

BUDGETS...

Planning, preparation and tact are the keys



BY MARK A. TODD

What exactly is a budget?

A budget can be defined as a working plan showing the amount of funds needed to maintain the normal operation of an organization for a given period of time.

Budgets may be prepared on a quarterly, biannual or annual basis. From here on, I will be referring to an annual budget designed to be used by the golf course superintendent.

In order for a budget to be successful, it must be carefully planned. Not only is it

important for a superintendent to formulate his budget accurately, he also must be able to sell it to his superiors.

The failing of a budget is most often due to improper preparation.

You can't begin planning a budget by blindly guessing what your needs will be for the upcoming year. You must have facts to go on. This requires careful research and the use of as many resources as you can get your hands on. It's also a good idea to start planning your budget as early as possible. This will give you plenty of time to gather all the information you need so that you will be prepared before the

budget deadline.

When first preparing a budget, a superintendent's primary objective should be to outline what he needs for the upcoming year. This is usually evident to the superintendent who has been at the same golf course for several years. For the superintendent who is creating a budget for the first time, this can be a real challenge. In either case, there are always some available resources to use.

Other things to consider are long-range projects including capital improvements for the next three to five years. Taking this *(Please see COMMITTEE, page 50)*



Committee likely to approve a budget it helped write

(Continued from page 49)

into consideration may save you unnecessary costs in the meantime.

Take inventories. This tells you what you already have. Last year's budget may have purchased items which will not be used up by the end of the fiscal year.

Make sure you find out what your superiors and membership expect to be covered in the budget. Be aware of any special

events, projects or purchases which might be expected to come out of your budget.

After closely evaluating all areas mentioned above, you should have a fairly accurate account of what your budget needs will be for the upcoming year. It is also advisable to consider a contingency factor for each category which is applicable.

After you have established your proposal, your next step is to sell it to your

greens committee and/or membership. By using a little tact and careful planning, you can bring the odds into your favor.

One approach to selling your budget is by having your greens chairperson or committee formulate it with you. By going over costs and expenditures together, you won't be presenting any surprises come proposal time.

Let's face it: a greens committee is going to be more apt to respond favorably towards a budget proposal that they helped formulate. Another advantage to this approach is that the greens committee is aware of any capital improvements or events in the planning stages, thus helping you out with the planning of this year's and maybe even next year's budget too.

But no matter what method you decide to use to sell your budget, the objective should always be the same: to make your proposal look as attractive as possible. Even the most thought-out budgets are useless unless they can be justified and approved.

The time spent preparing a budget can also be looked at as an investment. By careful planning, you may eliminate problems which might occur later, especially during the last months of the fiscal year.

By considering the guidelines mentioned above, you can greatly increase your chances of success in preparing a budget which will work for you.

Help is all around you...

Where can you get help? Here are some places to look for ideas:

- Previous budgets are always an excellent reference. If you prepared the previous budget, go over it and find out how accurate you were. If you made mistakes, find out why and compensate in those areas for the upcoming year.
- Key employees. They may have ideas which may help you.
- Club accountant may also assist you.
- Trade publications and periodicals also are good.
- Superintendents at neighboring golf courses, especially the more experienced ones who have been in your area for awhile.

BUDGET PREPARATION CHECKLIST

Salaries & Wages	Make sure to add a contingency factor for overtime, raises, etc. Review old time cards and labor records. For wages, be sure to consider all permanent and seasonal employees plus extra labor.
Fertilizer	Look at past fertilizer records and fertilization programs. Also consider inventory on hand.
Chemicals	Fungicides, herbicides, insecticides, wetting agents, nematicides, etc. Consider present stock. Review old pesticide application records.
Irrigation	Review inventory, average cost-of-repair records for sprinkler heads, pipes, fittings, valves, drain tile, etc.
Equipment Parts	Parts for mechanical repairs can be projected from past cost records.
Gas & Oil	Again, past gas and oil records would give an accurate cost projection.
Golf Equipment	Pins, flags, stakes, cups, tee markers, towels, etc. Past records of vandalism would give an estimate of how much contingency to allow.
Landscaping	Include annuals, ornamentals, mulch, border edging, etc.
Sand & Topdressing	Look at past records.
Seed & Sod	Look at last year's overseeding records. Consider any sodding projects in the planning stages.
Electricity	Average past records
Water	Average gallons used over past years.
Telephone	Use past records
Tennis Courts	Past records
Swimming Pools	Past records
Miscellaneous	Employees' uniforms, office supplies, vehicle license and registration, dues, meeting and conference expenses.



Except maybe for Hawaii, no place has conditions like South Florida

This past spring, the South Florida chapter hosted a meeting with Dr. James Beard on getting back to the basics in turf management. All of us need periodically to hear this information again. After all, Dr. Beard did write *Turf Management*, the book that virtually all universities and colleges use for educating turfgrass students.

