small stub. Recent critics of Shigo's technique—which is based on plant physiology—advocate a cut between flush and Shigo's for aesthetic reasons.

Tips on cutting—

1) Use the one-third rules on trees. Never remove more than *one-third* of a tree's crown. Try to encourage side branches that form angles that are *one-third* off vertical. Ideally, main side branches should be at least *one-third* smaller than the trunk's diameter. For most deciduous trees, don't prune up from the bottom any more than *one-third* of the tree's total height.

2) Be sure to cut only the branch tissue, and not that of the stem or trunk. Also, be very careful not to injure the branch collar, cutting just beyond the collar ridges.

3) Always start by removing dead wood. Then remove damaged and diseased parts. Then remove water sprouts and suckers. Finally, deal with rubbing branches.

4) When sawing off a branch, support the part being cut so it doesn't rip the trunk's bark as it falls away. If the branch being cut is too heavy, use a double-cut. Make a preliminary cut one-third to halfway through the branch, cutting from underneath about six inches beyond the collar ridges. Next, make the first complete cut on the outer side of the preliminary cut. Saw until the branch falls cleanly away. Finally, make the second complete cut at the collar ridges.

5) Dip pruning tools in a disinfectant (undiluted alcohol or 10% solution of household bleach) after each cut when you work on infected trees to avoid spreading diseases.

—Sources: National Arbor Day Foundation, Holden Arboretum, The Davey Tree Expert Co., The Garden Council, Virginia Tech, The American Horticultural Society, Fiskar's Inc.

Cabling, bracing trees properly protects long-term 'investment'

Cabling and bracing can support both trees and your bottom line—but make sure you know what you're doing.

by James E. Guyette

■ Tree care companies that provide cabling and bracing services can support at-risk trees, along with the company's bottom line.

"It can be a real profit-making operation," says Dr. Kenneth C. Miller, a tree pathologist with Miller and Associates, Ravenna, Ohio. "An \$80 to \$90 cabling job is not uncommon, and it will preserve the aesthetic value of the tree, too."

This type of service "moves" best in upscale neighborhoods but homeowners need to be informed of the increased value involved. "That's something the company owner has to train the sales person in," says Miller. "It's something you're not going to sell in a blue collar area, but it

works in a yuppie area quite well."

The benefit—"Trees are usually a long-term investment," points out Paul McFarland of McFarland Landscape Services, Philadelphia, Pa. "If clients want the beauty of the tree, they would invest in cabling to preserve the tree's structure."

In many communities, few tree care companies tackle cabling work. "Cabling and bracing is dragging its feet because people are afraid to get into it," says Dr. Alex Shigo, Shigo and Trees, Associates, Durham, N.H.

"I think cabling and bracing is an extremely good practice, but many people run from it because they don't know how to do it."

Not only must the people attempting cabling and bracing be experts at tree biology, but mechanical engineering skills are also required.

Be careful—Even a seemingly easy cabling job can bring trouble, too.

"They have to match all the coordinates together to get a good hold, (or else) they could really create a lot of damage," observes McFarland.

He knew one cabling job that went

awry when the cable broke and went through a greenhouse.

Miller is even more explicit. "Landscapers should stick with dogwoods" or other easy-to-handle trees, he says. Using pole saws and ladders, a company can probably prune branches up to 20 feet high without harming the tree. However, cabling and bracing is a different story.

"I don't know if a landscaper wants to get involved with cabling," Miller notes. Even guy wire installation can be costly if attempted by someone without the proper training. "He or she is going to wind up girdling the tree."

"A mark of a professional is that he or she is able to make a decision," notes Shigo.

"You have to be brave enough to talk to the client and say, 'I'm going to assign risks. Here is a tree I will cable and brace—and here is a tree I will not cable and brace.' If the client wants something else, get it in writing."

—The author is a freelance writer specializing in the green industry. He is based in South Euclid, Ohio.

Monitor potassium levels for healthy turfgrass

A healthy grass leaf contains 2.5 to 3.5 percent of potassium. The growing medium and cation exchange capacity are keys to potassium content.

■ Most soils contain relatively large amounts of potassium (K^+) the essential element for plant growth, often in quantities as much as two percent of the weight of the mineral portion.

