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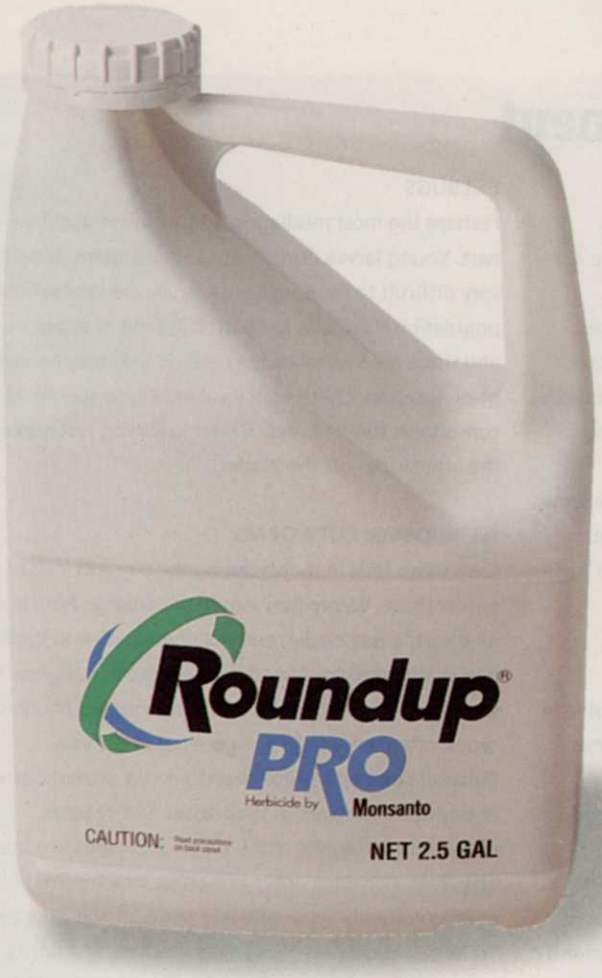

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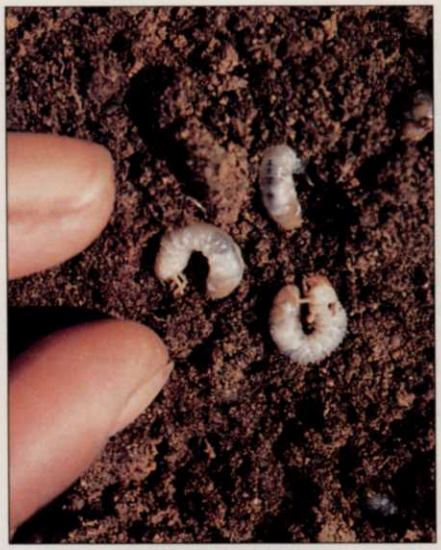

White grubs are much easier to control when they're smaller than these.

grub species, young grubs emerge sometime between mid July and early September, and most of them emerge during a three-week period or so. If the situation dictates that a treatment must be made just as the grubs begin to emerge (for example, scheduled lawn care rounds), a turf manager probably should use one of the slower-acting but longer-lasting insecticides on the market. If a grub problem becomes apparent late in the "window of opportunity" (perhaps early September, as grubs are already developing and causing damage), a turf manager should use one of the faster-acting materials, even though most of those materials also break down relatively quickly.

For many of the thatch insects like chinch bugs, webworms, cutworms, treatments can be made in response to insect activity. However, in an area with a history of cutworm or webworm activity, a turf manager should watch for moth activity. Moths of both cutworms and webworms are nocturnal and are attracted to black light traps. In addition, many sod webworm species can be seen flying haphazardly just above the turf, particularly at dusk. When the number of moths increases noticeably, you should consider treating the area about two to three weeks later. This allows time for the moths to mate, for the females to produce and lay eggs, and for the eggs to hatch into tiny (and vulnerable) caterpillars.

Note: mention of any particular product does not imply endorsement by the author. **LM**

The author is an associate professor in the department of entomology at the University of Massachusetts.

Insects and their treatment

WHITE GRUBS

Feed on roots of turfgrass. Early symptoms—turf resembles drought stress. Heavily damaged turf can be rolled back like a carpet because there are no roots remaining.

Cultural control: Provide adequate moisture to root zone. Avoid mowing too low. Minimize other agronomic stresses.

Chemical strategies: Use products which can penetrate thatch reasonably well. If treating when grubs are just emerging (often mid July to mid August), use a slower-acting but longer-lasting material. If spot treating after damage becomes evident, use a fast-acting material. Water in any application with at least 0.25 inch water as soon after application as possible to improve contact with grubs.

CHINCH BUGS

Suck plant juices from stems. Usually most severe or noticeable in sandy soils or sunny areas, especially in areas with thick thatch. Usually most active in summer months.

Cultural control: Reduce thatch. Avoid drought stress. use endophytic cultivars of ryegrasses or fescues.

Chemical strategies: Many turf insecticides are labeled and effective. Consider using products that will remain in the thatch (e.g., Dursban). Apply in late spring or early summer if sampling documents need. Summer applications can also be very effective if necessary. Water in lightly, just enough to move the insecticide off the blades.

BILLBUGS

Perhaps the most misdiagnosed turf insect problem in the Northeast. Young larvae burrow inside plant stems, older larvae are very difficult to time, and once larvae are well established, the population is difficult to control. Timing of application is critical, and there are several billbug species that may be involved in any given location. Check with local extension specialists or private consultants for your area. Water in lightly, just enough to move the insecticides off the blades.

WEBWORMS, CUTWORMS

Caterpillars hide in thatch during the day and feed at night on tender tissue. Caterpillars sometimes emerge from burrow holes, nibble off a few blades, and pull them back into the burrow to ingest during the day. May thin or kill patches of grass. Several species of both webworms and cutworms, each with different life cycles, often more than one generation per year.

Cultural control: reduce thatch, avoid drought stress, use endophytic cultivars of ryegrasses and fescues.

Chemical strategies: many turf insecticides are labeled and effective. Consider using materials which remain in the thatch or are relatively immobile like some of the new pyrethroids. Treat two or three weeks after peak moth flights. Treat as late in the day as possible. Water in lightly and avoid mowing for a day or two after application if possible.

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A changing picture

Long-term changes are the trends we observe in landscaping with new turfgrass varieties and new landscape plantings.

By RICK L. BRANDENBURG, Ph. D
North Carolina State University

Those of us involved in landscape and turf management experience both short and long-term adjustments. When I speak of short-term adjustment I am referring to annual weather conditions. This would include above or below normal temperatures or precipitation during the season. These fluctuations from "normal" weather may have a significant impact on the abundance of specific insect pests.

Short-term effects - the summer of '97

Throughout the Southeast, late summer produced a drought in many areas. This encouraged outbreaks of southern chinch bugs on St. Augustinegrass, in particular, but also on some other warm-season grasses. Southern chinch bugs do best under hot, dry conditions and their abundance is usually enhanced in turf that is over fertilized and has a significant amount of thatch. While good cultural practices and irrigation can help minimize the impact of chinch bugs, St. Augustinegrass is always under threat when the weather has been hot and dry, for an extended period of time.

The hot, dry conditions also appear to enhance the impact of ground pearls on centipedegrass. Ground pearls continue to be a sporadic, yet fluctuating pest of centipede from the Carolinas across to California. Our major frustration with this pest has been our lack of success to develop effective management strategies.

Weather creates unusual turfgrass stresses and pest problems. The interaction between them can be most damaging to the turf.

While North Carolina is at the northern range for bermudagrass mites, we saw in increased incidence of this pest, which again was a reflection of the drought. Proper fertilization can help bermudagrass outgrow the damage, but this was effective only where adequate irrigation was available.

The hot, dry conditions also appeared to have negative consequences on other pests. Many grub species were hard to detect and species which spend time near the surface, (e.g. green June beetle bugs) appeared nonexistent. The dry soils apparently resulted in some delays in egg-laying, egg hatch, and grub tunneling and feeding near the surface. When sufficient rains finally occurred, grub feeding and injury became quite apparent. This sudden "increase" in green June beetle grubs caught many turfgrass managers by surprise.

Weather the previous winter (1996-97) also appeared to have a significant impact on several pests. Throughout much of the Southeast, winter temperatures averaged almost four degrees above normal for December through February. This ensured good winter survival of southern pests such as imported fire ants along the northern extent of their range. The fall of 1997 saw a significant increase in fire ant mounds along the edge of their northern movement.

Long-term effects

Insects are opportunistic creatures with an amazing ability to take advantage of what we set in front of them. Provide them with an adequate source of food in an appropriate environment and they will find it. This is often times the result of our landscape design and plantings. This occurs in several ways. When the adults of various scarab or white grubs lay eggs in the soil, they need to acquire moisture from their surrounding environment to

PHOTO COURTESY PAUL HELLER, PENN STATE UNIV.

The hot, dry August made green June beetle grub damage slow to appear. Rains later in the summer showed much damage.

maintain the ability to hatch. Japanese beetles fly during the day and actively seek those areas of lush, healthy turf (a sign of adequate soil moisture). Some of the other beetles that fly at night don't make that distinction and simply lay their eggs in a more random fashion. If their egg laying coincides with sufficient rainfall and soil moisture an infestation may occur. The availability and use of irrigation in the landscape obviously creates a more suitable habitat and increases the likelihood for the presence of white grubs.

In addition, landscaping, particularly the planting of ornamentals, may influence the abundance of turf pests. Perhaps the most frequently observed is that of ornamentals that are continually fed upon by Japanese beetles. Once the beetles are attracted to an area that also contains high quality turf, it only seems logical they may use that turf as a site to lay their eggs. Thus we create the complete habitat for all stages of the pest. We see the same with the use of hollies as landscape plantings often attracting twolined spittlebug adults and subsequently creating infestation of the nymphs in the turf. In addition, the continued population growth observed in the warm-season turfgrass areas of the United States is creating the need for new housing developments. In the Southeast these developments are going up in what was previously pine forests. More and more commonly I am observ-

Alternative control more common

The future of integrated pest management for turfgrass is dependent upon the development of environmentally and economically sound tools for insect control. The good news is that we already have a number of "non-conventional" products available for use and many more in development.

Over the years we have seen several entomogenous nematode products on the market, but problems with consistent results, shelf life, formulations, and product viability have limited their success and marketability. Several companies are still actively involved in insect parasitic nematode and striving to overcome the shortcomings of current technology.

Recent improvements in the ability to mass produce the insect fungal pathogen *Beauveria bassiana* have allowed at least two companies to begin serious investigation into its application as a turfgrass bioinsecticide. One company, Troy Biosciences, currently has a product called Naturalis-T labeled for use against a number of turf insect pests. Independent testing of this product is underway.

DowAgroSciences recently introduced Conserve SC, a natural compound that is in the spinosad class and is a fermentation product from a naturally-occurring soil organism. This insecticide has good efficacy against a number of Lepidopterous or caterpillar pests. It is most effective when applied against the smaller stages of worms.

A natural product that has been in use for many years is the active ingredient azadirachtin which is found in the oil of the leaves and seeds of the neem tree which grows in many tropical areas. This product is also effective against caterpillars and works as an insect growth regulator and is more effective when applied to the smaller worms. Trade names for azadirachtin-containing products include Azactin and Turplex.

Companies continue to experiment with various strains, of the bacterium *Bacillus thuringiensis*. This product has received limited use against caterpillars, but new strains may emerge in the future that are effective against turf insect pests.

Research has dramatically improved the formulation, shelf life, handling and application characteristics of these natural and biological products. Research is looking into isolating the toxins found in many natural controls and producing them synthetically. This has the potential of producing an even more cost effective and efficacious product for insect management.

The short-tail cricket has increased in importance in the Southeast in the past few years. We are unsure if this is due to changes in the turf landscape or a reflection of short-term weather effects.

Pest identification and numbers can be determined by a variety of sampling tools, one of which is a flush with soapy water.

ing infestations of short-tailed crickets creating unsightly mounds throughout home lawns. These crickets create their tunnels and mounds in turf, but feed primarily on pine cones and bark. There presence as a pest is a reflection of our invasion into their habitat.

What's ahead in 1998?

As we look ahead to 1998 it is, as usual, anyone's guess as to what will be the unexpected problems and which pests will be more troublesome than normal. Such questions about predicting pest problems are often subject to pure speculation. The dry period in late summer may have reduced some of our grub population.

Theother news about what's ahead for 1998 is a rapidly increasing arsenal of insect management tools that include conventional, natural, and biological products. **LM**

The author is a research/extension entomologist in the North Carolina State University Department of Entomology.

Management of warm-season insect pests

CUTWORMS, ARMYWORMS

Hosts: all warm-season grasses
Field Diagnosis: Clip turf off at soil level. Severe infestations may leave large bare areas where turf has been consumed.
Control Practices:
- use "soap flush" to detect
- treat late in day
- do not mow and remove clippings for 1-3 days
- may be present from early spring to late fall

FIRE ANTS

Hosts: all warm-season grasses
Field Diagnosis: Ants create unsightly mounds which may also damage mowing equipment.
Painful stings of concern in high traffic areas.
Control Practices:
- best controlled in spring and fall when workers are actively foraging for food.
- mound treatments generally most effective, but are labor-intensive
- controls must be continued once program is started (fire ants will return at higher levels if treatments are stopped)
do not disturb mounds during treatment
- use baits prior to contact insecticides to allow workers to return baits to mound

MOLE CRICKETS

Hosts: prefers bahiagrass and close-cut bermudagrass
Field Diagnosis: Extensive tunneling is unsightly. Root feeding causes dieback, thin spots.
Control Practices:
- use "soap flush" to detect
- treat in June/July as soon as egg hatch
- follow-up treatments usually necessary
- look for adult activity in March/April to define areas of high risk for egg hatch

GROUND PEARLS

Hosts: most commonly attacks bermudagrass and centipedegrass
Field Diagnosis: Yellowing and then complete dieback of turf with no new regrowth the following season
Control Practices:
- no known effective control measure
- practice good turf management to increase turf tolerance
- irrigate during dry weather

SOUTHERN CHINCH BUGS

Hosts: all warm-season grasses prefers St. Augustinegrass
Field Diagnosis: Feeding results in turf becoming yellow and eventually turning reddish-brown.
Control Practices:
- avoid over-fertilizing
- manage thatch
- irrigate during dry spells
- apply pesticides with plenty of water
- multiple treatments often necessary

TWOLINED SPITTLEBUGS

Hosts: all warm- season grasses
Field Diagnosis: Results in yellowing of infested turf and severe infestation have noticeable unsightly "spittle masses".
Control Practices:
- control adults on ornamentals like hollies
- treat on cloudy days when possible, since spittlebugs are higher up on turf
- begin monitoring in early summer

WHITE GRUBS

Hosts: all warm-season grasses
Field Diagnosis: Grubs feed on roots and cause drought stress and turf dieback. May attract moles, skunks, etc. which damage turf searching for grubs.
Control Practices:
- attracted to low-cut, highly-maintained turf
- dig squares of sod 4-6" deep in late August to detect small grubs
- treatments most effective in late August/early September
- avoid ornamentals attractive to adult stages of Japanese beetles or green June beetles

BERMUDAGRASS MITES

Hosts: only bermudagrass
Field Diagnosis: Initial yellowing of leaf tips, followed by shortening of internodes causing a tufted growth. May die under severe infestations.
Control Practices:
- irrigate during dry spells
- proper fertilization helps turf outgrow damage
- Resistant cultivars Floratex, Midiron, and Tifdwarf
- multiple treatments often necessary

BEES/WASPS

Hosts: all turf types
Field Diagnosis: Holes, mounds, tunneling in turf area. Insects flying over turf area.
Control Practices:
- maintain a healthy, lush stand of turf. Most bees and wasps that live in the soil prefer a thin stand of turf
- mulch areas under shrubs, trees, etc. and keep mulch fresh to discourage nesting.