As I sat glued to my seat for five hours, something kept clicking in my mind: Southern Florida does not fit into the normal mold for the textbook. I guess the rest of the country is normal; southern Florida is truly unique.

"When do you first mow your rough

down here in the springtime?" Beard asked.

"Every Monday morning," I replied.

Let's face it: we don't go into dormancy down here. Maybe a light frost now and then, but the word "dormancy" is not a part of our vocabulary. Having traveled to Arizona, Texas and California during our three most recent GCSAA conferences, I am even more convinced that the only climatic region similar to ours is Hawaii — a true bermuda-base homefield.

Our topic for this issue of the *The Florida Green* is "Winter Preparations."

Let's get to the heart of the issue: Just how do we prepare for our winters in Florida?

First, we have mowed our greens 362 times this past calendar year. That's right. There were only three days that we did not mow greens! And even though our winters seem more like an overlap of fall and spring, we still must prepare for a heavy-play — Snowbird — season. Superintendents in South Florida have gradually changed their cultural practices over the past few years to policies more consistent with Dr. Beard's lecture.

Severely scalping turfgrass has a direct effect on the depth of root growth. Mow off the leaves and the roots die back.

(Please see IF THE MEMBERS, page 52)

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If the members want perfection in November, then they have to give us the course for renovation in the summer...

(Continued from page 51)

"Bermuda at a height of 6 inches can pass roots down to a depth of 7 feet!" says Dr. Beard. "Cut the bermudagrass back to less than one inch and you'll have less than an inch worth of roots."

Therefore, my summer projects incorporate more aerification, virtually no verticutting and absolutely no scalping.

For the past two years, we have aerified our greens five times during the summer. The tourists migrate north by the end of April and we begin "tearing up the golf course."

Our winter preparation actually commences the first of May.

We will aerify with 1/2 and 3/4-inch tines on walking-type machines for the greens, collars, green slopes, tee tops and tee slopes. No tractors or heavy equipment is used here.

Our schedule (underline indicates using DOT sand topdressing):

May: Greens, collars, green slopes, tees, tee slopes

June: Greens, collars

July: Greens, collars, green slopes, tees, cartpath wear areas, fairways, rough.

August: Greens, collars.

September: Greens, collars, green slopes, tees, tee slopes.

Let's review the benefits of the aerification program.

For the first time, 1/2-inch tines will be used without a topdressing, a practice some consider controversial, but I believe the benefits are greater to leave the holes open. An increase in the ratio of oxygen pore space to soil ultimately will decrease as the aerification soil wall deteriorates from irrigation, rainfall and surface mechanical wear. Open up the upper strata as much as possible. We should be so lucky as to create "soft greens."

Just as the greens are beginning to heal, we come right back in! For the next four months, we'll do the same thing: tear them up just when they're getting good! At my workplace, I can get away with it because we are such a seasonal club. We will not even have 110 members play for the entire summer.

I realize it's a great benefit.

If the members want perfection in the winter, they have to give us the course in the summer for renovation.

The greens are monostand Tifdwarf, the collars are planted outward to 15 feet, also with Tifdwarf. Tifton 328 bermudagrass is planted around the greens cut to a fairway height halfway down the slope. The tees, including slopes also are planted in 328. These grasses require special attention 12 months of the year. The visual and playing conditions, however, are rewarding enough to merit the maintenance hassle. It will take nearly a month to aerify all of the areas on the plan.

In June, we aerify only the greens and collars and, yes, we will topdress with enough DOT sand to virtually fill in all 3/4-inch holes. By the way, all aerification plugs will be cleaned off the greens, collars and tee tops every time. To drag the thatch across these areas will not take away the undesirable thatch.

July is much like May. By then the heavy summer rains have settled in. Topdressing the tees will be beneficial for the 328 and by this time the employees have the program down pat. Upon completion, we'll begin aerification of wear areas in the Tifton 419 bermudagrass around cart paths. We always do this operation last to reduce contamination.

August is much like June. By then the greens soil has truly been modified. Thatch is being removed and the topdressing is dragged in several directions to fill in the holes.

September is tough: it's very wet — sometimes 16 inches of rainfall — and sometimes we'll creep into October to finish the slopes.

After five months of tearing up the entire golf course, life begins to return to "normal." Our goal has been accomplished. The greens are nice and healthy, the tees almost look like greens, a winter fertilization program is now in full swing. And the crew is well aware of the long, hot winter still ahead.

After all, we will mow greens on Thanksgiving Day, Christmas and New Years. The entire crew will feel the pressure of producing a finely groomed golf course all the way through the winter until things calm down next summer.