At the same time, the concentration of potassium in the soil solution from which the grass draws its needs may be only 50 to 100 parts per million.

This relationship illustrates the reason why the total chemical analysis of a soil has little correlation with its ability to supply grass with a nutrient and why soil testing procedures were developed which were more closely related to plant growth.

The potassium in the leaf is not associated with the structure of any specific compound such as protein or carbohydrate in the leaf. It appears as a free ion in the cell sap and helps maintain the ionic and pH balance within the cell as well as with some enzyme functions.

In fact, when a leaf dies, most of the potassium contained in the leaf will be leached out by the rain and returned to the soil.

The major portion of the potassium in the soil is found as an element in the structure of clay minerals and sand grains originating from the mica and feldspars in igneous rock.

Over many years, the potassium-containing minerals mica and feldspars break down. The potassium released due to this breakdown may become part of the structure of secondary minerals known as clay minerals or become exchangeable ions in the soil solution.

The potassium which is part of the clay structure is considered slowly available to the soil solution and can slowly recharge the potassium in the soil solution over a period of weeks or months. The rate at which the restructuring or breakdown of clay minerals releases potassium is known

as the potassium supplying power, and can vary significantly between soils.

Potassium taken up by the plant is composed of potassium in the soil solution and the exchangeable potassium.

Cation exchange—Cation exchange occurs when compounds or minerals are surrounded by a sphere of negative electrical influence.

This gives them the ability to attract positively charged ions. Ions such as potassium, calcium and magnesium carry a positive charge, and are attracted by the negative charge the same way the north pole of a magnet attracts the south pole.

Cation exchange is also a property of

clays and thus are more fertile due to a higher CEC.

There is little the turf manager can do to alter the amount or type of clay in his soil. He can, however, increase the humus content by returning clippings, top dressing with composted organic materials and use management practices which favor a dense, deep root system.

Don't look for immediate results; this is a slow process.

Sports field CEC—Sports fields built on an all sand rooting medium will have a very low CEC as evident from the above discussion. The lack of any CEC in sand is one of the reasons many designers will advocate the inclusion of a small amount (three to 10 percent) of natural top soil in the mix.

Attention to the potassium nutrition of turf growing on a sand system is critical. More frequent applications will be

HUMUS/CLAY MINERAL POTASSIUM RETENTION THROUGH CATION EXCHANGE

	(grams potassium/kg. material)
Humus	78
Montmorillonite clay mineral	39
Illite clay mineral	15.60
Kaolinite clay mineral	3.12
Sandy loam low in organic matter	0.76
Sandy loam high in organic matter	3.90
Clay loam with kaolinitic clay mineral	1.56
Clay loam having illite clay minerals	21.45

large organic matter molecules, particularly when present as humus, because they also have a negative "sphere of influence" Since clay minerals and humus have a negative sphere of influence and therefore attract cations, the cations are held from leaching in the percolating ground water.

Cation exchange capacity—The ability of a soil to retain all cations by the exchange system is called its cation exchange capacity (C.E.C.). The CEC of a soil depends on the amount of organic matter, the amount of clay and the type of clay found in the soil. The silt and sand fractions do not have a negative charge, so they have no effect on the CEC.

The type of clay mineral which makes up the clay fraction has a large influence. Clays found in the tropics tend to be the kaolinitic types with a low CEC. Clays found in the temperate regions such as Canada have illite to montmorillonite type

required. A soil testing system will give a reading on the potassium primarily in the soil solution, potassium which may be quickly lost by excessive rain or irrigation. There will be little reserve in the cation exchange system.

The turf manager must decide the economics of frequent light applications of soluble forms of potassium versus the cost of the coated materials. There is little research available to guide him regarding the application timing of slow-release potassium.

All potassium fertilizers, with the exception of controlled release forms, are water soluble. As a result, they can cause foliar burn when applied at high rates or where there has been an over application due to equipment failure or operator error.

—by R.W. Sheard, P.Ag., writing in the *Sports Turf Newsletter*.

New horizons in disease control

New formulations, packaging and use rates make control products easier to use and more effective, as the green industry charts its course into the new century.