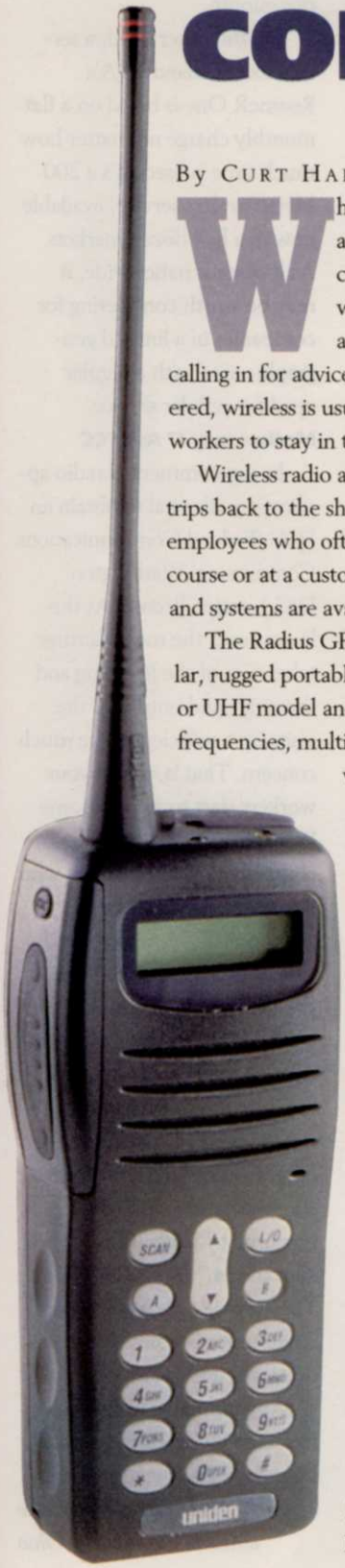
Tune in to wireless communications

By Curt Harler

When it comes time to "reach out and touch" someone, wireless communications is definitely the way to go. Whether it's the boss assigning a task or a working calling in for advice or to have a spare part delivered, wireless is usually the best way for grounds workers to stay in touch.

Wireless radio and cell phones not only save trips back to the shop but are a safety feature for employees who often are working alone out on a course or at a customer site. Several new products and systems are available.

The Radius GP350 from Motorola is a popular, rugged portable unit. It is available as a VHF or UHF model and comes with programmable frequencies, multiple private line or digital private line, programmable power output, programmable internal VOX, time-out time and the Quik Call II feature for paging. The 16-channel model includes priority scan and signaling capabilities. A two-channel VHF unit, which operates in the 146-174 MHz range, will cost about $730. The 16-channel version is about $100 more. For the UHF models, running in the 403-470 MHz range, add about $50 to the cost of either of the VHFs.



Icom, America of Bellevue, WA has a pair of simple, portable radios with a minimum of switches and keys to keep operation easy. The IC-F3S is the UHF model and the IC-F4S is the UHF transceiver. Both use SmarTrunk II for telephone interconnect and unit-to-unit calling. Conventional mode with CTCSS and DTCS encode/decode is available for operation in out-of-service areas. The VHF units operate in the 163-150 or 146-174 frequency range. The UHFs are keyed to 400-430 or 440-470 MHz, according to version.

Maxon has a good line of two-channel and four-channel radios, especially suited for areas where interference is not expected to be a problem or for applications where cost is a major consideration. The CP-0510 is a five-watt VHF unit with a forgiving, flexible whip antenna. It comes with a charger, belt clip and a one year warranty for under $190 at most distributors. Maxon also makes a line of mobile/base station radios.

Another line of low-cost units is put out by Uniden. For under $150 they have a two-watt, single channel unit available in a range of fixed VHF or UHF frequencies. All come with a rechargeable battery and a one-year warranty.

Uniden's top-of-the-line SPH225 and SPU554 are far more powerful and feature 99 channels and a phone-like keypad as standard features. They are programmable by channel for 12.5-15 kHz narrowband or 25-30 kHz wideband operation. That feature allows compatibility with the mixed narrow/wideband systems which will become more common as the new FCC rules are applied to the marketplace.

Several dealers, including Radio Shack, offer CB-band walkie-talkies. Good for short-range use, or linking to a mobile with a CB radio, they can provide good service as long as the operation can find a channel that is not being used by locals for chit-chat or the conversation is nothing proprietary or secret.

In any commercial application, it is vital to obtain an FCC station license.

Watch out for GMRS units. That means General Mobile Radio Service and radios intended for personal use only. Sometimes they are marketed as Family Radios. While they're fine radios with decent range (up to two miles), commercial use of the radios isn't allowed.

Niceties of radio

Depending on the application, there are a number of add-ons which make use of the radio more effective in the field.

Headsets are handy for workers in noisy environments or when they need to perform

a function (like a repair) and still have both hands free.

A host of antennas are available both for base stations and for mounting on pickup trucks or other mobile units. In buying a VHF antenna, the higher the gain figure the more expensive the antenna. Expect to pay about double for a 4.5 dB gain unit what the asking cost is for a 3.0 dB unit.

Before buying any unit, grab the radio and play with it for a while. If it will be used with a belt holster, wear it and see whether the antenna pokes the wearer in the ribs. Heavy is good if it means tougher design; heavy is bad if the unit will be carried around for a long time. Many firms are designing units which look more presentable. "Two-way radios are being used in a variety of businesses that want a cut above the old brick-style radio units," says Sal Farina, Uniden's national sales manager.

Portable battery packs are convenient to have for those long, overtime days. So are fast chargers. If several radios will be used in the business, consider a gang charger. Gang chargers will re-charge a half-dozen or more radios at once and they eliminate the mad scramble to find open power outlets at the end of the work day.

One good, commercial source for accessories like chargers and holsters (as well as radios from many manufacturers) is BearCom, Dallas. The company has outlets in many major cities. However, there is a lot more to efficient power systems than just re-charging the battery.

Most radios come with trickle chargers that work overnight. It is possible to buy rapid chargers that can do the same job in an hour. That can be convenient when crunch time comes. A rapid charger costs about double what a normal charger would run.

The best way to handle any unit with a battery is to allow the battery to discharge fully before re-charging. It is also a good idea to avoid over-charging a battery, allowing it to sit in the charger. Overcharging can damage a battery.

Not all radio communications is person-to-person. Wireless is showing up in areas like golf course sprinkler system control.

With some units, it's possible to erase the short-term memory effect that nic-cad batteries are prone to. Try operating the unit until the ni-cad is completely discharged, then recharge it fully. Repeat the process at least three times.

Not all radio communications is with people. Wireless is showing up in non-communications areas, as well, for instance, on wirelessly controlled golf course sprinkler systems. Timing, quantity, and specific areas of the course to be watered can be controlled from a portable radio by the superintendent.

Cellular solutions

There are a host of cellular solutions available. When purchasing cellular phones, keep in mind that the phone is likely to be used only in a limited area — around an office park or within the city limits. Purchase a plan which allows the most unlimited local calling and forget about adding on low-cost roaming capability or the other niceties one might purchase if the phone were being used by a world traveler.

If cellular is chosen for certain applications, good cellular service can be purchased from the local phone company or even at a kiosk in a local mall. A word of advice: sign up for the shortest contract time possible.

Cellular rates are notoriously variable and have trended downward each year. Do not get locked into a long-term contract. Two years is the maximum term one should consider.

It is possible to buy pre-paid cellular time, recharging the card as needed. Topp Telecom's TracFone is an ultra-compact portable cellular phone well suited for occasional use. The advantages of the TracFone include its low initial retail price ($99 at Radio Shack or Circuit City, which includes 60 minutes of airtime), no monthly fee, and limited exposure to abuse, since the amount of phone time which can be stolen is limited to whatever is left of the $30 or $50 credit stored with the phone. The need to recharge the phone could become a nuisance for units in frequent daily use, but for occasional emergency or back-up use it provides a means of controlling who makes calls. Each unit has its own phone number and local calls run about 80 cents per minute.

On the other hand, a service like Midland USA's RoameR One is billed on a flat monthly charge no matter how much time is used. It's a 200 MHz wireless service, available now in a half dozen markets. As it spreads nationwide, it may be worth considering for companies in a limited geographic area with a regular need for cellular service.

Mother may I? Ask FCC

In any commercial radio application, it's vital to obtain an FCC (Federal Communications Commission, Washington, D.C.) station license. At the lowest end, the manufacturer takes care of the licensing and the range and output of the units isn't sufficient to be much concern. That is, unless your workers start to step on some licensed operator (like a taxi company or other vendor) who has assigned frequencies.

The FCC requires a certificate of frequency coordination for any large-scale use. This would include most mobile uses where a base station is in touch with trucks operating around town. Contact the Personal Communications Industry Association, 500 Montgomery St., Suite 700, Alexandria, VA 22314-1561. They provide frequency coordination for businesses and educational users. **LM**

Any reputable radio dealer has free FCC applications and frequency coordination forms.

—Curt Harler is a freelance writer in Strongsville, Ohio

Salt tolerant turf restores landscape

Salt-tolerant turfgrasses make it possible to produce high-quality turf on sites where maintenance may not otherwise be possible or economically feasible.

by MICHAEL DEPEW

About 2.5 billion acres world-wide are affected by salinity. Most are primarily located along coasts (including islands) and in arid and semi-arid regions.

Much of this marginal land and wasteland is only suitable for halophytic plant species—species with a set of ecological and physiological characteristics allowing growth and reproduction in a saline environment. Increased research and development on the selection and management of halophytic species for landscape use could lead to high quality vegetation of salt-affected land and/or the use of brackish or salt water.

The development of these turfs may be a significant contribution to the turf industry in areas with saline water.

Paspalum and dropseed

Two halophytic turf species are currently available for utilization. This includes three ecotypes of seashore paspalum *(Paspalum vaginatum)* and one ecotype of seashore dropseed (*Sporobolus virginicas)*. The seashore paspalum ecotypes include two fine-textured turfs (similar in texture to Tif 328) suitable for use on greens and tees and one medium-textured turf (similar in texture to Tif 419) suitable for use on fairways, roughs, and athletic fields. The seashore dropseed turf is a very fine turf suitable for use on close cut fairways and athletic fields. Other halophytic turfgrasses are currently under development including salt grass *(Distichlis spicata)* with increased salinity tolerance (up to 60,000 ppm) and cold tolerance. High salinity tolerance and cold-tolerant warm-season turf is particularly important in climates which have high seasonal temperatures, poor quality water and periodic cold events.

"The key to the development of these turfs has been the utilization of a multiple high stress environment", says Stewart Bennett, CGCS of Environmental Turf Solutions, Pineland, Fla.

"The multiple high stress environment includes the use of low mow heights, high salinity irrigation and high traffic stress."

The seashore paspalum ecotypes were developed utilizing brackish irrigation up to 15,000 ppm and in an environment receiving periodic flooding from salt water tidal surges. This results in a very high attrition rate of turf. The benefit is a remaining turf that can withstand these types of real-life stresses.

The seashore dropseed ecotype was developed under a similar high stress environment. An initial selection of a native forage cultivar from a Caribbean island formed the basis for the development of a turf.

"The seashore dropseed was collected off a beach that was frequently grazed by goats" says Paul Tillman, another member of the ETS research team.

"This turf was not irrigated except for incoming tides. We placed the turf under close clipped conditions at about ½-inch, using salt water for irrigation. The turf struggled and most of it died initially under close mowing but once the remaining turf adapted to the high stress environment, the resulting turf was very fine textured and of high quality. From our development nursery we placed test areas on golf courses to see how well it stood up to traffic. The turf performed beautifully forming a very dense and stiff turf. Some of the test areas went for several weeks without irrigation of any kind and yet the

An application of table salt is made to the target weed species on a putting green. This is done by first wetting the area with a mist of water from a spray bottle. The wet leaf retains the salt, and thorough burning of the plant tissue is achieved. In full sun, extensive plant burning is observed in a matter of a couple of hours.

The following day, the weed species is completely burned leaving only the seashore paspalum turf. Don't try this on bermudagrass greens folks!

After one week the turf has already filled in two to three inches around the margin and is spreading throughout the center of the treated area.

turf still was green and of an acceptable quality. We are very excited about this turf for use in the Caribbean and similar areas. Some of the islands have no freshwater resources except for expensive desalinized water. A golf course in the Virgin Islands, for example, has expenditures for desalinizing irrigation water in excess of $3 million dollars per year."

There has to be a lot of rounds of golf on a course like that just to break even financially. The use of seawater, either straight or diluted with limited fresh water can result in considerable savings in many areas of the world.

The development and use of these turfs is not without challenges. Each has its own unique set of management and maintenance requirements.

"For example, when we placed the seashore paspalum turf onto a Florida golf course for trial we encountered weed encroachment that we did not experience in the nursery," says Tillman. "This presents a unique situation in that labeled herbicides are limited, especially for grassy weeds. The problem was not an inherent weakness in the turf but rather a situation in which the salinity of the irrigation water was too low for optimal growth and development of the seashore paspalum. The irrigation water was already being diluted with culinary water so that the course could grow bermudagrass. A simple adjustment in the dilution ratio increased the salinity of the water and the seashore paspalum thrived. To speed the removal of weed invaders we experimented with the application of straight granular sodium chloride table salt to the plants. In the weedy areas in which only about 10 percent seashore paspalum was present, we had about 90 percent fill-in three weeks after the salt treatment."

Halophytic turfgrass has a unique and specialized role in the industry. While not needed in areas without salinity or severe water quality issues, the development of these turfs fills a niche in the industry. Halophytic turfgrass makes it possible to produce high quality turf on sites in which the maintenance of turf may not be possible or economically feasible. **LM**

—The author and Stewart Bennett and Paul Tillman make up the technical team of Environmental Turf Solutions, Pineland, FL, which markets and distributes halophytic turfs.

Marketing the halophytics

Private research and development efforts have led to the availability of high quality turf species suitable for use in general landscapes, sports turf and golf courses. The three principals of Environmental Turf Solutions (ETS) headquartered in Pineland, Fla., have been working with the development of halophytic turfgrasses for the past seven years. With the successful development of high quality turf species, ETS was formed in 1997 to facilitate the marketing and distribution of these halophytic turfs. The ETS technical team consists of Paul Tillman, Michael DePew and Stewart Bennett. Paul holds a degree in engineering and a masters degree in turf agronomy. Michael holds bachelor degrees in turfgrass science and soil science and masters degrees in soil science and agronomy. Stewart is a certified golf course superintendent and holds an A.S. degree in golf course operations.

For more information, ETS can be contacted via e-mail through their web site at www.etsturf.com.

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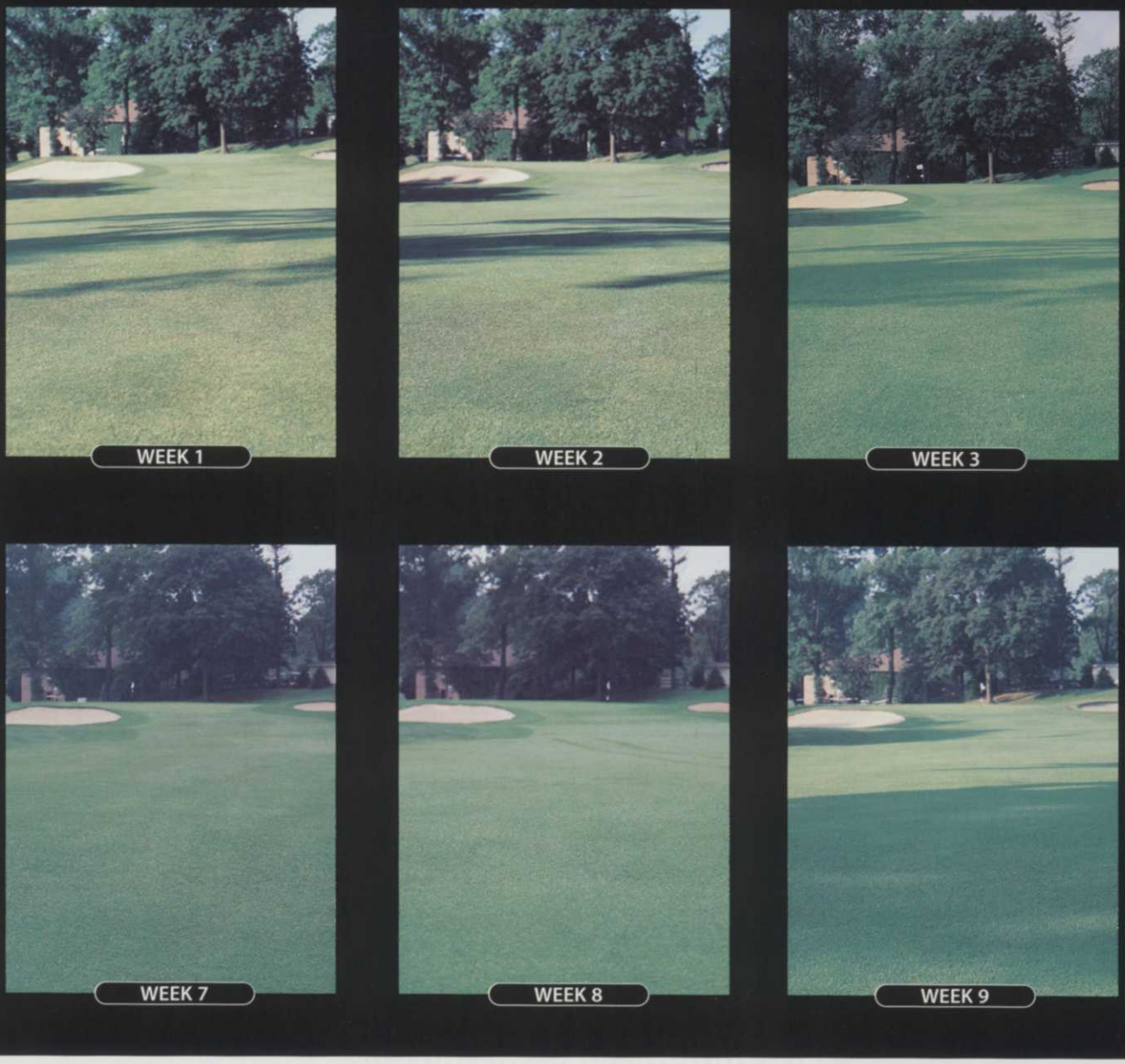