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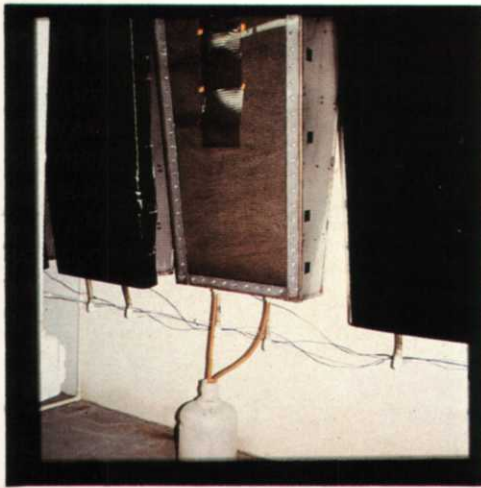
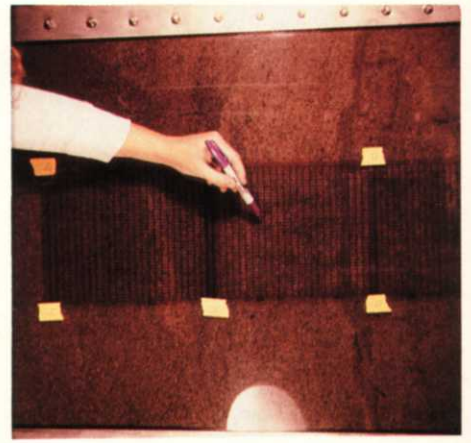


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Getting to the roots of some problems...

Those are no ordinary test plots in the photo above. They're actually the "roof" of a unique laboratory known as a "rhizotron," a subterranean structure for studying root growth (above right) and the leaching of chemicals through the soil (note tubes leading to jugs at bottom of photo on left). These photos were taken at the University of Nebraska. At a May 21 FGCSA meeting in Naples, FTGA Awards Chairman Bobby Rehberg suggested that the construction of a rhizotron at the University of Florida would be a worthwhile project for the Florida turf industry. "We could make the boxes slightly bigger in order to study various types of green construction," Rehberg suggested. "With the grief we're getting about pesticides, nitrates and fertilizers, this would be a great way to get some hard data to counter some of that bad publicity." Nebraska's rhizotron, which cost \$140,000 to build, consists of two wings off a central control room. An older, less elaborate rhizotron at Ohio State University cost less, he said.

If overseeding gets you bent out of shape...

POA TRIVIALIS BY RICHARD HURLEY, Ph.D.

Poa trivialis is native to all of northern Europe, temperate Asia and North Africa. It was introduced to North and South America and Australia. Brought to the United States from Europe during the colonial period, it is best adapted for growth in moist, shaded areas from Newfoundland and Ontario, Canada, to North Carolina and west to Minnesota and South Dakota. It has been reported in Colorado, Utah and as far south as Louisiana. *Poa Trivialis* can be readily found on the West Coast from Alaska to California.

Poa trivialis is commonly known by its scientific name, but is also referred to as rough bluegrass, rough-stalked bluegrass, shade bluegrass, rough-stalked meadowgrass, and rough meadowgrass. *Poa trivialis* produces a moderately fine-textured, light-green, medium dense turf. It is a cool season, sod-forming perennial which spreads by creeping leafy stolons, and may be found growing in soils with a pH ranging from five to eight, with

(Please see POA TRIV, page 58)

REDTOP BY A. DOUGLAS BREDE, Ph.D.

Somebody once said that history repeats itself. Many old-time turf managers will recall when professor Burt Musser at Penn State extolled the virtues of redtop in every turf planting during the 1940s and '50s. It offered quick establishment, fine texture and early spring transition.

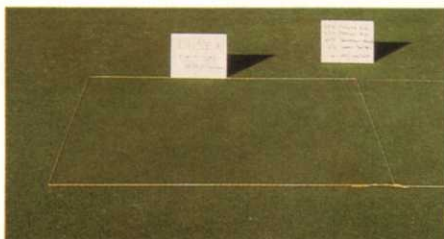
As years passed, redtop use waned. But in the 1980s, with bentgrass prices on the rise, golf superintendents began re-experimenting with it.

"Superintendents like the qualities of bentgrass in overseeding," says Dr. Rich Hurley, vice president for research at Lofts Seed Co. "Redtop has the qualities of bentgrass but will establish quicker.

"The weakness of creeping bentgrass isn't in its rate of seed germination," says Hurley. "Bent actually germinates quite quickly. But the seedlings just sit there — they're tiny, little seedlings that don't contribute to the stand until late in the season. Redtop has

(Please see REDTOP, page 60)

“*Poa trivialis* has been recommended for winter over seeding of dormant warm season turfs, usually in combination with the improved turf-type perennial ryegrasses.”