Control product manufacturers and end-users continue to find better product formulations and new strategies for prevention at lower rates.

Here's an exclusive look at some of the people—from manufacturers, to research professionals, to superintendents—who are finding new ways to get the job done.

—Terry McIver, Managing editor

Summer decline less complex with new control combination



The edict that golf greens be "short and fast" puts added stress on turf root systems, which adds to disease control problems.

■ Just three years ago, few people understood what caused summer decline complex on bentgrass golf greens. Even worse, no one knew how to control it.

In 1992, North Carolina State University researcher Dr. Leon Lucas found that 4-8 oz. of Chipco Aliette WDG and 4-8 oz. of Fore WP brand fungicides—applied every 14 days—provided excellent control.

Tests conducted in South Carolina by

Dr. Bruce Martin and research in other states have confirmed Dr. Lucas's results.

"We're seeing more evidence that high levels of fertilizers and especially potassium fertilizers, contribute to the onset of pythium diseases," says Lucas.

"For years there has been a move toward using more potassium because many people feel it helps turf tolerate heat and drought better. This seems like the ideal thing to do if you want to help cool-

season turf hold up better during the summer.

"But the levels of soluble salts are climbing too high, and we're seeing a clear connection between high amounts of salts from fertilizers and disease damage. These high salt levels can develop quickly on new, high-sand-content green mixtures with low cation exchange capacities.

"Applying high levels of potassium can cause direct damage to roots and stolons, making them more vulnerable to infection from pythium and rhizoctonia species," Lucas explains.

"In addition, it is believed that potassium may create a favorable environment in which pythium species can more easily reproduce."

Lucas recommends using potassium at rates of 5-6 lbs./1000 sq. ft. each year, provided potassium levels are monitored through soil tests and tissue analyses.

"In many of the cases where we see summer decline complex being most severe, we also see high levels of soluble salts in the soil," reports Lucas.

"Roughly 150-250 parts per million should be sufficient for optimal plant growth. As an extra precaution, I recommend one-half the recommended rate twice as often to further protect against injury. When I find salt levels above 300 ppm during dry weather, root rot and decline of bentgrass is more severe."

It is important to note, Lucas emphasizes, that the same soluble-salt fertilizer levels that are completely harmless during wetter weather may actually cause injury during drier periods. The only way to remove the high salt levels is to apply enough water to leach the salts deeper into the soil. Applying this extra water during hot weather, however, can actually encourage disease development.

New formulations—One new tool

superintendents now have for enhanced protection from summer decline complex is the option of using the flowable formulation of Fore fungicide.

Because of earlier difficulties with maintaining a suspension of the formulation, recommendations initially called for Chipco Aliette WDG fungicide to be mixed

remain healthy throughout the summer."

According to Lucas, the combination has been used on bermudagrass, with good results.

"We don't fully understand all the synergistic effects of combining Chipco Aliette and Fore just yet," says Lucas, "but it does provide enhanced disease control. We also see improvements in turf quality that cannot be attributed to disease control alone."

Despite the enthusiastic reports from superintendents throughout the U.S., Dr. Lucas still stresses the importance of accuracy in applications. Of critical importance with the Aliette/Fore combination is timing. For best results, apply the combination in early summer, when daytime temperatures reach the high 80s or low 90s, and when night time temperatures remain near 70 degrees.

"It's also important that superintendents continue making the applications at 14-day intervals throughout the summer as long as heat and humidity remain high," says Lucas. "Some people have waited until later in the season, or have tried applying the combination every four to six weeks when they see clear symptoms of decline. They do get significant curative effects but not nearly the dramatic improvements in turf quality and disease control that you get from being on the regular program."