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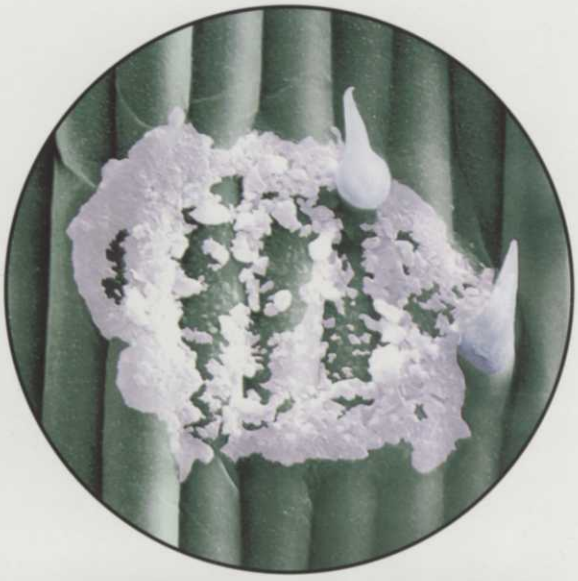

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*For best results, we recommend using 20% lower application rates on a 7-10 day schedule. Section 12(a)(2)(G) of FIFRA provides that it is unlawful for any person "to use any registered pesticide in a manner inconsistent with its labeling"; quoted language is defined in section 2(ee) of FIFRA and expressly excludes the act of "applying a pesticide at any dosage, concentration, or frequency less than that specified on the labeling unless the labeling specifically prohibits deviation from the specified dosage, concentration, or frequency." Thus, in the absence of specific label prohibitions, it is not unlawful under section 12(a)(2)(G) to use a registered pesticide at a dosage, concentration, or frequency less than that specified on the labeling of the pesticide.
User must have label in possession when applying these rates.
†For a copy of our Daconil Ultrex Super Weather Stik Guarantee, write to Daconil Ultrex Guarantee, ISK Biosciences Corporation, Turf & Specialty Products,1523 Johnson Ferry Rd., Suite 250, Marietta, Georgia 30062
†† Micrographs have been colorized for demonstration purposes.

AG-A298 I

One bunker done, a few more to do

Stuart Eyman

STUART W. EYMAN
GUEST COLUMNIST

Otis Golf Club is a nine-hole course, on Cape Cod. It was built in the early 1960s by the Air Force and it remains a military golf course. It's now owned and operated by the U.S. Coast Guard. It gets about 27,000 rounds a season.

The greens are push-up style, and most of the bunkers were built into the green slopes resulting in high bunker faces. These faces won't hold sand and allow stones in the subsoil to fall into the bunkers.

When I decided to renovate the bunkers I had three objectives. (See related article on page 14L)

1. Lower the faces so sand would hold better.
2. Eliminate the stones.
3. Make some of the existing greenside bunkers smaller.

We started with a bunker on 9 green. My boss and I decided to change its design by lowering the face and adding a cape to it. First we removed enough soil from the bunker face to lower it about two feet, then we removed the remaining sand.

We used ¼-inch plywood to mold the cape and backfilled against it with loam. We graded and rolled the bunker so that a landscape fabric would lay flat.

Next, we laid out the fabric and partially filled the bunker with a rock-free "infield" mix of sand and clay. After grading and rolling this mix we added the sand. The last step in the process was to grade and sod the cape and surrounding area.

The end result was a more manageable stone-free bunker. The cost for this project was $359.25 in materials and about $1275 in labor. Most of the labor cost resulted from hauling the material because we only had two Cushmans.

We have several other bunkers that we will be renovating and making smaller as money and time permit.

—Stuart W. Eyman is superintendent at Otis Golf Club, South Dennis, Mass.

[SUPERS ON COURSE]

Swanson oversees 3 courses

Environmental Golf announced the promotion of **Gregg Swanson** to regional superintendent. He will be responsible for overseeing golf course maintenance at three California courses—Canyon Lake CC, Lake Elsinore; Bernardo Heights CC, Rancho Bernardo; and Silver Lakes CC, Helendale. Other EC announcements include the naming of **Mike Robson** as superintendent at Cross Creek GC, Atlanta; **Stan Overton,** superintendent at Birkdale GC, Huntersville, NC; and Brad Rook, superintendent at Silver Lakes CC.

Zedreck's 2nd term as PA Turf prez

Michael P. Zedreck, CGCS, started his second term as president of the Pennsylvania Turfgrass Council. Zedreck is superintendent at Pittsburgh Field Club, and has been on the board of the PA Turfgrass Council since 1988. Re-elected to the Board were: **Thomas R. Bettle,** superintendent at Quicksilver, **Jeffrey Fry,** superintendent at Lebanon CC, and D. Todd Struse, superintendent of grounds, LuLu Temple CC.

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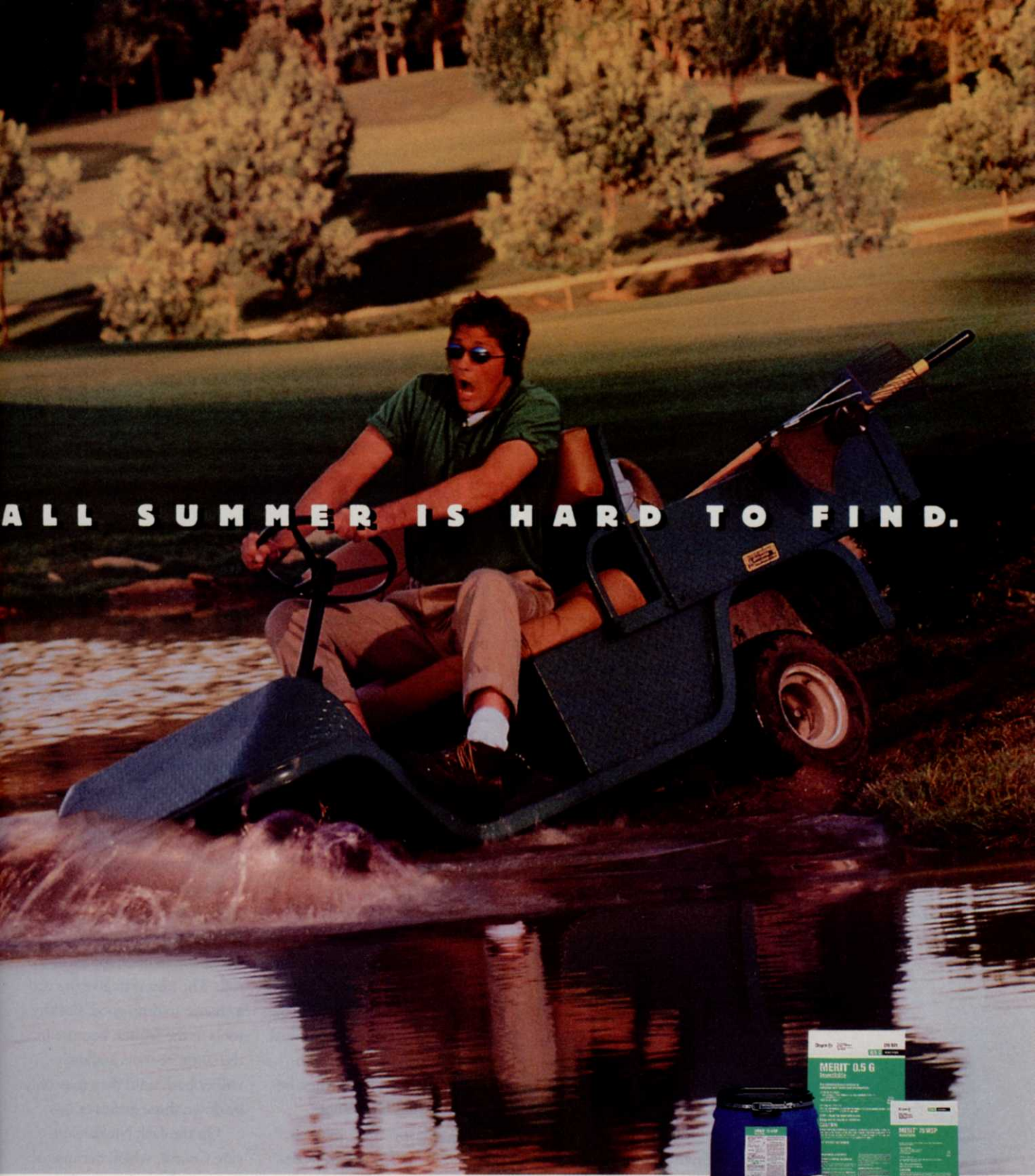

Which should be of some comfort. Because you don't need grubs trying to ruin your course. You have enough help doing that already.

For more information, contact Bayer Corporation, Garden & Professional Care, Box 4913, Kansas City, MO 64120. (800) 842-8020. http://usagri.bayer.com

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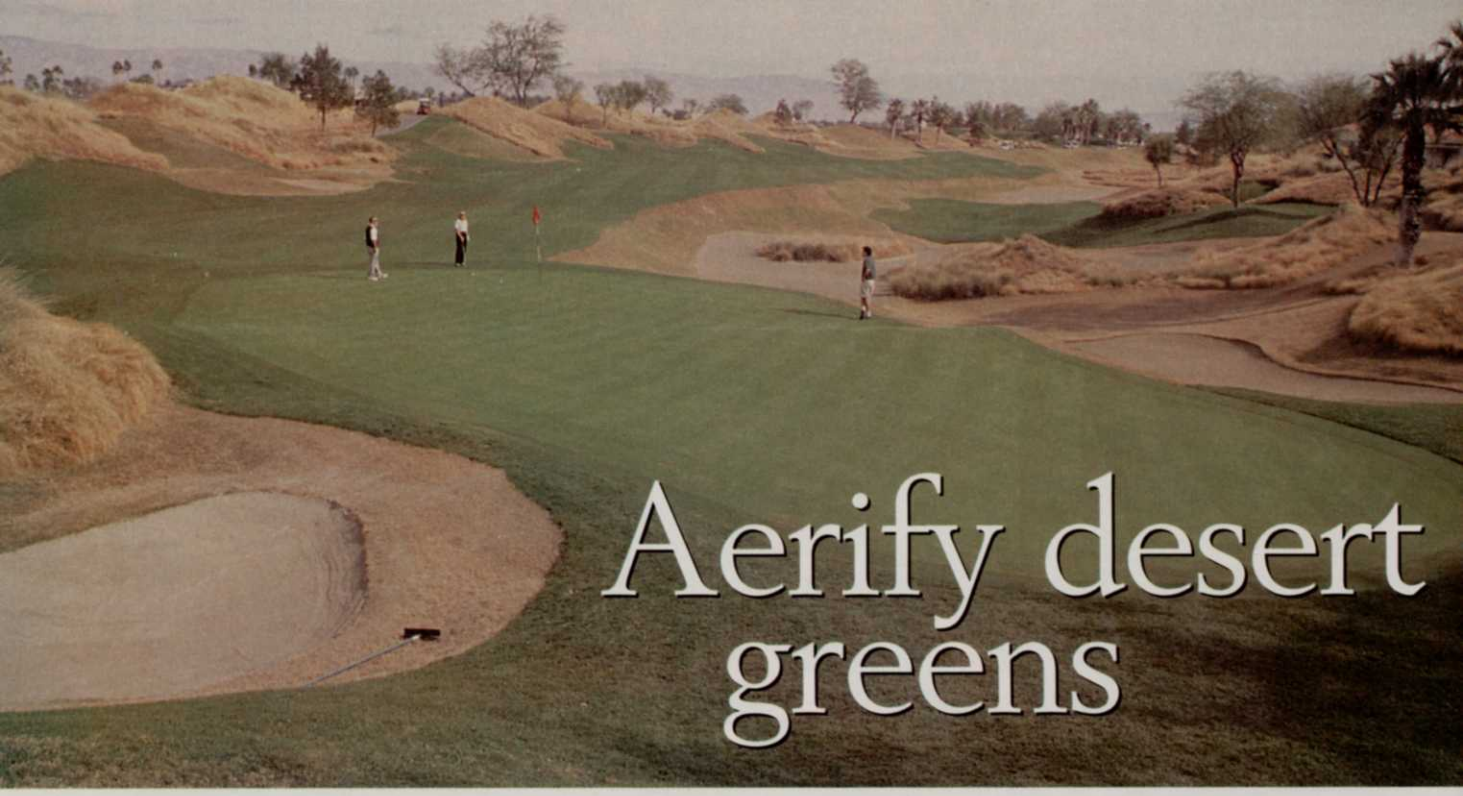


Aerify desert greens

By DON DALE

If there are three major steps in preventing heat stress on desert bentgrass greens, Kurt Desiderio would probably list them in this order: aerify, aerify and aerify. It is aerification that has kept his greens at PGA West alive and kicking.

"Our goal in aerification is to keep as much air space in the soil as possible," says Desiderio, who is superintendent of two PGA West courses in La Quinta, California. La Quinta is near Palm Springs at about sea level in one of the hottest golfing regions in the world.

"This area was basically blow sand," Desiderio says, and the greens were built on sand. That might sound like a medium which water and air would penetrate freely, but it is not. And even finer sand gets blown around the Coachella Valley during storms, and that sand compacts on greens to form a hard surface soil.

Desiderio, who came here in 1996 after working in El Paso, Texas, says the ideal greens base would be 50 percent soil and 50 percent pore space. Of that 50 percent pore space, 25 percent should be filled with water and 25 percent with air.

Needing more air

"That's checked with laboratory analysis. We pull cores and send them off about twice a year," he says. It's usually done once in spring and once in the fall.

"We're probably only 40 percent pore space, and of that, only 15 percent is air space," he says. That puts his bentgrass, which is not ideally suited to the desert in any case, in a continual state of stress in the hot summers. The top three inches, because of wind-blown fines, needs to be opened up for air.

Desiderio's program begins in late winter with regular aerification with needle or pencil tines "to keep the greens loose." He does this until the weather warms up, driving the tines six inches deep to give roots room to grow through dense sand.