LOFTS SEEDS

At left is Laser at 10 pounds/1000 square feet; at right is a mixture of 35% Palmer perennial ryegrass, 35% Prelude perennial ryegrass, 24% Jamestown chewing fescue and 6% Sabre poa trivialis at 20 pounds/1000 square feet.



LOFTS SEEDS

Left is Pennway at 5 pounds/1000 square feet; right is 60% Laser and 40% Penncross at 7 pounds/1000 square feet.

Poa 'triv' retains color, can't tolerate traffic

(Continued from page 56)

best growth occurring between pH six and seven. Besides being well adapted to damp, shaded locations, it is also found growing in wet meadows, as a component of high fertility grasslands and along ditch banks. It has the ability to germinate and grow at low temperatures, displays good color retention in the fall, produces early spring greenup, germinates rapidly with good

seedling vigor, and has excellent winter hardiness.

Poa trivialis has been recommended for winter overseeding of dormant warm-season turfs, usually in combination with the improved turf-type perennial ryegrasses, with mixtures containing between 10 to 15 percent *poa trivialis* by weight.

Poa trivialis does not tolerate drought and is likely to be short-lived on dry sites. The root system is fibrous, relatively shallow, and annual. It may be severely damaged or killed during periods of moisture stress, especially in dry sandy soils. *Poa trivialis* also has poor wear tolerance and will not persist under heavy traffic.

There are approximately 2.3 million seeds per pound. Seed germinates under a wide temperature range with peak germination occurring at approximately 50 degrees F, with a reported base temperature of 40 degrees F. Base temperature refers to that temperature below which 50 percent of potential germination would not occur.

Rhizoctonia brown patch, leaf spot and dollar spot are the most common diseases associated with the grass. However,

ophiobolus patch, pythium blight, fusarium blight, rust, stripe smut and powdery mildew have also been reported as occurring on this species.

Before the release of “Sabre” *poa trivialis* in 1977, no domestic cultivars were commercially available. Most of the seed was imported from Europe. Common types are normally rather tall growing, light in color and form a loose-growing sod. They are of limited value for winter overseeding.

Development of cultivars which have a lower growth habit, a darker green color, the ability to form a dense sod, improved disease resistance, and reduced seed shattering would be helpful in expanding the potential usage of this species

• • •

Dr. Richard Hurley is vice president and director of research and agronomy for Lofts Seed, Inc., Bound Brook, N.J.

POA TRIVIALIS

- ✓ Perennial cool-season grass adapted to moist soils and shaded environments.
- ✓ Injured by hot, dry weather, but performs well in cool, shaded locations and is often the primary grass species found on these sites.
- ✓ Forms a rather loose turf which is intolerant of wear.
- ✓ Growth habit provides extensive shallow and surface roots, making it prone to injury by hot, dry weather.
- ✓ For attaining green color and a winter playing surface, utilized as a component in mixtures for overseeding greens and tees in southern United States.
- ✓ Ability to grow at low temperatures, displays good color retention in the fall, produces early spring green-up, germinates rapidly, has good seedling vigor and excellent winter hardiness.

MANAGEMENT TIPS...

- Cutting height** — Unlike perennial ryegrass, poa trivialis can be cut close immediately after overseeding. Once established, poa trivialis can withstand heights of cut below 3/16 inch.
- Fertility** — Schedule light, frequent applications of soluble nitrogen at 0.5

pounds/1000 square feet every two to three weeks after overseeding throughout the winter season.

Irrigation — During fall establishment period, water lightly 3-4 times per day between 10 a.m. and 4 p.m. As poa trivialis has poor heat and drought tolerance, water management is critical for successful overseeding.

Redtop has superior seedling vigor

(Continued from page 56)

better seedling vigor, and the plants are more substantial. Redtop contributes to the stand early in the season."

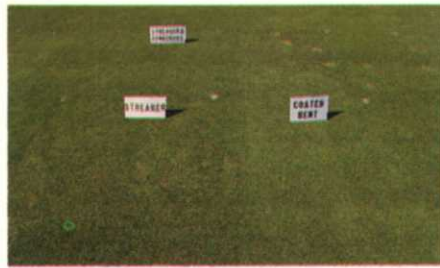
Redtop, being a close relative of bentgrass, mimics many of the qualities of bentgrass. It has 5 million seeds per pound, which compares quite closely to the 6 to 8 million per pound of bent. Redtop also has the soft, fine-textured leaf of bentgrass.

The big difference between the two comes in the spring. Following a fall overseeding, bentgrass produces one of the most luxurious late spring turfs in the overseeding business. Unfortunately, that's also about the time that the bermuda is staging a comeback. Redtop, on the other hand, prospers mainly in the fall and winter. As warm temperatures hit, redtop gives way to the bermuda.