Precautions—Research in 1994 showed a potential for phytotoxicity and thinning on high sand content greens when using the combination at the 4- and 8-oz. rates on newly-emerged bentgrass seedlings. Thinning was not observed on plots treated with Aliette alone. Based on these preliminary observations, caution should be used when treating newly

*New Horizons in disease control
continued on page 28*

Turf Quality and Color of Bentgrass Tests Conducted at North Carolina State University

Pesticide(s)	Turf Quality (Scale: 1-9)	Turf Color (Scale: 1-9)
CHIPCO® ALIETTE® WDG (4oz.) + Fore® FLO (13fl. oz.) + Blendex (1.25oz.)	8.5	7.8
CHIPCO® ALIETTE® WDG (4oz.) + Fore® WP (8oz.)	7.8	7.5
CHIPCO® ALIETTE® WDG (4oz.) + Dithane WP (8oz.)	5.8	6.0
Control	3.3	4.0

Note: Rates are in oz./1,000ft. Fungicides were not washed off of leaf surfaces (watered in) after application. Blendex® was used at a rate of 0.5 oz./gal. of mix; 2-5 gal. of water used/1,000ft. Turf quality rated 1-9, with 9 being best. Turf color rated 1-9, with 9 being the darkest green. July, 1994 - NCSU

Chipco Aliette and Fore: data from research of Dr. Leon Lucas.

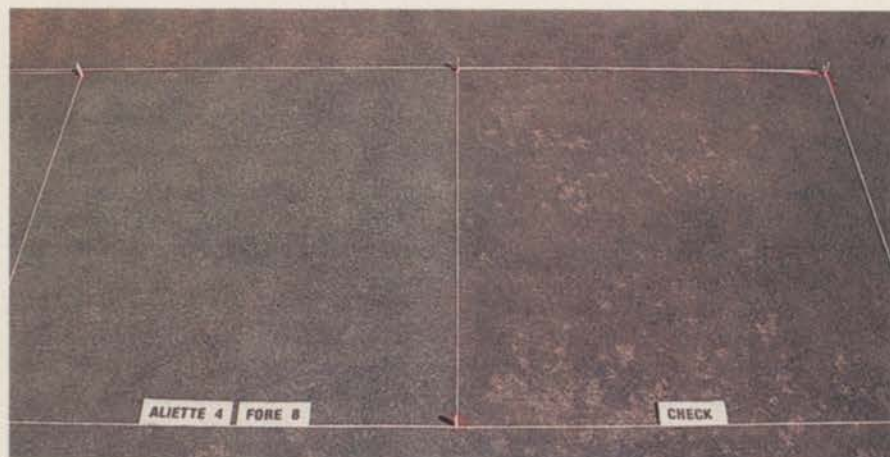
with Fore WP.

But research conducted by Dr. Lucas in 1994 shows that Chipco Aliette WDG can be mixed with Fore Flowable, provided that a compatibility agent is also used.

"We wanted to make sure this combination with Fore Flowable was safe and effective," explains Lucas. "What we found was that it actually provided even better turf quality than with Fore WP."

Superintendents have also begun using the fungicide combination on other grasses. Although formal scientific research is just getting started for many of these applications, reports from superintendents so far have been very positive.

"Some people have used the combination on other cool-season grasses such as tall fescue and had excellent results," reports Lucas. "I've personally seen two cases where the combination was used on home lawns—one with tall fescue and one with zoysia grass—and there was a dramatic improvement in the grass' ability to



The Aliette/Fore combination performs well on test plots in North Carolina.

Product mix proves two can be better than one

■ When dollar spot got in the way of his brown patch research, Dr. Pete Dernoeden tried a product mix that today is a new product for disease control.

The University of Maryland professor of agronomy was testing AgrEvo's Prostar 50 WP fungicide. "Before we could collect our brown patch data," remembers Dernoeden, "dollar spot would appear and wipe out our plots."

improved control of both diseases, with brown patch control going from 14-21 days to 21-28 days.

"The product combination appears to have an additive effect," says Dernoeden. "In other words, mixing the two products together provided better control of brown patch (rhizoctonia blight) than would have been expected with a normal use rate of Prostar alone."

Symptoms

■ On bentgrass golf courses, rhizoctonia blight symptoms first appear as tan blotches or lesions with reddish-brown margins.

The foliar blighting caused by rhizoctonia has a distinctive brown cast surrounded by a smoke ring effect when grass is wet. Large areas become blighted very quickly.

Rhizoctonia blight can often be misdiagnosed as pythium blight.

Couch recommends the Agri-Diagnostic kit now available to turf man-



agers. The chemical test is easy to administer and provides results in 20 minutes.