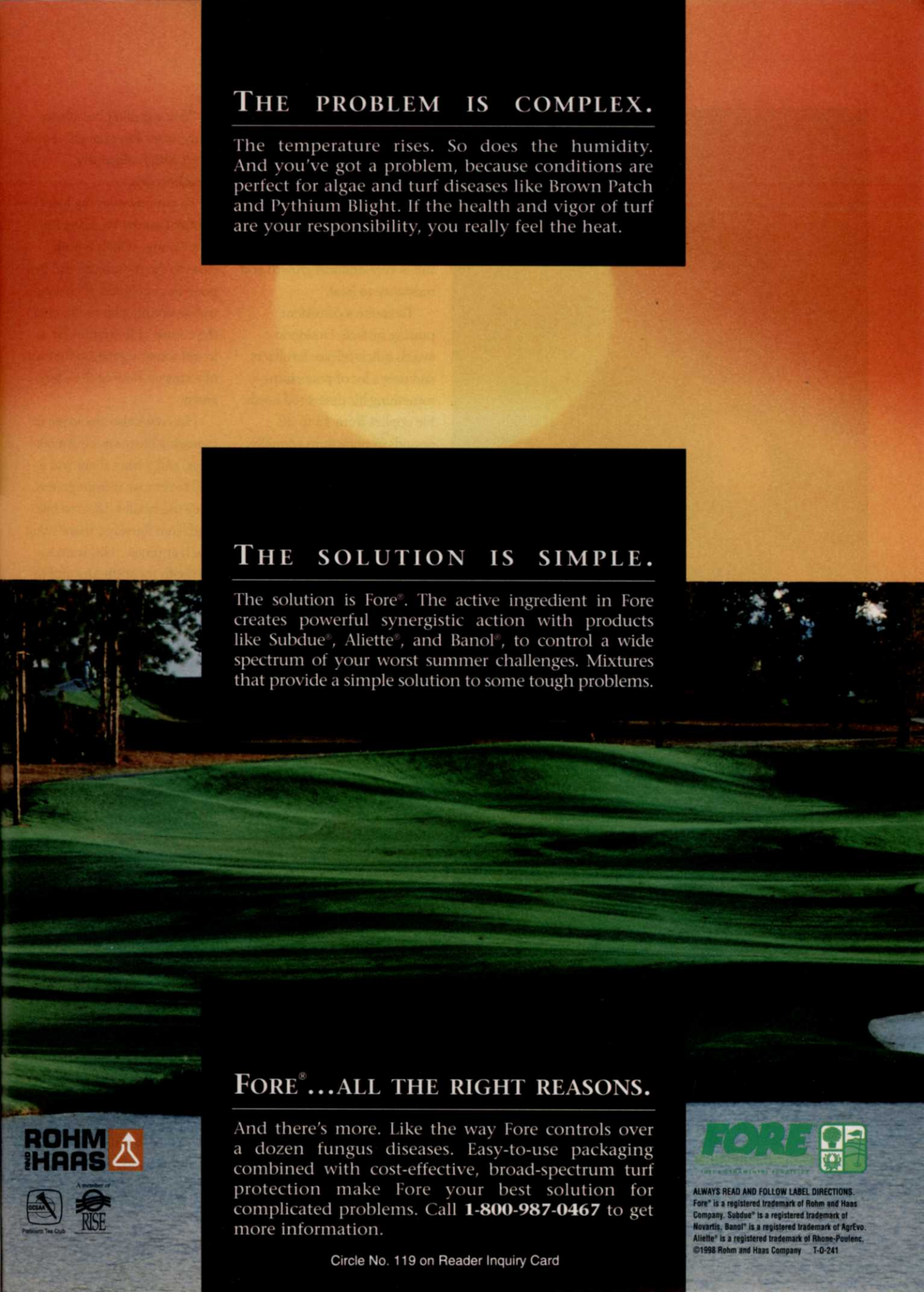
"I try to do it at least four times a year," he says. "My goal this year is to do it once a month, January through May." Then he will also do it at other times of the year as needed—even in summer if he feels it's necessary, though he has to be careful to not damage the turf in the heat.

In March he begins pulling cores with 5/8-inch tines on a Greenaire to open spaces in the soil. The idea is to give the turf a chance to drop good, healthy roots in the winter, because in the summer roots gradually wither back until they may only be down three inches or less.

On the Jack Nicklaus Private Course, which because of poor wind circulation is hotter than any other course, Desiderio does not use sand to backfill the cores. He uses Ecolite. That not only gives him a porous fill, it also is a light colored material that does not heat up in the sun.

Kurt Desiderio, superintendent at the Nicklaus and Weiskopf Private Courses at PGA West.

The first hole on the Nicklaus Private Course at PGA West in La Quinta, California.



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Kurt Desiderio cuts samples on a green to look at soil consistency and water penetration

"This Ecolite does not hold a lot of heat," he says. Last year he actually pulled one-inch cores 10 inches deep and backfilled with Ecolite. Even so it has been a struggle to keep the bentgrass healthy.

"It really helped us," he says of last summer's program of pulling one-inch cores and filling them with Ecolite. He would like to do this twice a year in the spring.

Prescription fertility

Desiderio's soil fertility program on the bentgrass greens is designed to give good nutrition while adding to soil porosity. He has a regular organic granular fertilizer program, using products like Sustane, Green Relief or Milorganite, supplementing that with foliar sprays.

"I spoon-feed on top of the organics," he says. That gives him good week-in, week-out growth built on a reserve of fertilizer in the organics. The result is very uniform growth and resistance to heat.

To create a consistent putting surface, Desiderio avoids quick-release fertilizers and uses a lot of potassium—something his desert soil needs. He applies from 15 to 20 pounds of potassium annually, parceled out as needed, and about eight pounds of nitrogen.

His normal program is a shot of organic granular 5-2-10 once a month at half a pound of nitrogen per 1,000 square feet of green. He supplements that about every 10 days with potassium nitrate and 6-30-30 or 20-20-20, applied foliar. He also uses B-Plus or other microbes to keep up organic action in the sandy soil, and adds iron at four ounces per 1,000 when needed.

Those are average annual figures. In the summer he uses less granular and more foliar, and in the winter more granular and less foliar.

Hold the salt please

Desiderio also can have a problem with salt buildup, so he applies a very heavy irrigation about once a month to flush salts down and away from the root zone. He puts it on top of an application of gypsum.

"That's a standard thing you do here," he notes. In fact, that's another reason for a good aerification program: salt flushing doesn't work unless you have a soil profile that will encourage water penetration.

"You wouldn't be able to apply water fast enough" if you didn't aerify religiously, Desiderio says.

To cut down on the heat quotient on the Nicklaus Private Course, which is built close to the mountains and gets poor air circulation, Desiderio tries everything he can to cool the course. He went so far as to cut some vegetation that was blocking air flow to the 16th green.

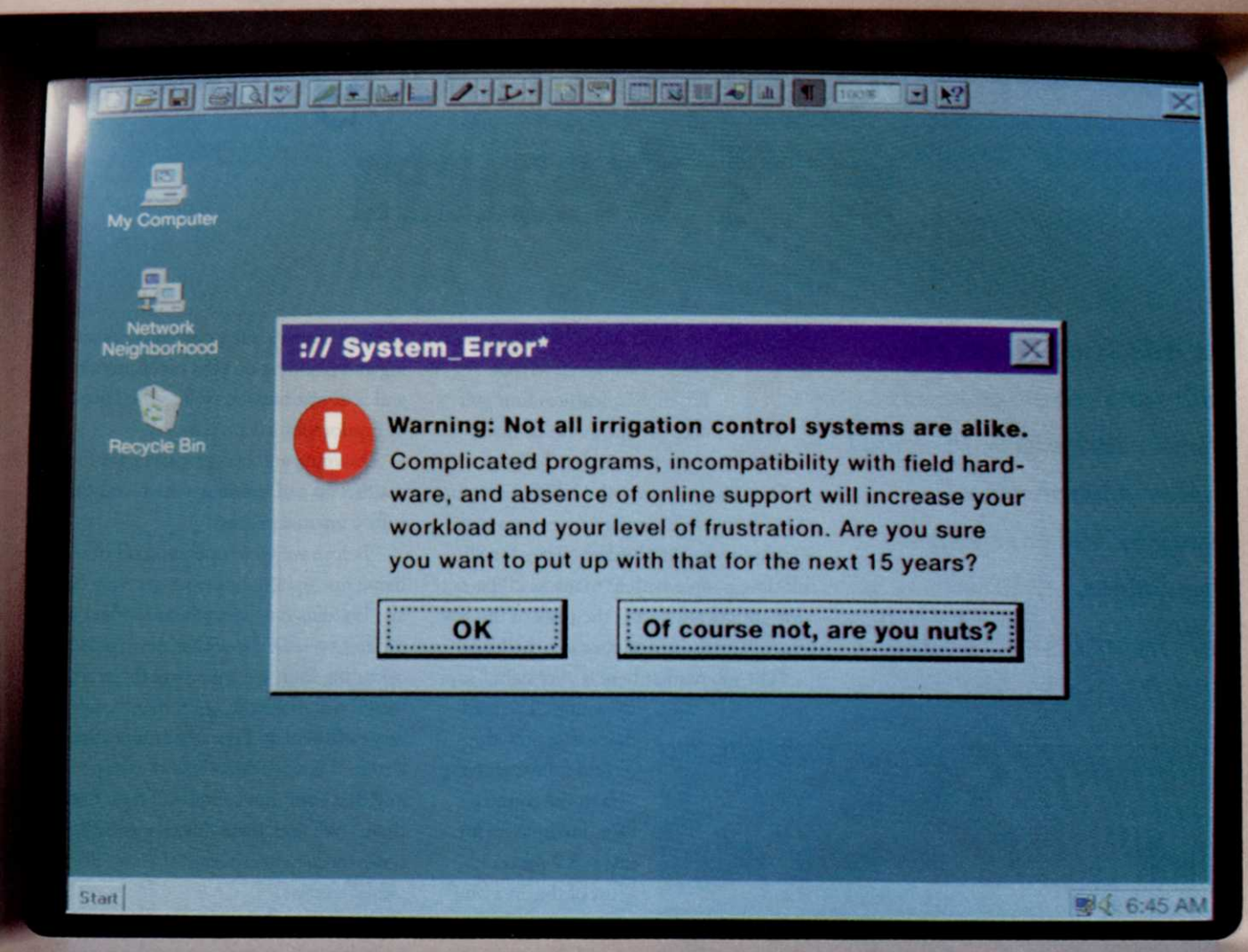
His crews also are active in removing blow sand from fairways, and wishes there was a way to remove it from greens. They use small loaders to take sand from fairways, there's that much at times. This is necessary both for aesthetics and to prevent those fines from compacting surface soil.

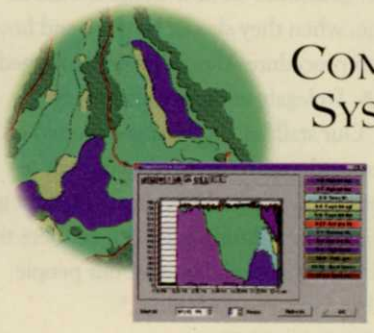
Heat is not as much of a concern on the hybrid Bermuda fairways and tees, he says, but he aerifies the fairways with 5/8-inch cores on a Renovaire once a year (in May or June) and the tees twice (the last time in August to give them time to heal before overseeding begins).

Because of the struggle with bentgrass, PGA West has decided to convert the greens of the Nicklaus Private Course to Tifdwarf Bermuda this summer, Desiderio points out.

His Weiskopf Private Course will retain its bentgrass, because its location is a little more open to air flow and its greens were built to USGA specs. They are better able to fend off the heat. □

—Don Dale is a freelance writer living and working in California.





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TORO
IRRIGATION

4 courses + 6 budgets = 1 team

At Wild Wing, course playability and course demands blend with budgets, personnel issues, environmental concerns and government regulations.

By STEVE & SUZ TRUSTY

The team from Cotton Creek Club, Gulf Shores, Ala., won the 11th Annual John Deere Team Championship Golf Tournament. Top row, from left: Andy Johnston, superintendent; Robert Craft, club president. Bottom row, from left: Herman Bloch, representing John Deere Golf and distributor Beard Equipment Co.; John Wright, club manager; Ed Nix, golf professional.

The 1,050 acre Wild Wing Plantation complex in Myrtle Beach, SC, features four golf courses, each with its own style, but similar challenges.

David S. Downing, II, CGCS, Director of Golf Course Operations, oversees over 90 employees. His budget allows for 85 full-time people with as many as 20 part-time employees during the peak of the season. Filling those positions is a challenge.

"The job market here is very tight," says Downing. "I've read that we're now the second fastest growing area in the country. Our unemployment rate is 3.2 percent. Most of the area businesses are in some aspect of the service industry and we're all trying to pay about the same wages.

"It's been a struggle, but we think we're starting to turn the corner. Our turnover is about 50 percent this year. Before that, we were running about 66 percent. So we've dropped it about 16 percent in one year, a pretty good move. Our wages now are still average in the market but we think we're training people better and making them feel more part of the team."

Delegate authority

Originally Downing had set up his management system with a superintendent over each of the four courses. Each superintendent had a foreman for that course and their own crew. Recently, several personnel have moved up to higher positions at other courses. He's currently restructuring and planning on two superintendents and four assistants as well as the Director of Equipment Maintenance.

Downing and his crew have got four courses up and running, which was thankfully a gradual process.

"Before we were operating off of one, fixing one up after grow in, growing one in, and building one, so each course had very different needs. Now that we're actively operating four, we anticipate the reorganization will make our equipment usage more efficient and our communications better. I'll work directly with two people and that communication will flow from there. We anticipate this change will put more focus on team spirit than on the individual courses."

Obviously Downing can't cover all 72 holes himself, so now comes the running of the employment gauntlet..Downing follows three steps:

- Find good people.
- Establish definitive quality standards with guidelines on how things should be done, when they should be done and how often procedures should be implemented.
- Delegate authority effectively.

"Our staff knows what is expected of them and assume ownership of their responsibilities," says Downing. "If I don't get to one course during a day, I'll be there the next, and I'm confident that our people will be taking care of things."

Multiple budgets

Downing operates with six budgets. Besides a general administration budget and a landscape crew budget, each course has its own individual budget. Along with the ob-

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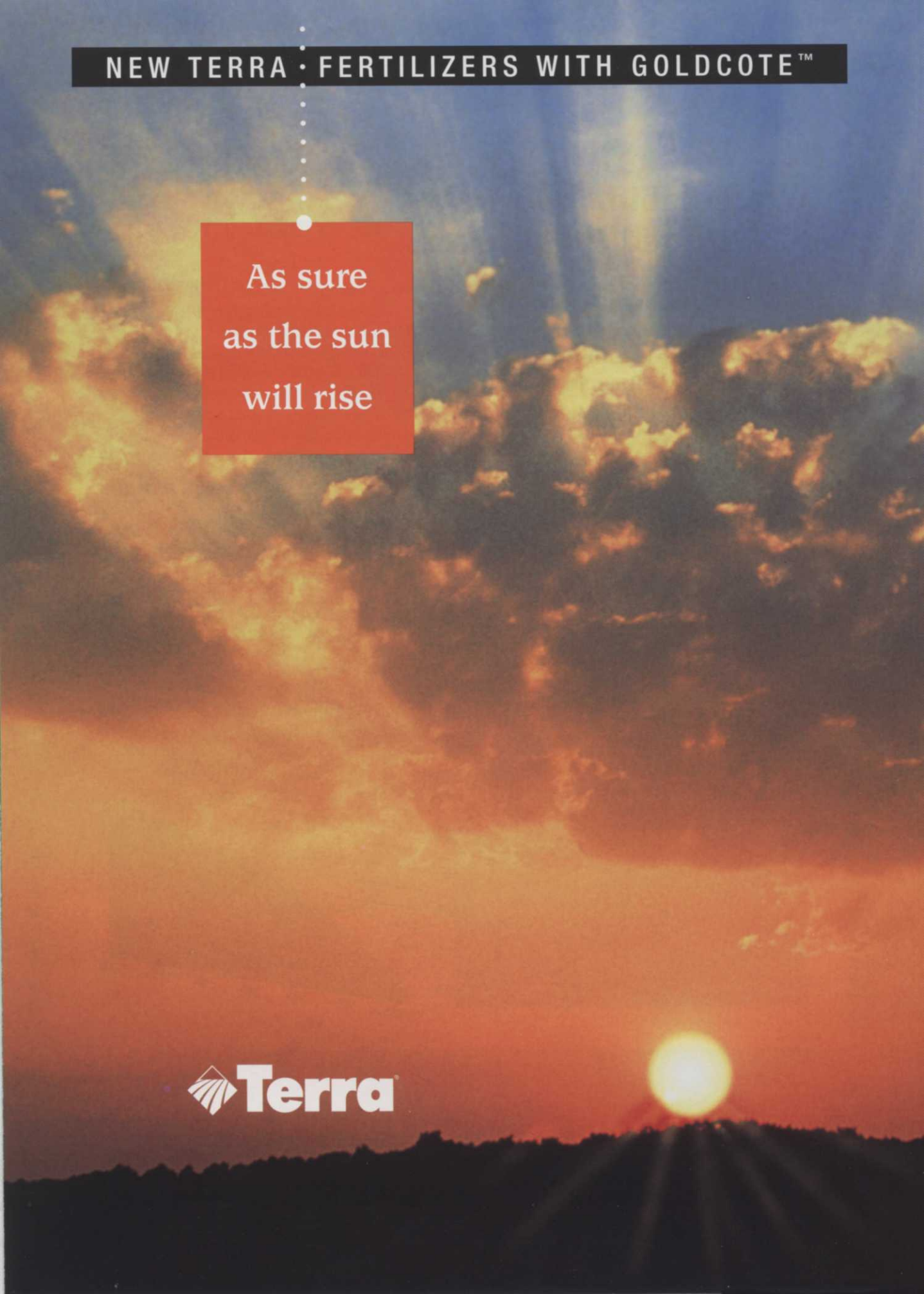
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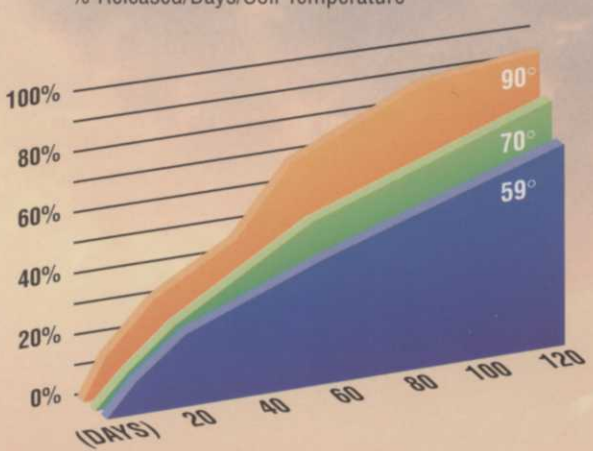
GoldCote Release Rates
% Released/Days/Soil Temperature



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Working with you.