In the 1984 National Dormant Bermudagrass Overseeding Test sponsored by the National Turfgrass Evaluation Program, redtop made the spring transition more readily than any other overseeding variety or blend except one.

Until recent years, the problem with redtop has been finding reliable seed.

Many times, golf superintendents have



JACKLIN SEED CO.

Al Dudeck and Bert McCarty at the University of Florida compared several overseeding mixtures during the winter of 1987-88. Mixtures of Streaker redtop with Penncross bentgrass displayed similar turf qualities during fall and early winter to that of Penncross alone. The summer 1988 issue of *The Florida Green* contained the data of this experiment.

discovered (after the fact) that their seedlot of common redtop was polluted with orchardgrass, or other undesirable crop plants.

Arden Jacklin, retired research director at Jacklin Seed Co., began working on the problems of common redtop in the early 1970s and several years later released "Streaker" redtop.

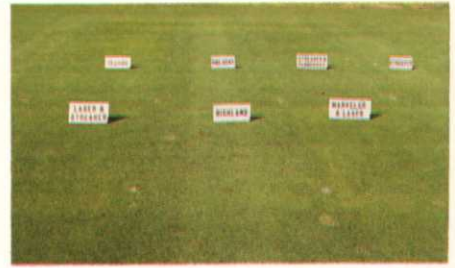
Streaker is sold as certified, which gives some assurance of varietal purity and integrity.

Farmers are paid a premium to ensure freedom from *poa annua* and seed of other crops.

Jimmy Ellison, golf course superintendent at Arnold Palmer's Bay Hill Club in Orlando, uses Streaker on his third nine.

"We use it in areas where we've had a lot of wear or thinning," says Ellison. "We go in with a two-to-three-pound rate of Streaker, and we'll see grass again real quick."

Hurley likes to see



JACKLIN SEED CO.

Addition of redtop to overseeding mixtures may offer finer texture, darker color, and easier spring transition than the use of perennial ryegrass or creeping bentgrass alone.

Streaker used as a component of overseeding mixtures.

"I'm a big fan of three, four and five-way combinations for winter overseeding," says Hurley, "because you don't know what kind of a fall and winter you're going to have. Florida can have highly variable conditions in the fall, winter and spring, from warm to cool, wet or dry.

"Having a redtop, a *poa trivialis*, a ryegrass and maybe a chewing fescue in the mix helps cover your bases. There's a lot of luck in getting a good winter overseeding catch, and a broad-based mix will sometimes help."

Redtop is used more frequently as a mixture component than straight. Its characteristics are best used to enhance the quality of other overseeding grasses.

Redtop also can be used as a "diluent" when overseeding bentgrass. If you would normally plant creeping bentgrass at 5 pounds per 1000 square foot, try planting a 50:50 mixture of about 2.5 pounds of bent and 2.5 pounds of redtop. This helps stretch your overseeding dollar, since redtop seed is much less expensive than creeping bent. Yet it retains the bent characteristics in the stand.

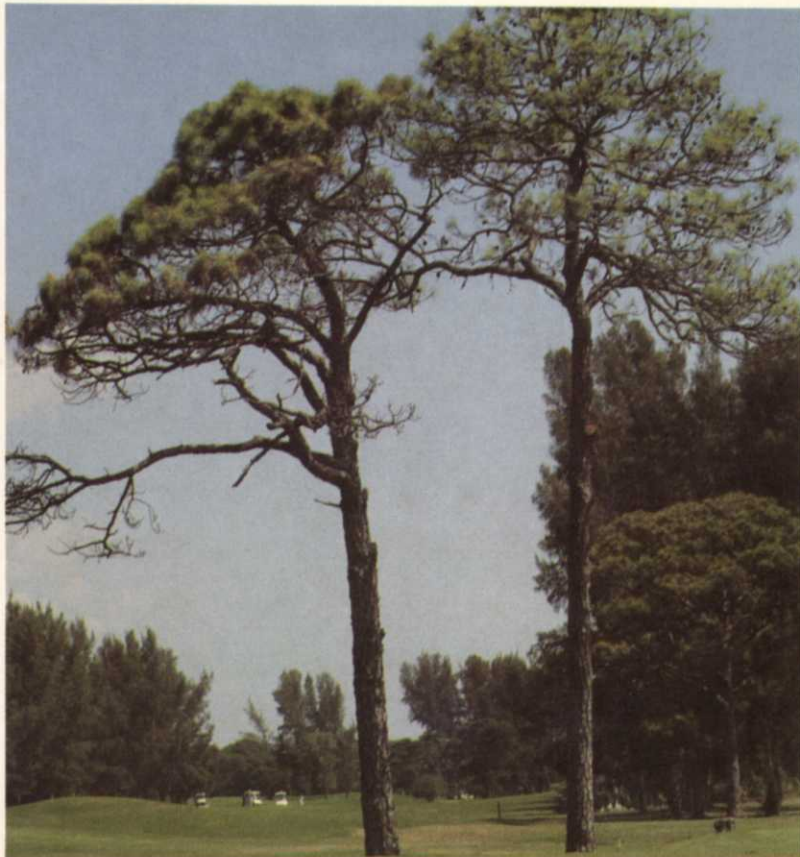
When adding redtop to perennial ryegrass, adjust the rate of the ryegrass down and include 10 to 15 percent redtop. For example, if you're using 30 pounds per 1000 square foot of ryegrass, reduce the rate to 25 pounds and add two to three pounds of redtop.