"Once turf managers know they have rhizoctonia blight, we suggest they spray with Prostar or Prostar Plus the first time that nighttime temperatures remain above 70 degrees," says Couch. "Temperature is the real key to rhizoctonia control, but when it also becomes humid, the fungus starts colonizing and you can get some serious disease outbreaks."

To gain control of the dollar spot problem, Dernoeden mixed Bayer Inc.'s Bayleton turf and ornamental fungicide with the Prostar. The combination

"A rate of two ounces of Prostar WP and one ounce Bayleton 25 DF per 1000 square feet provided a level of control equivalent to four ounces of Prostar."

emerged bentgrass greens. Tests are scheduled for this year to further verify any potential problems.

Lucas emphasizes the need for continued sound management practices, including fertilization levels, soil aeration as needed and air circulation around the greens.

"To get the best results, you have to look at the big picture and consider the entire biological system in which grass is grown."

On the market—The combination control product is now available as a "twin-pack," under the name Prostar Plus. After more than 50 university trials in 10 different states over seven years, brown patch control is consistent even under high disease pressure, according to AgrEvo.

Prostar Plus is packaged in water-soluble bags containing the lowest rates of both products. Each twin-pack covers 12,000 sq. ft. of turf at the normal usage rate. In addition, the combination provides control of 17 other turf disease, including pink and gray snow mold, summer patch, pink patch and Southern blight.

Another researcher who tested the product combination is Dr. Houston Couch of Virginia Tech. Couch described control of brown patch and dollar spot on a tall fescue sod farm as "extremely effective." An advantage of the tall fescue test was that researchers were able to count diseased leaves rather than estimate the percentage of blighted areas on bentgrass.

Couch recommends turf managers follow a preventive program of disease control rather than take a curative approach.

"They'll actually use less product this way," says Couch. "But the first step in proper disease management is accurate disease identification. Managers need to make sure which disease they are spraying."

Both Dernoeden and Couch suggest preventive brown patch control, during the first or second week in June on cool-season turf.

Superintendent takes preventive measures

■ An integrated management approach based on preventive disease control measures works wonders for golf course superintendent Scott Werner, CGCS, of the Lincolnshire Fields Country Club, Champaign, Ill.

Werner's success begins with a turf foundation based on proper fertilization. By stimulating a healthy turf, Werner believes he wards off diseases and weeds that usually accompany stress conditions.

"Our goal is a fairly moderate rate of growth," says Werner. "We don't want any excessive periods of heavy growth which stress the turf and detract from playing conditions."

The greens at Lincolnshire are fertilized every two to four weeks, depending on conditions. Werner uses low rates of N, which means he can make applications more frequent without paying for it with rapid growth.

The fertilizers are high in potassium, to promote turfgrass vigor and stress tolerance, and a healthier, more vertical and upright growing plant.

Soil problems—The golf course that is Lincolnshire Fields was carved out of what Werner calls "good 'ol central Illinois dark, heavy loam." It retains water, drains poorly, and is prone to compaction in heavy traffic areas. After a heavy rain, the ground becomes water-logged or the water just sits on the surface.

"The soil type has a great effect on disease problems, particularly pythium blight, which is a water mold disease," says Werner. "We have a difficult time controlling diseases in those areas that don't drain well."

Dollar spot and brown patch frequently appear on the course, and Werner does his best to combat them. Subsurface drainage tiles have been installed, and he aerifies often with a Cushman GA60.

When necessary, preventive fungicides are brought into play.

"When you detect disease," says Werner, "a certain amount of damage has already been done."

"Given the fact that we work around play schedules and golfers, it would take us days to treat for a widespread outbreak.

By that time too much damage is done. We feel we can be more successful, cost-effective and use less total fungicide each year by treating the course preventively."

Greens are treated on a two-week rotation. Tees and fairways are covered every three to four weeks.

Tank mixes—Werner tank mixes systemic and contact fungicides, using several different products that complement each other's strengths and weaknesses. Though he follows label recommendations, he prefers the low-end rates and looks for synergy between products.

Werner mixes traditional sterol inhibitors—such as Banner and Bayleton—with contact fungicides—Thalonil, thiophanate, Chipco 26019, Vorlan and Curalan. He says the results have been favorable, especially in terms of product performance and turf safety. Pythium control was exceptional after applying the combination of Fore and Aliette.