"Our courses are competing against indoor, air-conditioned working conditions and against positions where base salaries are supplemented by tips."
—David Downing

David Downing, center, says more and more kids are playing golf. The game has to be kept at affordable prices.

Host for manufacturer's tourney

On November 8th and 9th of 1997, the Falcon and Avocet Courses of Wild Wing Plantation hosted the finals of John Deere's eleventh annual Team Championship Golf Tournament. The tournament raised $19,600 for the support of GCSAA and the Canadian GCSA. Downing says, "The John Deere Tournament is an important event in the golf business, especially for superintendents. It brings together all the people on a course's management team and provides an opportunity, at both the regional qualifiers and the finals, for these key people to get to know each other better and improve communications. It helps emphasize the importance of the superintendent's role in the success of the course and its appeal to the players."

The winning combination of availability, appeal and affordability add up to a solid future for golf.

S & S. T.

cont. from page 8G

vious control of funds, the multiple budgets provide a clearer picture of actual expenses, allowing Downing to fine-tune for greater profitability. This also helps train the superintendents and assistant superintendents about the budgeting process and tracking their budget during the year.

Weather and competition

Tourists are a big business for all the Myrtle Beach golf courses. Most, including Wild Wing, work with the hotels on booking play. The increased level of competition from new courses impacts the number of rounds on the existing courses.

Weather patterns also have a huge influence on the amount of tourist play. Downing notes that 1995, the first year all four courses were open, had nearly ideal weather: little rain and mild temperatures. Wild Wing did 175,000 rounds that year.

"Since then we've been closer to 160,000 to 165,000 rounds," says Downing. "The last couple of winters we've had days we were forced to be closed because the ground was frozen. During the summer of 1996, we had two different hurricanes that we evacuated for in mid-week. While these hurricanes missed us, the people that were here for the weekend were gone and didn't come back."

The superintendent's role

The role of the superintendent has become increasingly important as course playability and overall course demands blend with budgeting and personnel issues, environmental concerns, and governmental regulations. Establishing recognition of and support for that role within the course's management team is an essential ingredient in balancing the multiple challenges.

Challenges continue, but the future looks solid for golf, according to David S. Downing II, CGCS, "It comes down to making golfing opportunities available to a wide variety of players - and keeping it affordable," says Downing.

"The Tiger Woods phenomenon exists," continues Downing. "There are more and more elementary age kids playing golf. One fifth grade teacher reports that twelve kids in her class are players. We've never seen that amount of early involvement before. Part of it is the Tiger factor, but part of it is that kid-size equipment is available now. My son Alex is on his second or third set of clubs and he's 9 years old. As he grows, we're either able to find the clubs or get them made." □

The Trustys write on a variety of Green Industry related topics from Council Bluffs, Iowa. Steve Trusty is executive director of the Sports Turf Managers Association.

No 'bunk' bunker program

A Michigan superintendent discovers that the first step in delivering better bunkers to his members is to ask them for their help.

By RON HALL/ Managing Editor

If your bunkers are overdue for renovation, consider borrowing from a program that Alan C. Bathum used with good results at Cascade Hills Country Club, Grand Rapids, MI.

Like most things that turn out well, Bathum followed a simple step-by-step approach to accomplish his goal to upgrade the bunkers at Cascade Hills. Key to the process was the care he took to build cooperation with the club's management and members. This is, arguably, the most vital ingredient of any major course improvement project.

Bathum, with 20 years golf course experience, five of them at Cascade Hills, knew that renovating all 56 bunkers on the original 18-holes of the 27 holes at the country club would be a big job. It needed the blessing, not only of management, but of the membership too.

That's why he *had* to have a plan.

Actually his plan is part of a larger vision that he and other Cascade Hills officials, like the club manager and club professional, began developing soon after Bathum came to this club. At that time, each person identified capital improvements that they thought the club needed. The professionals have been addressing them one at a time ever since.

Superintendent Alan Bathum followed a plan for renovation.

"Bunkers was definitely one of the improvements we needed, particularly bunkers that drained," said Bathum. Thunderstorms and heavy rains often filled them with water. "It really hurt the playing conditions," he admitted.

Even so, members of Cascade Hills (or any course, for that matter) often don't see bunkers at their worst because superintendents and their crews usually tidy them up before golfers can get to them. But the members at the club were well aware that their bunkers needed help.

"We asked them (members) to prioritize what they felt was most important. Bunkers came up real close to the top," said Bathum of a survey of members' wants.

Armed with the results of the survey, the superintendent formed a sub-committee made up of himself, the greens chairman (at the time the club president too), club manager, golf pro and several individuals from the greens committee to plan for bunker renovation.

After some discussion, and after meeting with other superintendents in their part of Michigan, the subcommittee tentatively chose a construction company out of Canada, Turf Drain Inc. The committee asked the company to rebuild two bunkers on the eighth green in the fall of 1995 on a trial basis so that members could judge them during the 1996 season. They were particularly concerned that they get the right sand for their bunkers.

Early in 1996 the committee gathered

Members at Cascade Hills CC appreciate the improved appearance and playability of bunkers at their course.

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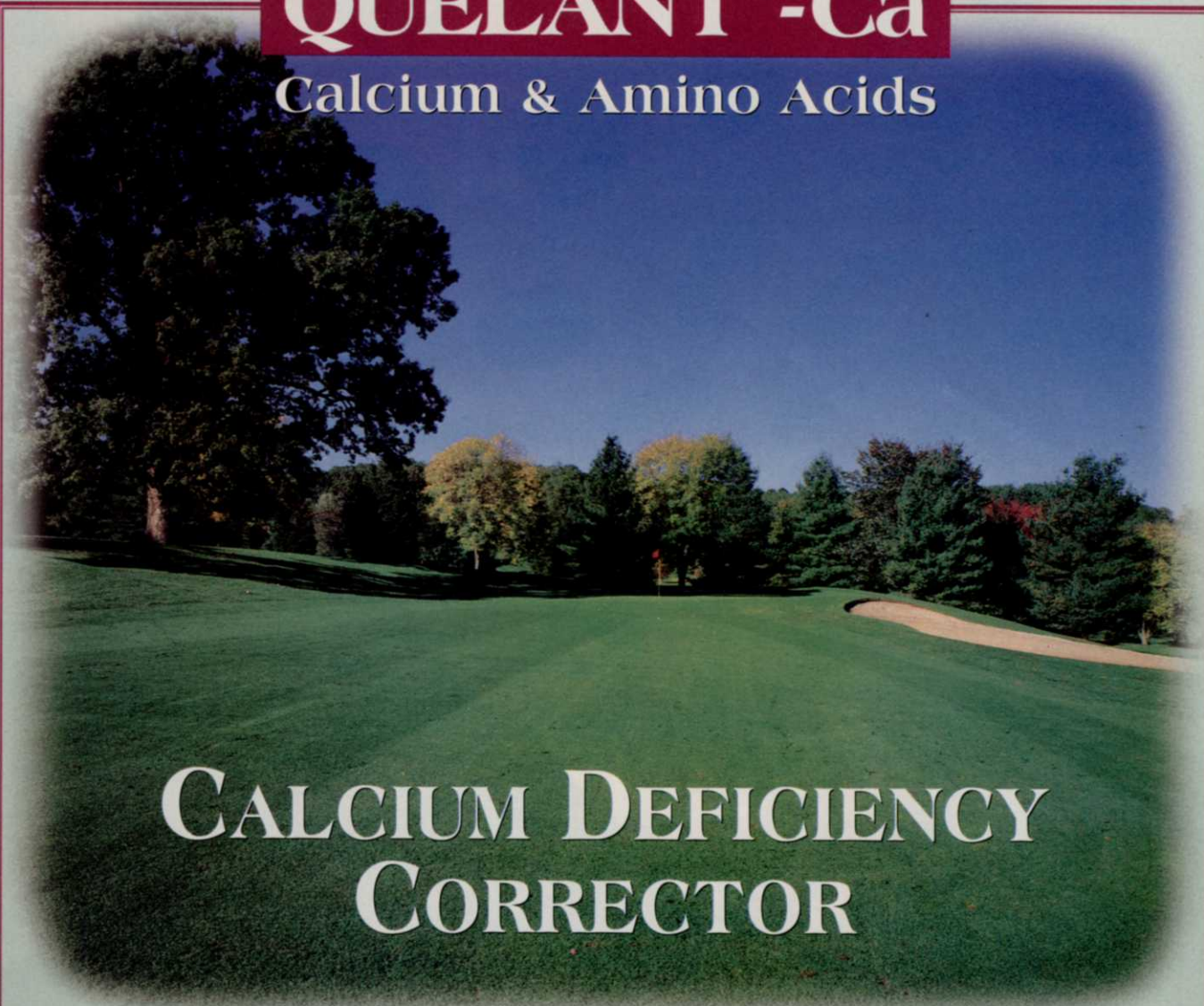

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Two neat bunker tools

Terry Buchen, CGCS, sees a lot of neat things at golf courses because of his consulting business Terry Buchen Golf Agronomy, Williamsburg, VA. He mentioned the following two pieces of equipment at a fall turf conference at Penn State.

Marshall Fearing, superintendent at Castle Pines Golf Club, Castle Rock, Co, uses a giant vacuum to remove sand from bunkers. The vacuum is owned by the Hall-Irwin, a company based in Greely, CO. Tom Briddle, director of golf services for Hall-Irwin, says industrial vacuums are often used to remove loose soil from utility or trench excavations. So, why not use one for taking sand from bunkers?

"When you use a mechanical device in a bunker you're taking a risk of destroying the bunker, and I've ruined a few in my career" says Briddle.

The vacuum was modified to work in a bunker by attaching the hose to a snow blower. "A man can't hold the suction hose," says Briddle who says the machine can move a couple of cubic yards of dry sand an hour.

In northeast Ohio, Frank Dobie at Sharon Golf Club, uses, an attachment he invented and sells, the Sandpacker, for the Toro Sandpro. The purpose of the Sandpacker, is to firm up the sand in a bunker, but still rake the top 1/4 to 1/2-inch.

"The whole concept is pretty simple," says Dobie. "Visualize a ski going through powder

snow. We took the shape of the front of the ski and put it where the cultivator bars were."

The weight of the steel on the front edge of the unit is enough to pack loose sand and the serration's on the back of the steel give the sand the raked, finished look.

Dobie's been selling the Sandpacker for 10 years, and most units are sold word of mouth, he says. To learn more about it, call Dobie at 330/239-2458 or Gary Bogdanski, who makes them, at 330/239-1939.

cost estimates from the architect Bruce Matthews of Design 3, Lansing, MI, (who provided them with photos and drawings), and from the construction company. It then made its presentation to the greens committee and Cascade Hills board of directors.

Both bodies gathered in a special meeting about a month later and agreed to ask the membership for a special assessment to handle the costs. Within another three weeks the members voted positively on the assessment, and construction on the bunkers began in September 1996.

"The work went fairly quickly. We had half the bunkers done in the first 2 1/2 months," recalled Bathum. By the spring of 1997 they had all been renovated.

Bathum says members are now happy with the bunkers, and he is starting to prepare for a renovation to the course's irrigation in the next couple of years. □

Tips to smooth the process

Superintendent Alan C. Bathum makes the following suggestions for anybody contemplating a major bunker rebuilding program:

▶ **Document the condition of your bunkers with photographs.** They're a good tool to help convince members that improvements are in order—particularly when they're compared to photos of good bunkers.

▶ **Educate and gain the support** of your greens chairman or immediate supervisor on the scope of the project. Keep that person advised during the renovation. This is important.

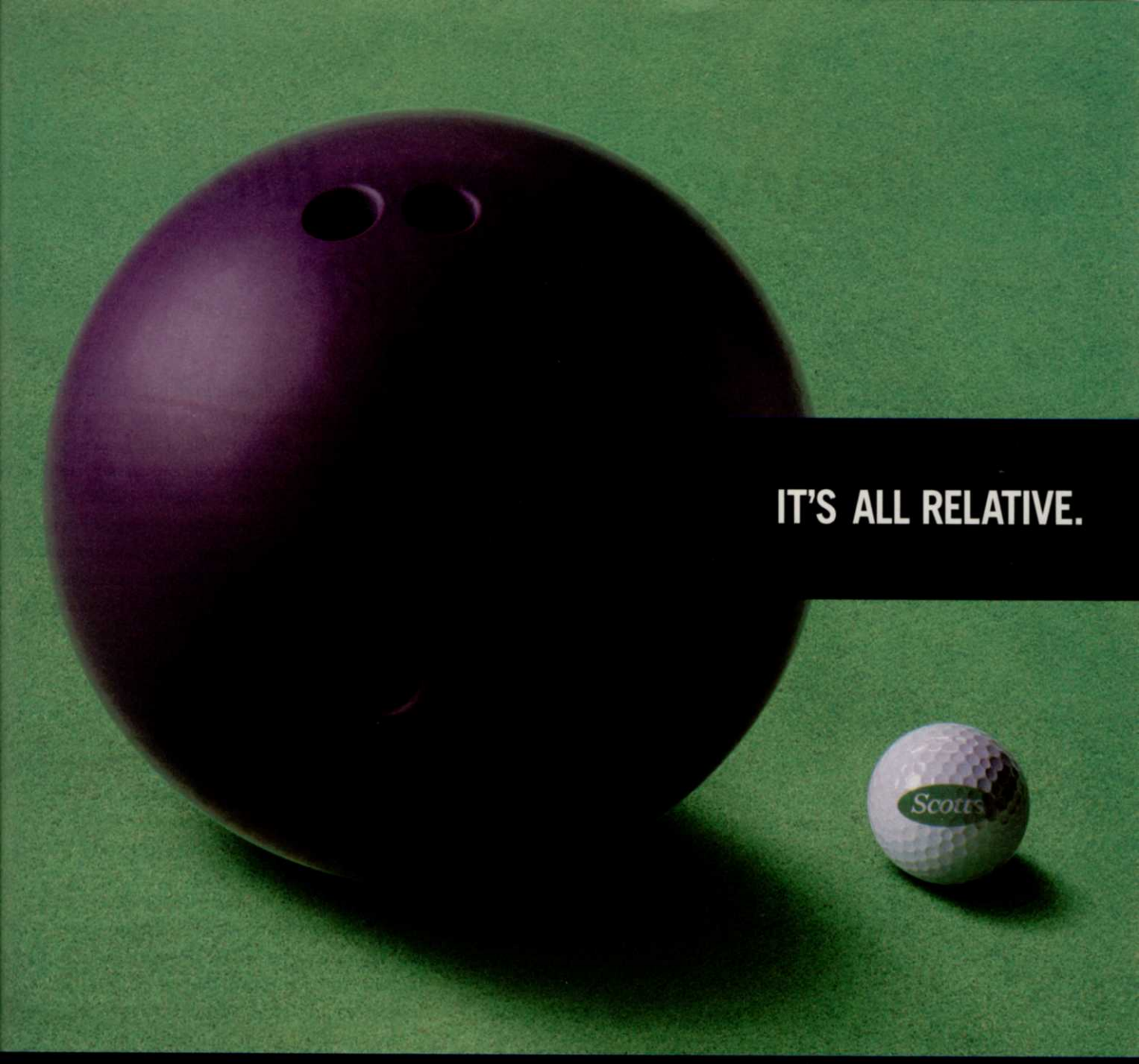
▶ **Meet first with small groups** at your club and gain their support, so they can begin talking up a bunker improvement program.

▶ **Keep your renovation subcommittee small.** "If you have 8 to 10 people making decisions, it makes it tough on the architect, tough on the superintendent, and tough on the construction company," says Bathum. Don't forget the golf professional who can give you valuable input from the players' perspective.

▶ **Hire an architect.** "We've done a lot of renovations in the past but we felt we needed an architect for this big of a project. An architect helps you early to recognize costs and concerns, and can also help sell the project to the membership."

▶ **Find out as much** as you can about the construction company that you intend to hire. Check with other superintendents who have used that company.

▶ **Don't become too rigid** with your improvement project. You want to be able to make changes early in the project if it will make the project go smoother.