Like a bentgrass with no stolons

Even though redtop has been used for over 70 years, many people are unfamiliar with this species. Dr. Jim Beard's *Turfgrass Science and Culture* text says, "Redtop is one of the most widely adapted turfgrass species. It may behave as either a long-lived or a short-lived perennial, depending on the intensity of culture, soil and environmental conditions."

Redtop is a close relative of creeping bentgrass — both grasses are members of the *Agrostis* genus. Unlike creeping bentgrass, though, redtop has no stolons. Redtop creeps by means of strong rhizomes beneath the ground.

Redtop has the deep, slate blue-green color of creeping bentgrass. In the national test results from Florida, Streaker redtop scored an 8.3 in genetic color (with 9 equal to the darkest green), while most perennial ryegrasses scored in the 5.0 to 7.7 range.



DAVID WEDGE

There's no treasure in golden pines

BY DAVID WEDGE

WEST PALM BEACH — Golden Pine Syndrome, formally known as South Florida slash pine decline, is present on practically every golf course in Florida but little is being done about it. The last study in South Florida was done by Dr. Roger S. Webb at the University of Florida and was published in *Soil and Crop Science Society Proceedings* (43:34-35, 1984).

GPS is not a disease as such. It is a failure to thrive. *Two pinus elliotti showing severe South Florida slash pine decline. The author calls the condition "Golden Pine Syndrome."*

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Healthy trees show deep green color



Trees in transition lose needles



Deep gold is evident in advanced stages

because its natural environment has been altered by humans.

Studies from Florida to Virginia show that pines of all types are particularly sensitive to changes in their environment. In south Florida, the South Florida slash pine (*Pinus elliotti*) and the sand pine (*Pinus clausa*) are the species that seem to show the most sensitivity to human intrusion.

The syndrome is initially seen as a gradual yellowing of the needles. A progres-

sive loss of second-year needles occurs over a period of several years. Finally the first-year needles become progressively more chlorotic and the loss of needles becomes more dramatic.

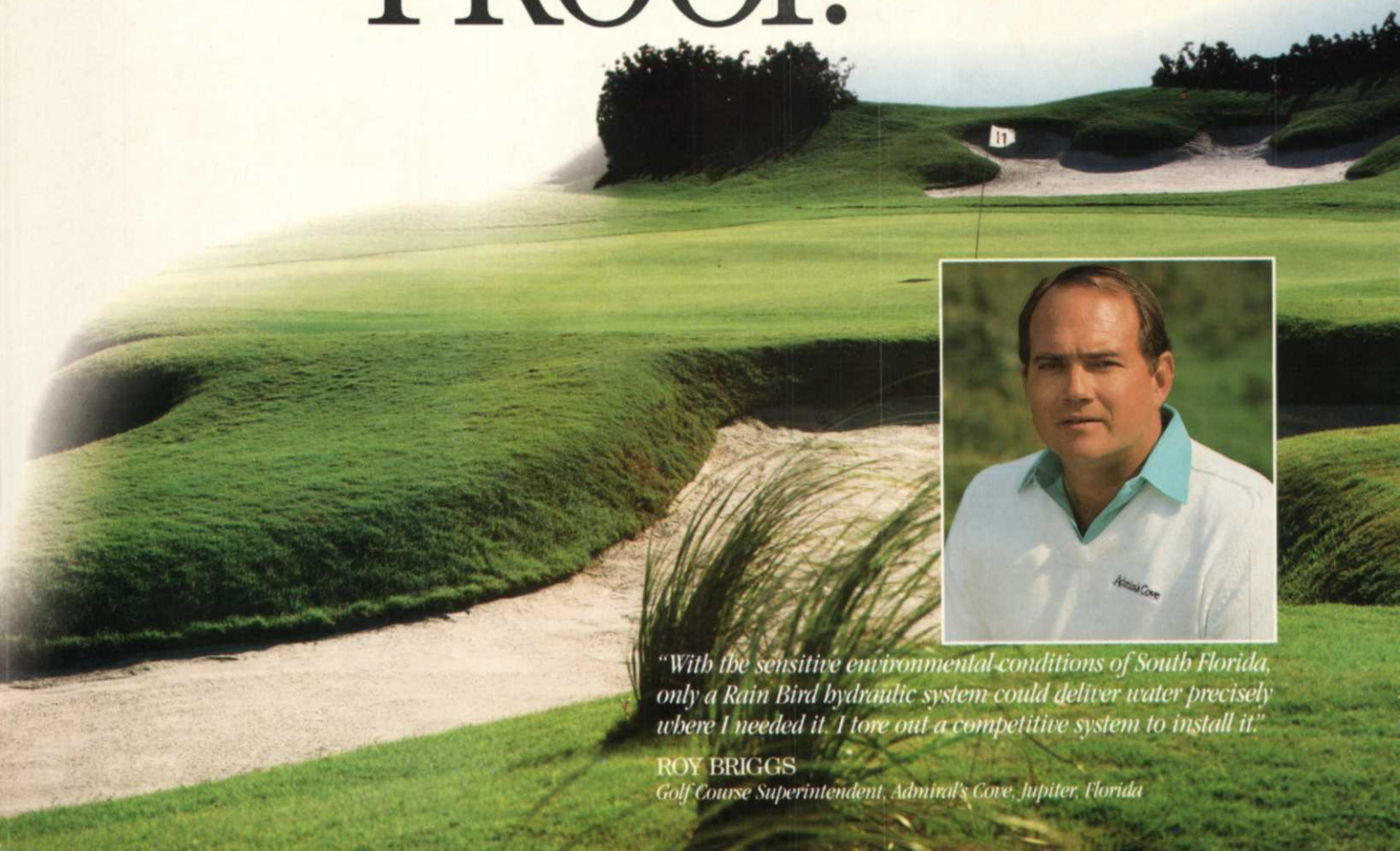
Eventually needles are reduced to the branch tip and tree death occurs, surprisingly often without an accompanying beetle infestation.