Werner is trying combinations of newer products, such as Eagle fungicide, a newly-registered systemic from Rohm & Haas Co.

Werner looks closely for effectiveness and turf safety in the products he uses. Length of control is also very important. If a product passes his standards, it must then be as cost effective as his current line-up.

The superintendent tested Eagle for three years as an experimental product. Werner compared Eagle in side-by-side comparisons with Banner, Bayleton and Daconil for dollar spot control, one of the worst disease problems at Lincolnshire Fields.

Werner recommends Eagle in the fight against turf disease.



Scott Werner and a view of Lincolnshire Fields. Werner considers product efficacy, safety and length of control.

"We need all the products we can to control diseases and prevent resistance," he says.

Cultural accompaniments—Werner balances management practices to encourage turf vigor and discourage disease.

Werner overseeds perennial ryegrass at a rate of 200 to 300 lbs. per acre for tees and fairways in late summer and early fall. The overseeding contributes to healthier turf at times of heavy disease pressure.

Spring verticutting toughens the turf for the heavy play that summer brings. Grooming reels or turf groomers also provide a very light verticutting with each mowing.

A new computer-controlled irrigation system is almost completely installed.

It uses an on-site weather station to accurately monitor loss from the turfgrass and soil.

With the data, Werner can determine his irrigation needs and schedules. During the stressful summer months, he can let the computer program each day's irrigation automatically. The coverage and control of this new system allows for more accurate and efficient irrigating, which uses less water.

New horizons in disease control continued on page 30



Spring verticutting prepares greens for heavy play at Lincolnshire Fields.

Taken as an integrated plan, turf aerification, fertilization and irrigation provides the best possible turf conditions, explains Werner.

All of which is important when you consider the speed with which a disease problem can grow.

"If we don't practice good disease prevention and control," says Werner, "in a matter of days an untimely outbreak of disease could ruin all our good work."

Social responsibility results in new 'vision'

■ Turf and ornamental chemical manufacturers must be able to adapt to the continuing changes in product regulations, market needs and technology as the start of a new century approaches.

Those changes include attention to programs for lower product rates, waste water reduction and innovative packaging.

Ciba Turf & Ornamental Products, for instance, has established "Vision 2000," which includes attention to social responsibility, environmental protection and economic growth.

"These elements will enable us to forge partnerships with green industry customers as we move closer to the year 2000," says company director Bill Liles.

Like many companies that manufacture control products for the green industry, commitment to exceeding regulatory standards is one of Ciba's self-imposed mandates.

One Ciba facility began a water recovery program and reduced waste water by 99 percent. Overall, company manufacturing facilities are well ahead of regulation standards which go into effect in 1998.

Membership—and involvement—in professional associations is a key aspect of some companies' commitment to the green industry. Ciba also co-sponsors educational programs such as the Audubon Cooperative Sanctuary Program for Golf Courses and scholarship funds for the children and grandchildren of golf course superintendents (the Legacy Awards).

Ciba and other manufacturers continue to offer products that can be used at low rates, while protecting soil and water resources. Low-rate products from Ciba include Banner, a broad spectrum fungicide.

Closed packaging systems limit user and environmental exposure to turf protection products during mixing. Ciba's turfPak is a returnable and refillable micro-bulk container.

Wettable powder and gel formulations in water-soluble packages are other innovations.



Ciba's Bill Liles: stresses training and continued education.

Economic growth—To ensure economic growth and a strong industry, product manufacturers go beyond simply supplying customers with a product. The next step is to provide customer and industry support.

"When a customer buys our product, they receive much more than just the packaged chemical," says Liles. "Included with that purchase is our guarantee of quality products, training and continuing education and nationwide industry support."

Liles urges customers to continue to support products labeled specifically for the green industry. Otherwise, he fears, "there is a serious risk that companies like ours will no longer be able to afford steep registration costs."

"The journey (a product takes) from test tube to market costs between \$15 million and \$30 million, and takes from seven to 10 years," Liles explains.



The 'turfPak' system as designed by Ciba limits pesticide exposure, speeds application time and ends package disposal problems.