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Circle No. 124 on Reader Inquiry Card

Bringing butterflies to the garden

Add a new dimension to your flower beds by attracting butterflies with particular nectar plants and techniques.

By TONY BERTAUSKI

Perennial flower beds can add so much to the value of homes, businesses or golf courses. They provide soft textures against the hard angles of buildings, splendid colors that catch our eyes, and wonderful fragrances. With a few mindful adjustments you can increase another dimension to your next perennial flower bed design. Using certain plants and gardening techniques, you could attract more of nature's beautiful pollinators: butterflies.

The first step is to locate the flower garden in a sunny location. Butterflies thrive in well lit gardens. Shade gardens are not effective because butterflies need the sun to regulate their body temperature. There should, however, be some shade available for the butterflies to seek relief from hot, summer days. This can be achieved by planting small to medium size shrubs along the north side of the garden.

Shrubs and nearby trees also provide a protective wind break. A garden located in the middle of a pasture will often be subject to sweeping winds that make it hard for butterflies to flutter from one plant to the next. Groupings of woody plants create a calm, micro-climate that butterflies will be drawn to and stay for a longer period of time.

There is no shortage of the variety of plants that attract butterflies (Table 1). The plants that attract butterflies will do so for two reasons. One is for nectar. Butterflies feed themselves on the sweet, sugary nectar that plants provide. It is good to plant groups of each species in the garden instead of spreading out the plants throughout. These groups will have greater appeal to passing butterflies and encourage them to skip easily from plant to plant.

Another reason why certain plants attract butterflies is to provide a food source for the larvae stage (Table 2). Butterflies will seek out particular plants to lay their eggs upon so that when the larvae hatch they have an immediate food source. For instance, Monarch larvae only feed on milkweed plants. Thus eggs of the Monarch will be found on milkweed plants. It is just as important to include food plants as well as nectar plants in your garden design.

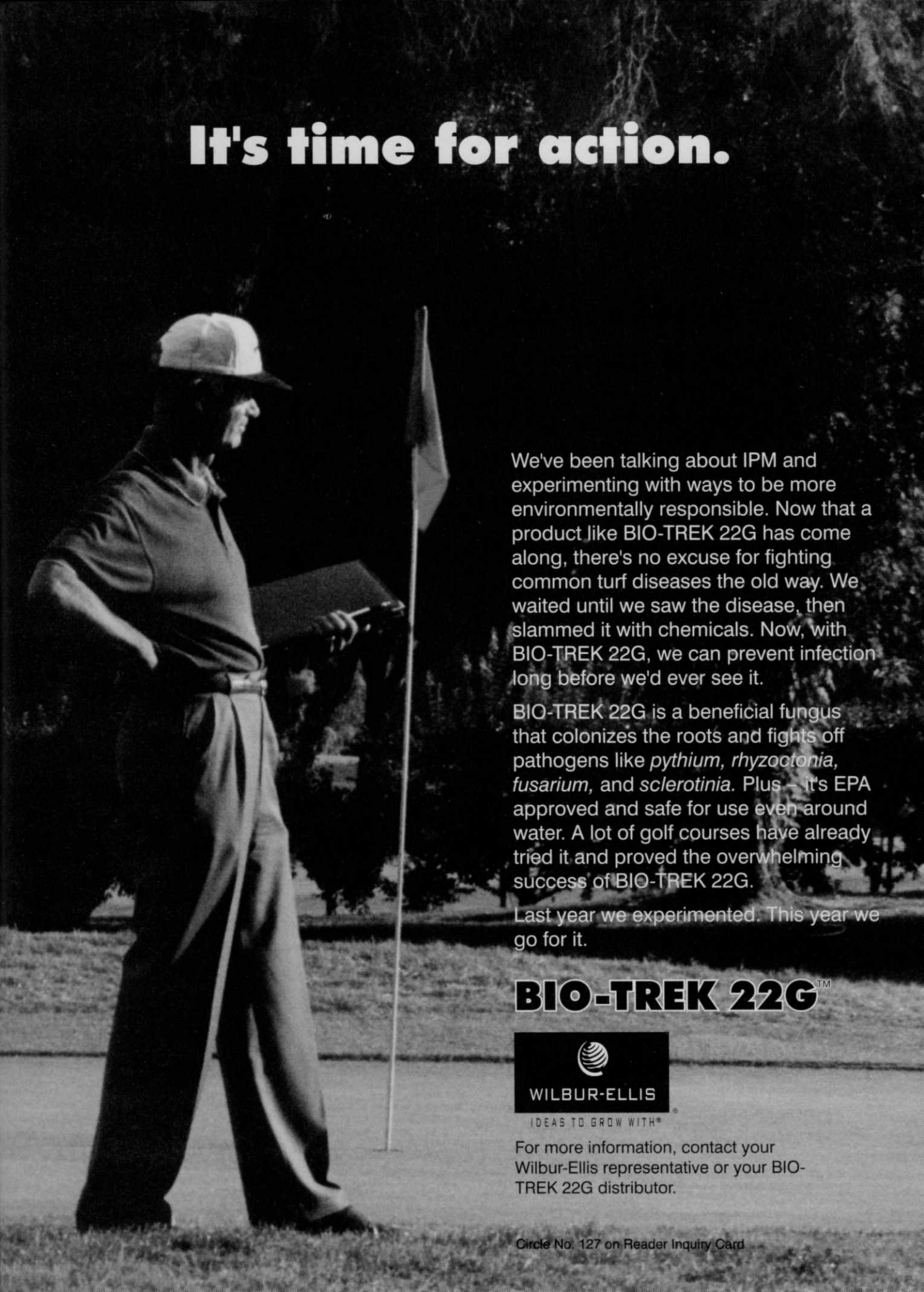
Do some research about the butterflies indigenous to your area of the country. There are many species that can be found in most of the United States, such as Monarchs and Cabbage Whites. However, each area is different. Check books at the library or contact the entomology department at a local university. Choose your plants according to the butterflies you expect to find in your area.

There are a few additional things you can do to cater to behavioral characteristics of butterflies. One is to add groups of large rocks within the garden. Butterflies use warm rocks to regulate their temperature or to dry their wings. Most often but-

cont. on page 22G

TABLE 1. A PLANT LIST FOUND IN TEMPERATE ZONE 5 THAT PROVIDES NECTAR TO ATTRACT BUTTERFLIES.

PERENNIALS	*ANNUALS*	*TREES/SHRUBS*
Aster	French Marigold	Birch
Bee Balm	Hibiscus	Dogwood
Blanket Flower	Mexican Sunflower	Elm
Butterfly Weed	Sweet Pea	Hackberry
Coneflower	Salvias	Hawthorn
Gayfeather	Verbena	Hornbeam
Red Valerian	Zinnia	Lilac
Pincushion Flower	Poplar	
Phlox	Privet	
Viburnum	Willow	


It's time for action.
We've been talking about IPM and experimenting with ways to be more environmentally responsible. Now that a product like BIO-TREK 22G has come along, there's no excuse for fighting common turf diseases the old way. We waited until we saw the disease, then slammed it with chemicals. Now, with BIO-TREK 22G, we can prevent infection long before we'd ever see it.
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cont. from page 20G

terflies can be found sunning themselves in the early morning hours when the air is cool and dewy.

Add a source of water

Butterflies cannot drink from pools of water. They get their moisture and nutrient requirements from sipping water from damp, often muddy, areas. This phenomenon is sometimes referred to as "puddling." Swallowtails and Sulphurs can often be found in groups puddling. Some of the best places to find butterflies is at golf courses where equipment is continually washed off. This area always has piles of wet, muddy grass clippings that are perfect for butterflies to swarm around and feed.

We can address this behavior by creating a damp area in the garden. There are several creative approaches to this. One is simply burying a clean oil pan with top of the pan level with the soil surface. The pan is filled with a mixture of soil and sand. The oil pan will retain water, keeping a damp area around a bit longer. Another approach is to create a slight depression in the ground and line it with plastic then cover with a layer of decorative rock. Moisture will be present between the rocks for the butterflies to feed on, especially in the morning dew. It can also serve as an area to sunbathe in the afternoon.

With these simple ideas in mind when selecting and placing plants in your next perennial flower design, butterflies may be the additional dimension of wonder your clients behold. □

TABLE 2. FOOD PLANT LIST FOUND IN TEMPERATE ZONE 5 THAT LARVAE WILL FEED ON.

BUTTERFLY/LARVAE	*PLANT*
Black Swallowtail	Fennel, Parsley, Dill
Great Spangled Fritillary	Violets
Buckeye	Snapdragons, Verbenas
Pearl Crescent	Asters
Viceroy	Willow, Poplar, Plum and Cherry
Cabbage White	Nasturtium, Cabbage
Monarch	Asclepias

The author is assistant superintendent at Brookhill Golf Course, Rantoul, Il, and has published several articles concerning golf course maintenance.

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A spring break that starts careers

Jack Hollerich dug the end of the shovel into the hump of gravel like he meant business. With beads of sweat glistening on his reddening forehead, he sent sprays of crushed limestone in the direction of partner Tony Cantelmo. Tony was tamping it smooth for all he was worth, never mind that the tamper's hickory handle had snapped in his hands.

Is this what college students do on spring break these days?

Yes, almost 600 of these students anyway. They competed for honors and for jobs—but mostly for jobs—at the 1998 ALCA Student Career Days in Raleigh, NC. They gave it their all.

The young men and young women tested their skills in a variety of landscaping events. (Yes, some young women are pretty darn good at climbing trees or operating skid steers and trenchers.)

Judging from the enthusiasm that they brought to Raleigh, you would have thought they were competing for the NCAA Division I basketball championships. And, in a sense, they were competing for something just a important to them—their careers. They worked like the dickens to impress potential employers. Representatives from more than 90 landscape companies were on hand to attract these youths to their "teams".

The ACLA Student Career Days (See article on page 24L) is one of the landscape industry's most important, and fun, events each year. It showcases the young talent in our colleges, universities and vocational schools. It brings this talent, and lots of enthusiasm, to the companies that go out looking for it.

This year's event was the largest ever and the weather was just about perfect, thanks to blue Carolina skies. If you see Drew St. John, St. John & Associates, Hattiesburg, Miss., congratulate him on another fine job. He's chaired the event the past several years. Also, congratulations to the students at North Carolina State University and all the other volunteers who made everybody feel at home in Raleigh. **LM**

RON HALL
Managing Editor

[PEOPLE & PROJECTS]

RBI tabs Jody Randall as vp

Jody Randall became vice president of **Randall & Blake, Inc.** (RBI), a 20-year-old company with offices in Colorado, Texas, Utah and California. RBI also appointed Dave Burnley as president of its subsidiary Contra Costa Landscaping, Inc., and Dave Wolkenhauer as assistant secretary/treasurer of CCL. John Bollwinkel now manages the Utah Division of RBI Maintenance.

New digs for Emerald Green LC

Emerald Green Lawn Care, which serves the Columbus, Ohio, market moved to a larger (6,000 sq. ft.) facility in Gahanna. Emerald Green expects a 30 percent sales jump in 1998. The company serves Franklin, Fairfield, and Licking counties.

PHOTOS COURTESY GLENN MOORE LANDSCAPING.

IRRIGATION EQUIPMENT & EDUCATION

In Part III of our Irrigation Series, we get technical. Read about hydraulics and pumps; water properties; installation information; how to price it and explain it!

By BRUCE SHANK, BioCom

In these times of downsizing and less government, mandated competence of any profession is a low priority. However, water is one of the few resources that federal regulators refuse to hand over to states. As part of the national infrastructure, like highways and prisons, water supply is one of the standards by which a state is judged. States remain dependent upon federal subsidies for development of water resources, yet only three states have implemented licensing programs for irrigation. When you consider that irrigation, both agricultural and landscape, consumes 80 percent of developed water resources each year, most state legislators are overly trusting in others to regulate water.

State regulators will, however, welcome input from industry regarding competence. Even so, only Texas, New Jersey and some counties of Florida have irrigation licensing laws on the books. We can therefore assume that licensing in the other 47 states is not going to happen rapidly.

Get architects and general contractors to require their sub-contractors to be certified. It will do more than most laws will ever do.

Certification shows credibility

Certification has tremendous value from a business perspective. It is one of the few ways to differentiate your company from other companies that may not be certified. You must establish a credible method of self-regulation before certification carries any significance. Consequently, self-regulation depends largely on associations, primarily state and national associations.

Since irrigation is a specialty, landscape associations look to irrigation associations for answers. One thing carries as much clout as a law, and that's bidding specifications.

Get architects and general contractors to require certification, and you will do more for technical irrigation competence than most laws will ever do.

The properties of H_2O

Landscape irrigation systems are available that waste less than 10 percent of the water pumped through them. Most systems in use today still waste up to 40 percent of the water

cont. on page 4L

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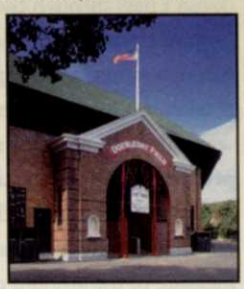

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cont. from page 2L

taken from the water source. That 30 percent difference represents a huge amount of opportunity.

Water is the liquid state of a chemical compound made up of hydrogen and oxygen. Water is relatively heavy and gravity has a lot of influence on it. When it freezes, water expands instead of contracts. Most things contract (get smaller) as temperature drops. That's why water breaks pipe and sprinklers as it freezes.

Water is a solvent and mixes with many minerals and salts. Those minerals and salts change its usefulness to plants. An amazing process called osmosis regulates the amount of water that enters a plant through its roots.

Lateral pipe and wire are installed with vibratory plow.

Trenching is cut in for the main line.

In simple terms, a plant will only take in water through its cell walls if the concentration of salt is higher on the inside of the plant than in the soil solution. If irrigation water is very salty, the high concentration of salt in the soil solution will cause the plant to stop letting water through its cell walls.

The salt concentration of water is usually measured by the amount of sodium in the solution because sodium is the primary positively charged ion in salts. If the water doesn't pass through the cell walls, the important elements dissolved in it won't pass through either. Water quality is important. It takes more salty water than regular water to meet a plant's needs.

pH affect on nutrient use

Another important chemical influence on water is something called pH. This is a measure of the amount of hydroxide ions in solution. A hydroxide ion consists of one atom of hydrogen and one of oxygen. The combination has a negative electrical charge.

Water is defined chemically as two atoms of hydrogen and one of oxygen. That's not really true. In most cases, water is a positively charged molecule of three hydrogens and one oxygen mixed with a negatively charged hydroxide ion. When the two are in the same concentration, the result is called neutral. But, when the hydroxide ion is present in a higher concentration, the result is called basic or sodic. When the hydroxide ion concentration is less than the water molecule, the combination is acidic.

Water is water, but the difference is when you fertilize. Important nutrients, such as nitrogen, phosphorus and potassium, can only be taken into the plant when the pH is in a certain range, usually somewhere between 6.5 and 7.5.

7.0 is neutral. If your water is either highly acidic or highly basic, nutrients are not available to the plant. Bad water is a bad carrier for nutrients.

System hydraulics

The science lesson continues with an explanation of pressure, flow and resistance. Two things greatly influence water pressure, gravity and friction. Gravity is controlled by elevation. A sprinkler head below the water source will have water pressure while one above the source won't even work without energy being used to pump water up to that point. Gravity is free energy in a matter of speaking.

Friction is energy lost by resistance. The amount of resistance is determined by the amount of water dragging against the side of the pipe. The inside of a pipe resists flow. The longer the pipe is, the more resistance there is. Also, the more pressure the water is under, the faster it will flow and the more it will press against the sides of the pipe. Consequently, resistance is greater. Finally, the larger the pipe, the lower the resistance because a lower percentage of the water is in contact with the walls of the pipe.

Other fittings affect pressure

Pipe isn't the only cause of resistance in an irrigation system. Constricting water flow or changing its direction causes resistance. Sprinklers, fittings, valves, tees, flow meters and backflow prevention devices all increase resistance and lower pressure. Every time you add one of the above to a stream of water, you lower pressure.

If sprinkler heads and emitters weren't designed to operate under certain ranges of pressure, it wouldn't matter. But they were. Without a certain pressure, sprinklers will not work properly.

You need to know the pressure at the source before you can begin to determine how many sprinkler heads or emitters can be used. Then, one by one, you subtract the pressure loss of the pipe and components until you reach the minimum oper-

cont. on page 6L

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cont. from page 4L

ating pressure of the sprinkler you want to use. Give yourself a little leeway to make sure you have the pressure you need.

For example, most pop-up sprayheads were designed to work properly with 15 to 20 pounds per square inch (psi) of pressure. Most impact sprinklers and gear-drive rotors need 40 psi to meet specs. Drip irrigation emitters deliver their gallons per hour at approximately 20 psi.