GPS is avoidable, however, and, in some cases, reversible.

Webb correlated GPS with commercial development of pine stands stressed by golf course, condominium and residential development along with grounds maintenance activities. Analysis of the annual growth patterns of trees killed by GPS has revealed that an immediate reduction of growth begins with construction of the golf course. Changes in grade, turf installation, mechanical damage to roots and irrigation

(Please see IT'S NOT, page 64)

PROOF



"With the sensitive environmental conditions of South Florida, only a Rain Bird hydraulic system could deliver water precisely where I needed it. I tore out a competitive system to install it."

ROY BRIGGS

Golf Course Superintendent, Admiral's Cove, Jupiter, Florida

It's not the water, it's what's IN the water...

(Continued from page 63)

practices all play a part.

Grade changes: No tree should ever be covered above the root flare. When essential roots are covered, they die from suffocation.

According to information gathered over

the past several years by Dr. Ed Gilman of the University of Florida, tree roots extend as much as three times the canopy width and within inches of the soil surface. Eventually, his work should help improve our tree-moving and maintenance techniques.

Turf installation: Although turf itself does not damage the tree roots, it competes significantly for limited nutritional sources.

Mechanical damage: Root damage from heavy mowing equipment, soil compaction, and the application of chemicals used in turf management are not always in the best interest of trees.

Irrigation: In general, it isn't the water which creates the problem; it's what's in it. Pine trees are adapted to acid soils. Water drawn from wells deep in the limestone aquifer, or surface water flowing through underground coquina rock formations produces highly alkaline irrigation water.

Current thinking is that the raised pH in the soil destroys the mycorrhiza which are associated with the roots.

Superintendents must institute every available horticultural water-saving technique. By limiting unnecessary turf areas, planting large amounts of trees, and incorporating mulch into their landscape maintenance programs, superintendents can be green industry leaders for maximizing their resources.



DAVID WEDGE

Notice that the only healthy pine in this stand is the farthest from the fairway.

... And here are some things you can do about it

Summer is an ideal time to institute some tree-care practices that may improve the beauty of your golf course, reduce water consumption and reverse early GPS-affected trees. Here are a few suggestions:

1. **Get a comprehensive soil analysis** of the areas near planned pine restoration sites.
2. **Leave native understory plants** undisturbed near pines. Where turf already is present, kill it off to the drip line of the tree. Mulch with pine straw, pine chips or cypress chips (in that order of preference) and allow the natural accumulation of pine needles under the trees. Interconnected groups of pine trees with mulched areas facilitate mowing and maintenance.
3. **Fertilize** in proximity of pine trees only with acid-forming fertilizers to prevent a rise in soil pH.
4. **Pines injured** during the clearing process should be sprayed with an appropriate insecticide.
5. **Downed trees** should be chipped and, after fumigation,

these chips can be used as mulch to interconnect large tree groups.

6. **Limit irrigation** or deflect it from pines. Only golf courses have the ability to grow algae four feet up the trunk of a pine tree.
7. **Mulch** does so many things for the landscape: it cools the rootzone and improves water retention in unirrigated areas even during drought. Roots are very sensitive to changes in temperature and mulch insulates the rootzone. Mulch encourages microbial activity and soil composition; it breaks down and releases natural organic acids, lowering the pH level. Not only does it control weeds, it fights compaction by providing shelter for soil organisms that live under natural leaf litters. And mulched areas provide beautiful color contrast.
8. **Schedule winter injections** into the cambium by a trained professional arborist. Studies have shown that injections do work when they are done correctly.



DAVID WEDGE

The jacaranda is planted in more locations in the world than any other flowering tree.

Tree conference draws 25 experts

WINTER HAVEN — Landscape architects, tree consultants, arborists and landscape maintenance professionals from around the world attended the 10th annual Menninger Sunbelt Tree Conference at Cypress Gardens April 16-19.

Among the 25 speakers were:

- Roberto Burle Marx of Brazil, world renowned for his use of flowering trees in landscape design.
- Dr. Henry M. Cathey, director of the United States Arboretum, who discussed "Tough Trees for Tough Times" and the new U.S. Department of Agriculture hardiness zone map.
- Donald C. Wileke, director of the American Forestry Association and chairman of the Minnesota State shade tree advisory committee who discussed the greenhouse effect.
- Dr. Nina Bassuk of Cornell University, who spoke on "Tree Stress in Urban Areas."

The conference concluded with a three-hour study tour of Bok Tower Gardens in Lake Wales, led by its director, Dr. Jon Shaw.

Superintendents interested in sending a staff member who specializes in tree care to next year's conference should contact David Wedge, 1044 Macy St., West Palm Beach, FL 33405; phone 407-588-0664. Cost will be about \$350.



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BUSINESS & AGRONOMY

Tiny wasp 'promising' against some roaches

BY DARCY MEEKER

GAINESVILLE — A little wasp about the size of two fleas strung together shows promise as a biocontrol for cockroaches and palmetto bugs, says a University of Florida scientist.

The wasps lay their eggs on roach egg capsules and "parasitized" 100 percent of the roach eggs found in dark locations in test kitchens, said Dr. Phil Koehler, an entomologist with the UF's Institute of Food and Agricultural Sciences.

"One of the nice things is that this wasp prefers all the dark places that are hard for us to spray, like inside walls and behind kitchen cupboards," Koehler said. "People could have these living in their houses and

never see them."

The wasp "stings" only roach eggs, not people, he emphasized.

In earlier research with graduate student Brian Hagenbuch, about 600 wasps were released per week for seven weeks in test kitchens. By the end of that time, wasp larvae infected over 93 percent of roach eggs in and on cabinets and on the floor. In another month, infection rate was over 97 percent except on the ceiling. The research is to be published this fall in the *Journal of Economic Entomology*.

Unfortunately, the wasps are of no use against the pesky little German roach which protects its egg case by carrying it around. Nor are they effective against the Asian

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roach, another egg case carrier.

"Some of our roach problems may be the result of generally applied pesticides," said Koehler. "If you do a lot of spraying, you may be giving yourself a worse roach problem in the end by destroying roaches' predators and parasites. Where we stop spraying, we may be able to re-establish these wasp biocontrols.

"We got our colony of the wasps (*Testasichus hagenowii*) when they appeared in a university lab in 1986 after it switched from sprays to a bait to control roaches," said the IFAS extension entomologist. "Baits do not attract or kill most of roaches' natural enemies. It would be interesting to know how much their effectiveness comes from buildup of natural enemies like the wasp."

One way to distribute the wasps would be to release clouds of them in the spring on roaches' overwintering spots.

"Usually there's one palm tree or other

gathering spot that has thousands of roaches in it, that serves as a roach source for the whole neighborhood," said Koehler, working with scientists at the "Insects Affecting Man and Animals" Laboratory, a Gainesville outpost of the USDA Agricultural Research Service.

There's a lot of research that must be done first, however, Koehler said, and with little grant money available for roach biocontrol, the project depends on grad student interest.

"Luckily, Juan Correa Curbelo from Puerto Rico has decided to do his Ph.D. on the wasp, even though we could offer him no support.

"We've just been trying to maintain the colony until we could get somebody like him in here," Koehler said.

Curbelo will work on faster ways of raising the hagenowii wasps and researchers will see if its pupae (an encapsulated resting stage between worm-like larvae and



DARCY MEEKER/IFAS

Dr. Phil Koehler of the University of Florida's IFAS holds a vial of roach-marauding wasps.

free-flying adult) could be freeze-dried and distributed like a pesticide.

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