You need to know the pressure loss of the water meter, the backflow prevention

Main line tees are ready for thrust blocking.

device, each fitting, every valve, and each subsequent sprinkler head before you can determine when you run out of the pressure necessary to run the last head. Don't forget elevation. That's why there are irrigation consultants and computer aided design software to figure out all the pressure losses.

Equipment needed

The less dirt you have to move the cleaner the result will be. Trenches for half-inch and three-quarter-inch pipe can be cut with a small earth saw. These relatively inexpensive trenchers can cut eight or more inches deep. For larger mains and laterals, and in areas where codes require deeper trenching, you'll probably require a chain trencher. Large earth saws are made for cutting through rock.

Assemble and glue **pipe and fittings**

cont. on page 12L

'Plug it in-and-go' pumps have service advantages

Over the last 10 years, turf and landscape professionals have seen a number of changes in prefabricated—or manufactured— pumping systems. Most agree that these advances successfully boost system reliability and increase the options for end-users. These changes also simplify service issues, reduce repair needs and cut service costs.

The improvements in manufactured pumps include 'one call service' offered by prefabricated systems makers saves time and money.

Systems manufacturers select all components, assemble, ship and provide warranties to cover every system. Should a service need arise, the manufacturer is held responsible for it, no matter which component may have caused the problem.

"One call service" offered by prefabricated systems makers saves time and money.

Manufactured pumping systems also have been improved over time. Many in this field now have as much as 20 years of practical pumping system knowledge, in landscape, golf course and industrial applications.

Variable Frequency Drive takes the system up to desired pressure level slowly, rather than kicking in at full force as in earlier conventional systems.

Source: John Murtaugh, manager of product support for the Flowtronex PSI FLOBOY line of pumps, Columbus, Ohio.

TOP THREE PUMP PROBLEMS & POSSIBLE CAUSES

Problem
Pump won't start automatically
Possible cause
Power is off
H-O-A switch not in 'Auto' position
Pressure switch sense line plugged
Fuse blown
Overload relay tripped
Safety tripped
Defective pressure gauge
Pressure switch misadjusted
Pressure switch defective
Defective H-O-A switch
Defective starter, motor or PLC

Problem
Pump operates but won't build pressure
Possible cause
Pump has lost prime
Plugged intake
Suction pressure too low
Control valve malfunction
Isolation valve partially closed
System overdemand
Wrong pump rotation

Problem
Pump shuts down on low pressure
Possible cause
Pump has lost prime
Plugged intake
Suction pressure too low
Control valve malfunction
System overdemand
Wrong pump rotation
Pump is cavitating
Material lodged in pump
Bad pressure switch
Bad PLC

SOURCE: FLOWTRONEX PSI, COLUMBUS, OHIO

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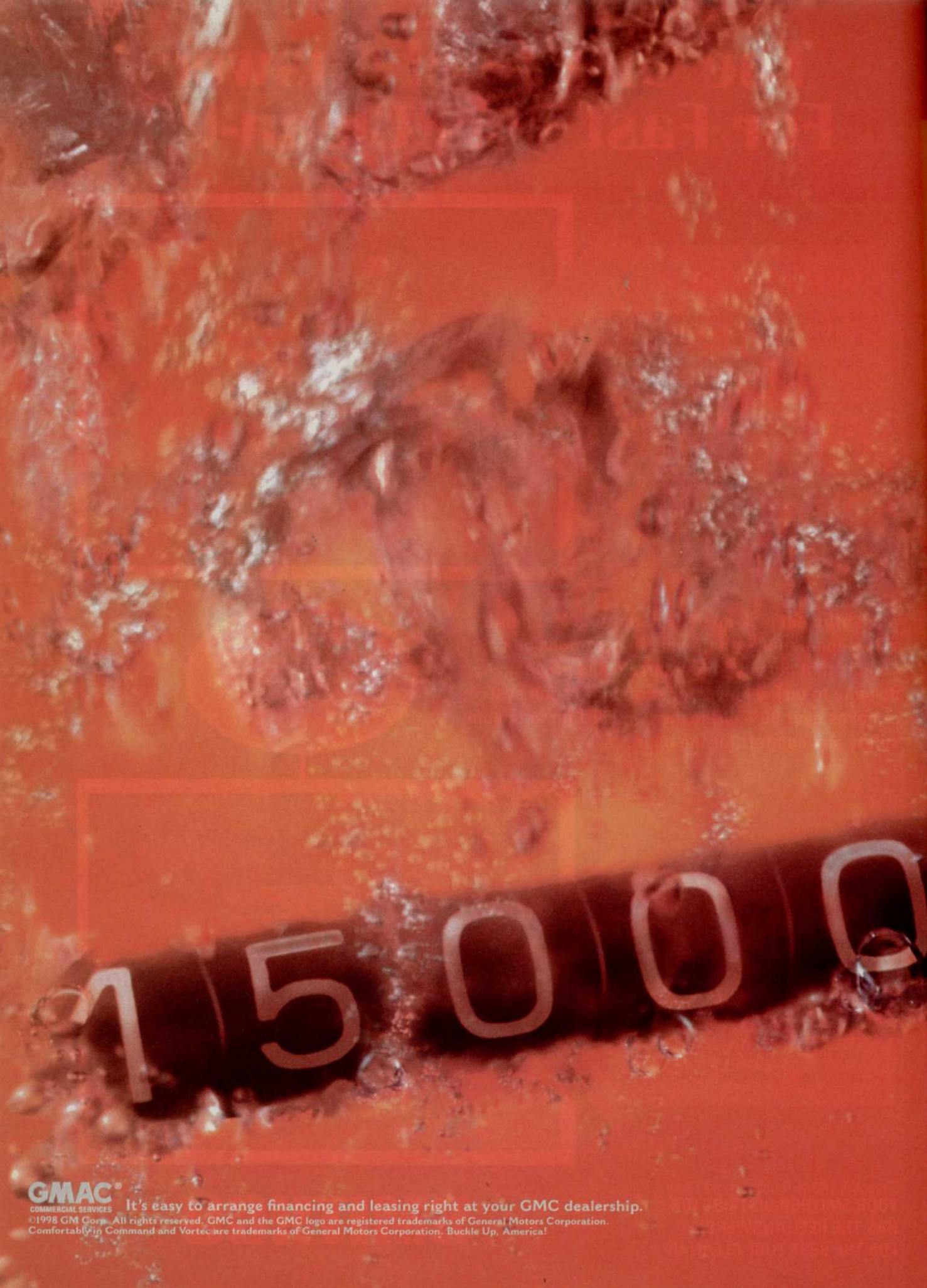

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❑ 4–6 months ❑ 10–12 months ❑ 2+ years ❑ Undecided

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* Maintenance needs vary with different uses and driving conditions. See owner's manual for details.

GMC®

COMFORTABLY IN COMMAND™

cont. from page 6L

The staging area, where irrigation construction materials are held for use. Keep it organized.

above ground where possible. Give yourself more room for **valve boxes** and sprinkler heads. Use swing joints or flexible risers for sprinklers. Valve boxes should be accessible for maintenance later. Preassembled valve assemblies can save time and increase reliability while providing for system expansion. Keep in mind that valve-in-head sprinklers are available for larger-radius heads. If elevation changes exceed ten feet for a station, consider splitting the station into two stations.

Locate satellites to keep wire length to a minimum. You can use battery-powered controllers until power is brought to the satellite. Install receivers for remotes on satellites when the budget allows. Handheld remotes are great time savers once the system is operational.

Make sure you meet local backflow prevention codes. In some areas, only licensed plumbers can install backflow prevention devices. If the system doesn't include a master valve, install a manual valve so repairs can be made with an unpressurized system.

Pipe racks and bins on trucks can save time. Buy bulk items like fittings, pipe and wire on sale. Try to buy sprinklers, valves and controllers by case loads. Sticking to a few brands will reduce your parts inventory considerably.

Theories regarding **head spacing** differ by the area and the dependence on irrigation for plant water needs. Two basic designs are rectangular and triangular. The application uniformity of any method is based on the overlap of sprinkler distribution at design pressure and flow. All designs require some overlap of application. Slope and wind can affect distribution. Do not mix sprinklers or brands within a station. Not only should the sprinklers be the same type, they should have the same nozzles.

Networking and education

Distributors and associations are the primary suppliers of educational support in the industry. Manufacturers also have schools during the year. For a list of books on irrigation, look up the Irrigation Association's web site at *www.irrigation.org*. You'll find a wide selection of books, many of which are used in the IA's certification programs. You can also find information on local irrigation organizations on the web site, as well as a list of members, manufacturers, distributors, and certified irrigation contractors, consultants, and designers.

The largest assortment of educational sessions on irrigation is available during the IA Irrigation Exposition each November. The Expo also features the largest display of irrigation materials, in addition to installation equipment, computer software, and consulting services.

Explain the system to clients

DeSantis Landscapes, Salem, OR, gives clients detailed explanations of what the irrigation system includes, and how to avoid problems. Here are some excerpts (-ed.)

"The system has been equipped with an up-to-code backflow device...to comply with water district, city county and/or state law. It allows for water to enter your irrigation system and not be allowed to return to your potable water. In most areas, your backflow device will need to be tested by a certified test, at least once a year, in compliance with water purveyors code.

XYZ valves have been installed. They will be found in the green valve boxes located in your yard. Please, do not cover these with bark dust, dirt, etc., as the location is easily forgotten. Each valve operates a number of sprinklers in a certain area called a 'zone' or 'station.'

XYZ popup heads are used in the lawn area and XYZ pop-ups in the shrub beds.

XYZ heads are used in larger areas because of the distance they spray and the ability to adjust their are (radius) from 10 degrees to 350 degrees. □

Bruce Shank operates BioCOM Horticultural Communications out of Palmdale, CA.

The main line and laterals are in, the area is cleaned up and seeded.

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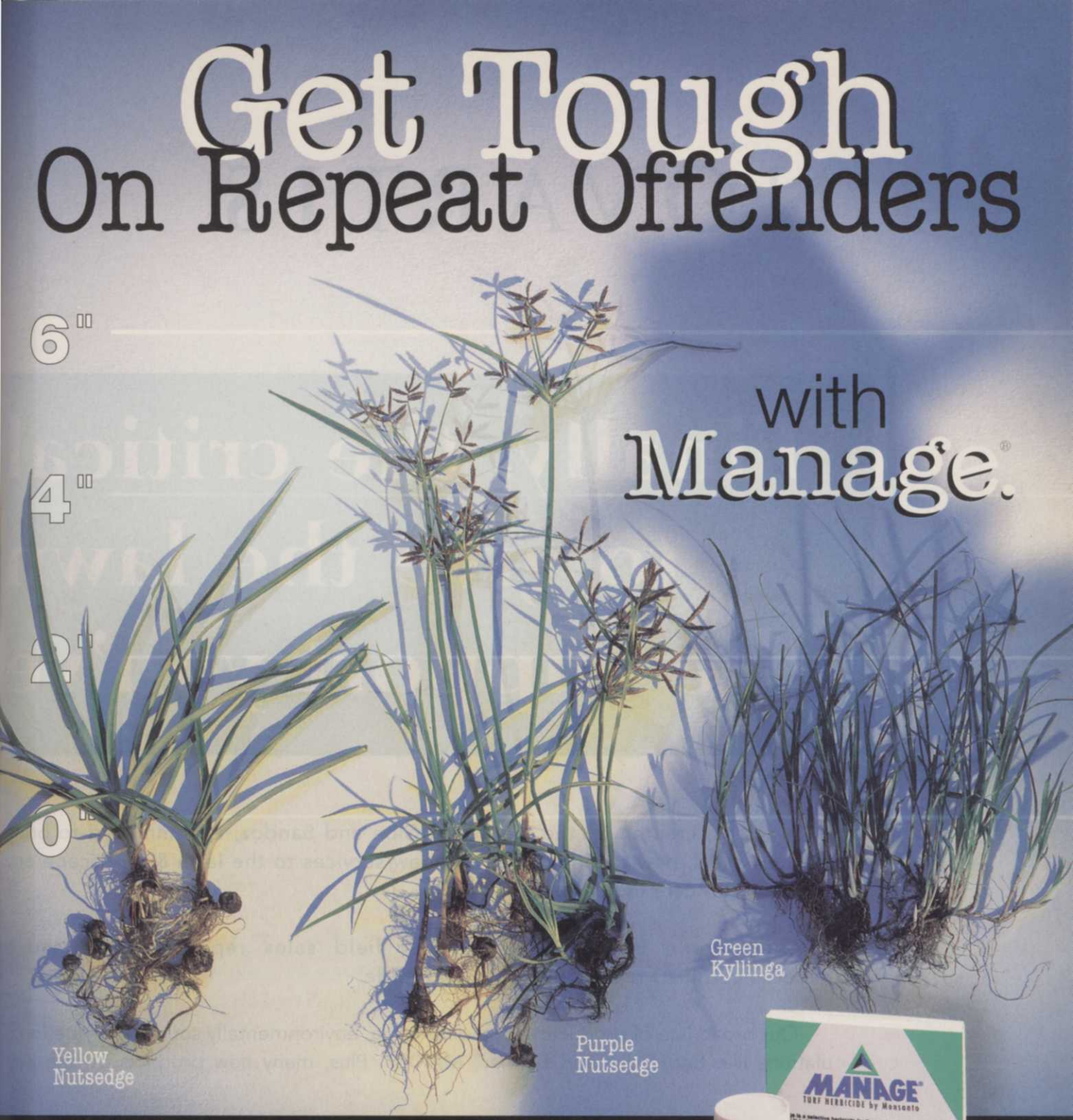

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COMPANY PLAN STIFLES Dutch elm disease

By TOM PROSSER/ Rainbow Treecare

Dutch elm disease ranks amongst the most devastating diseases of trees in North American history. While this may be old news, technology and chemicals used to protect elms from Dutch elm disease are not.

With dozens of cures or protective formulations for this disease proposed in the past 50 years, there has been a lot to choose from and a lot of information to wade through. Dutch elm disease is difficult to control, unfortunately most proposed cures do not work.

My job is to keep 5500 elms disease free. Clients pay us to do this. We guarantee these trees will remain disease free or we refund their money. We lose less than one percent of our treated trees over a three-year period. In the past 22 years, our company has treated more than 25,000 elms. Some of the earlier methods and chemicals we used gave much worse results then we get today. Disease mortality in Minneapolis/St. Paul and its surrounding suburbs ranges from approximately seven percent to over 30 percent, during a normal 3-year period, depending on the suburb. The intensity of the Dutch elm disease sanitation program is directly related to the percentages of trees lost.

Dutch elm disease is a fungus, which grows in the vascular system of elms. The disease is spread 2 ways: insect transfer and root-graft transfer. Approximately 90% of new infections are transferred by the Elm bark beetle whose life cycle revolves around elms. These beetles lay their eggs in dying or recently dead elms with the bark still attached. The newly-emerged adults then fly to nearby elms and feed on elm tissue in the crotches of two to four year old branches. If the beetle hatched in a diseased elm, the beetle will carry spores of the disease to another tree and infect the tree as the it feeds. This disease is so serious because of the ease with which it can move from elm to elm on this beetle. One diseased elm can produce thousands of disease-carrying beetles, all looking for a tree to feed on.

The second way this disease spreads is through root grafts. While only about 10 percent of all Dutch elm disease is spread this way, it is very important to be aware of grafting because current chemical injections will *not* stop this. Every tree injection chemical I have used or tested has not stopped or prevented root graft infection with Dutch elm disease.

All of the elms in this Minneapolis neighborhood have been treated with Thiabendizole for more than 20 years. No elms, out of 41 trees have been lost to Dutch elm disease. Surrounding elms have had losses of more than 55 percent.

The only way to stop root graft infections from occurring is to physically or chemically sever the roots between the dis-

The purpose of injection is to evenly and completely cover the entire crown of the tree; especially the two four year old twigs and branches.

The only way to stop root graft infections is to physically or chemically sever the roots between diseased and healthy trees.

eased tree and the healthy tree.

Root grafts must be taken into account when saving elms and be either physically broken, the neighboring tree removed, or uninfected root-grafted trees must be treated as well. If the elms are being monitored two or more times a season, the root graft issue can be dealt with after a neighboring tree becomes diseased. There must be a genetic similarity in the two elms for root grafts to exist. I have found that if two different elms are growing close together and they have very different shaped bark, they do not necessarily graft.

How tree injections work

Dutch elm disease only grows in the current year's xylem (water conducting vessels) of an elm. This is because elms only use the current year's xylem for transport and they plug last year's xylem with tyloses. This also means that any chemical injected into an elm will only move in the current years xylem.

The purpose of an injection is to evenly and completely cover the entire crown of the tree with enough chemical so that if a disease carrying beetle happens to feed on that tree, the chemical is there to either kill the disease spores or not allow the spore to germinate. Thorough distribution of a chemical in the vascular system of a tree is not easy to do and requires the excavation of the root flares. This gives a larger surface area in which to put the injection tees. Because this tissue is not as rigid as the trunk tissue, the chemical spreads out more laterally and moves up the tree more uniformly than trunk injection.

As a rule, you install 1.52 injection tees per diameter inch. Never drill deeper than one inch as this causes unnecessary wounding. A good reference is the pamphlet "How to Inject Elms with Systemic Fungicides" from the University of Minnesota.

Saving diseased elms

In my experience, none of these chemicals are useful for saving diseased elms. However, we get predictably good results by using an innovative technique that removes the disease through mechanical means. Basically, we physically isolate all the diseased tissue from the healthy part of the tree. This goes a major step beyond just removing the diseased limb; it involves understanding how the disease grows in the tree and then tracing around all of it. This works well because the person doing the tracing will know if they can get all the disease or not. When we know we have gotten all of the disease, we rarely lose a tree. However, if the disease has already grown into the root system, I know of nothing that works. There are complications in using this procedure when dealing with disease that has grown into a co-dominant stem of the elm. A co-dominant branch connection is different from a normal branch in that the vascular tissue is connected both at the top and the bottom. In a normal branch, the vascular tissue is only connected to the trunk at the bottom. Thus, if the disease grows directly into a co-dominant stem, it will move into the other co-dominant stem and grow back up the tree. When this situation happens, the disease can move fast and be very difficult to track down if not caught in time. This chainsaw procedure is not that difficult to learn, leaves shallow wounds on the tree and could save thousands of elms that are removed unnecessarily each year.

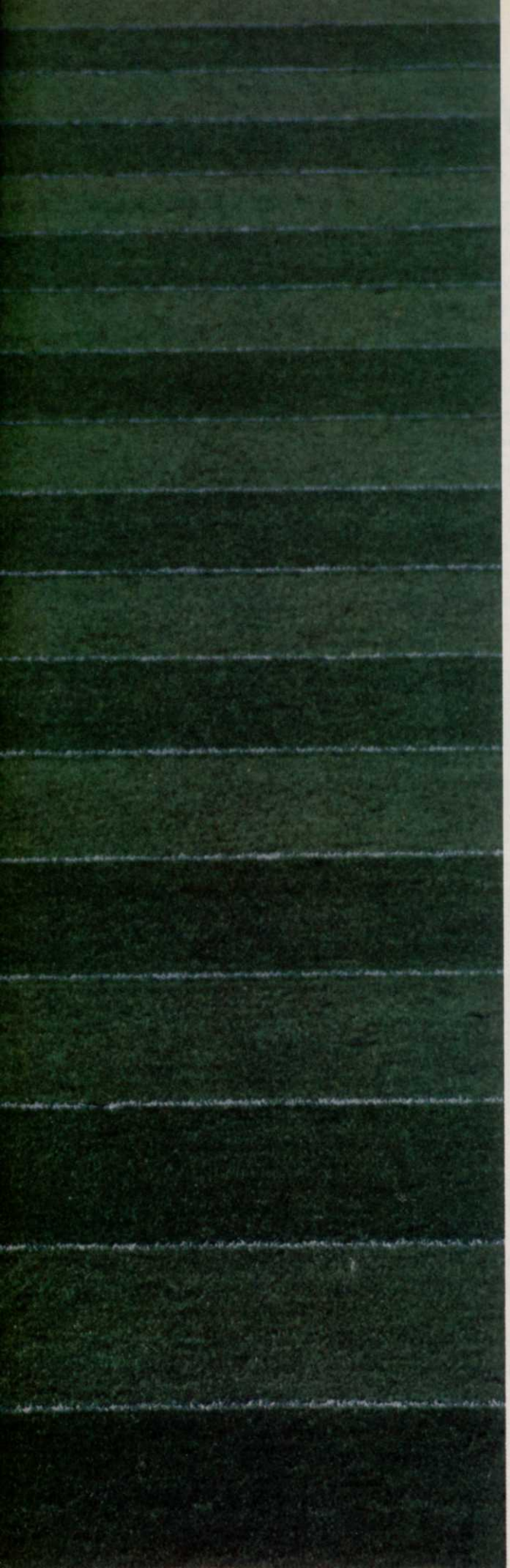
A diseased elm log can produce many thousands of beetles looking for a healthy elm to feed on. Notice the streaking of the fungus and the beetle galleries.

Elm injection is a valuable tool for the arborist. Its use should be limited to high value, irreplaceable elms. The most important aspect of Dutch elm disease control is the removal and disposal of diseased elms. Without sanitation, this disease can spread a very rapid path of destruction for elm trees.

Note: In oak wilt infected White or Burr oaks, *Ceratocystis fagacearum*, I have stopped the disease, with no return infections after 5 years. In numerous trees, the

cont. on page 21L


22



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ALWAYS READ AND FOLLOW LABEL DIRECTIONS

Circle No. 133 on Reader Inquiry Card

Chemical action in tree a key

It is important to note that the EPA, who gives a company the label and the legal right to sell a chemical, does not require that the chemical show efficacy for the uses listed on the label. As many people already know, it is a "buyer beware" market. Our company has found many chemicals ineffective in treating diseases listed on their product labels. I have found this to be especially so with chemicals claiming to prevent or cure Dutch elm disease. For a chemical to be effective at protecting an elm from Dutch elm disease, it must possess all the following properties and capabilities:

- Stay actively fungicidal or fungistatic inside the trees vascular tissue for an extended period of time.
- Be able to move in the xylem and distribute itself throughout the crown, especially in the two to four year old branches where the beetle feeds.
- Be water soluble, stay mobile, and remain in the tree in large enough quantities to be effective.
- The chemical must stay in the vascular tissue of the tree, and not move into the leaves in large quantities.
- Be able to move into newly-formed wood in large enough quantities to give multiple years of protection.
- Not harm the tree by being toxic or excessively low in pH.

Many chemicals have shown at least one of these properties; I have found only one material that possesses all of these properties. I have worked with a number of chemicals that have been proposed since 1976 with varying results.

Thiabendazole (Arbotect 20-S & Elmsafe)—Thiabendazole has been around since the late 70s. Research done at the University of Minnesota in the late 1970s, supervised by Dr. David French, showed that if the original label rate was multiplied by 12 times, there was efficacy. They built on an earlier discovery that below ground, root flare injection, could virtually give 100% distribution of the chemical in the tree. The fact that Thiabendizole both remains chemically stable (does not degrade) and is biologically mobile (moves into new sapwood); allows for multiple years of protection. Thiabendazole is the only chemical I have used that has given predictable and outstanding results. We believe the chemical is effective for 2 years. We retreat trees every 3 years because we want to keep injection wounding to a minimum, however we inspect all of our trees late in the 3rd season because 80% of our losses become infected at this time.

We have numerous examples of estates, golf courses and neighborhoods that still have 95% or more of their original treated elms, while next door every elm is dead. Our record of accomplishment over the past 10 years has been a loss rate of less than one percent over a three-year period.

We have found little or no necrosis around the injection wound as long as the chemical is properly diluted and the injection wound is no deeper than one inch. It is important to treat healthy trees only. The injection process can do great harm to trees with root diseases.

Thiabendazole, like any other treatment, must be used in an appropriate and technically accurate way. It prevents insect-transmitted infections, but not infections transmitted through root-grafts. I do not recommend injection as a cure for diseased elms. While there has been some success reported, I have personally never saved a tree by injection alone. I have caused the symptoms to disappear for as long as 2 years with Thiabendazole, but in every case, the disease came back. I have found a method of saving elms that works. But only as long as the infection has not moved into the roots. Even if the trunk is infected. I will describe this process using a unique method of pruning later in this article.

Propiconizole (Alamo)—Was introduced in the early 1990s and has shown promise as a material that is easy to inject and profitable to use. The recommended dose was 5-ml per inch diameter in 1993. In 1995, they raised the dose to 10-ml per inch diameter; now I have heard that the label rate may be increased to 20-ml per inch diameter. Currently, research is being done on this higher rate in hopes that it works better than the 5-ml or 10-ml rates. We treated over 400 elms with the 10-ml rate in 1995. Our losses were zero in the first year. In the second and third year, our results were not very good, as the number of trees lost was nearly equal to the surrounding community losses. I am not sure this material has the capability of moving into new

An elm tree being protected with Thiabendizole.

wood. We will wait to see the results of the newest research.

Copper Sulfate (Phyton 27)— Widely used as a flower preservative. My experience has shown that the material is not water-soluble and is very hard to inject. The manufacturer recommends trunk injection, claims it can save trees up to 30% diseased, and promotes it for many other tree diseases. We used this material on about 60 trees in 1986 as an informal test in a high disease area. There was little or no reduction in disease compared to surrounding trees at any point after treatment.

Lignasan—Is still used in parts of Canada and the East Coast. I used it for 3 years in the late 1970s. My experience was that it gave 1 year of protection. The chemical is very mobile and moves easily into the leaves. □

To get even and complete distribution in the tree, the root flares must be excavated.

cont. from page 17L

disease was stopped and did not return in almost every case with 2 exceptions. The chemical used was Propiconizole (Alamo) at the 10-ml rate. We believe this success has to do with the strong ability of these types of oaks to compartmentalize infections. Unfortunately, diseased elms we have treated with Propiconizole failed in 23 out of 23 trees. □

Tom Prosser is a Consulting Arborist and President of Rainbow Treecare in Minneapolis. Rainbow treats more than 5500 elms in a three-year period. They claim a consistent loss rate of one percent over that period of time.

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Circle No. 135 on Reader Inquiry Card

Career Days a big hit

Go-go economy gives green industry students lots of choices at record-breaking event in Raleigh, NC

By RON HALL/ Managing Editor

Here's a plug for the 23rd Annual ALCA Career Days. It's already set for next March. That's right, March 18-21, 1999, in Lexington, KY.

If your landscape company needs bright, enthusiastic young people, plan to attend. You may even want to help out. ALCA is always looking for volunteers and sponsors for Career Days.

The event's purpose is simple. Landscape companies come looking for employees. Not laborers but young people with the ability and desire to be crew leaders, designers, potential managers, young people looking to make landscaping their careers.

Students come to Career Days to compete (see sidebar) but mostly seeking opportunity.

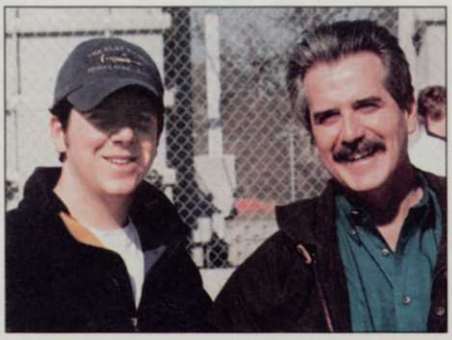
That's exactly what happened again in March in Raleigh, NC. About 600 students from across the United States got an opportunity to meet with 300 landscape professionals, representing just over 100 companies. The first day gave the students the opportunity to visit, and set up interviews, at the 90 booths set up by landscape companies in the Raleigh Convention Center. The second day they displayed their landscaping skills at a variety of competitive events at nearby North Carolina State University.

Mike Cooper sponsored irrigation.

John Gachina seeks quality interns.

Dean Snodgrass interviewed hopefuls.

Two-person teams from across the U.S. competed in deck building.



Michael Currin, right, Greenscape, Holly Springs, NC, and son Daniel at Career Days.

"I'm looking for some young people that have the potential to move into management," said John Gachina, CLT, CCLP, of Gachina Landscape Management, Menlo Park, CA. "My company continues to grow and we have to keep getting good people. That's not so easy to do. We're all competing for these good employees."

Gachina, a contractor for 24 years and the owner of his own landscape company the past 10, attended his third Career Days. He helped oversee and judge the irrigation competition.

"You have to keep with this program," Gachina added. "You can't just show up once, and recruit. You have to build your program, and hopefully the young person you hire has a good experience and the word gets out to other students."

Tom Pruett, president of LanArc, a landscape company located in Raleigh, said he was looking for a designer/sales person. "If we could get the right person, it would free up some

of my time. I think it would take our company to next level."

Dean Snodgrass flew from Portland, OR, with an eye to hiring production people with the ability to be crew leaders for Dennis' Seven Dees Landscaping. "Hopefully, we can find some young people who can move up to foremen pretty quickly. We had three good interviews, and took some resumés," he said.

Michael Currin, president of Greenscape, Holly Springs, NC, said his company needs "lead people and design people." He also hoped to attract summer interns to his growing company.

A number of the companies at the annual Career Days offered internship programs to attract young talent. These programs provide young people with valuable industry experience and training. It also gives both the companies and interns that they hire a couple of months to assess each other.

Bland Landscaping, Inc., Apex, NC, for instance, advertised that it takes two or three interns at a time.

"Students will have a department manager assigned to them throughout their internship. The manager will be responsible for overseeing the student's progress and development within each department," said literature from Bland Landscaping. "Each student will have the opportunity to sample a department for a period of no more than a month." Departments include: commercial maintenance, floriculture, commercial installation, residential maintenance among others.

John Gachina's company offered a similarly rewarding program, promising to give students "a real taste of what it means to be involved in an award-winning company."

This year's Career Days, with unemployment so low and landscaping companies hungry for young talent, must have seemed like a smorgasbord of opportunity for participating students. □

Lebo Newman, center, Redwood Landscaping, Santa Rosa, CA, talks about career opportunities with Janet Burk, Richland College, Dallas.

Michigan State's Bob Barkham did well in irrigation event.

Jack Hollerich, left, and Tony Cantelmo from Columbus State (Ohio) had a plan and followed it in building this small patio.

Californians take top honors

Dave Bakke, a student at Cal Poly-Pomona, was the Number 1 Superstar at Career Days after all the competition had been completed. Jason Green, Cal Poly-San Luis Obispo, was second and Jeremy Parker, Virginia Tech, third.

Cal Poly, San Luis-Obispo took team honors earning the Robert Callaway Trophy, followed by Cal Poly-Pomona and Colorado State University.

Students from these schools competed too: Auburn, Brigham Young, Cincinnati State Technical and Community College (CC), Clackamas CC, Columbus State CC, Cornell, Cuyahoga CC, Dakota Technical, Hinds CC, Illinois Central.

Joliet Junior College, Louisiana State, Meridian CC, Michigan State, Milwaukee Area Technical, Mississippi State, North Carolina State, North Metro Tech, Ohio State, ATI, Oklahoma State, Oklahoma State-OKC, Oregon State, Penn State, Richland College, Sandhills CC.

Shasta CC, Southeast Technical, Spokane CC, SUNY Cobleskill, SUNY Delhi, Tennessee Tech, Arkansas, Illinois, Kentucky, Maryland, Tennessee, Virginia Tech, Western Texas. □

Blueprint for Yellow Pages success

By LARRY SMALL

Advertising is a tricky thing. What catches the eye and what pricks the ears is subjective at best. And, yet every day—in our living rooms watching television, in our cars listening to the radio, at work reading the newspaper, in a doctor's office where we pick up a magazine in the waiting room—we are bombarded with thousands of images, each one vying for our attention, and trying to convince us to spend our hard-earned dollars.

Small: Millions seek landscapers.

Some of these images work and some don't.

Understanding this tricky and subjective equation can seem daunting. But this understanding is essential for every member of the lawn maintenance industry, especially when each year, nearly 36 million references are made to the "Lawn Maintenance" heading in the Yellow Pages.

The "Landscape Contractors" heading is referred to 38.3 million times every year.

According to a recent usage survey:

18 percent of American adults refer to the Yellow Pages every day;

-the average adult refers to the Yellow Pages an average of 1.8 times a week;

-there are 18.6 billion Yellow Pages references made every year.

In 52 percent of references, consumers have no name, or two or more store or business names in mind, and report that what they see and read in a Yellow Pages ad will influence which business they choose.

Customers are using the Yellow Pages when they're in the need of landscaping or lawn maintenance. But what makes a perspective client chose one Yellow Pages ad over another? Here are some tips to creating a successful Yellow Pages ad:

Ad flow and design.

A successful ad design draws the reader's eye directly to the ad. Keep the reader's eye heading directly toward the business' phone number. Vary the size of the type to keep the reader's interest and don't use a type style that is too ornate or distracting. Highlight with reverse type, especially for the company name and phone number. Make sure your ad is clean, uncluttered and easy to read: make use of "white" (empty) space.

Headline and copy

A successful headline is catchy and draws readers to your ad. Make your headline funny or bold or in the form of a question. Make your headline act as a quick identification for customers referred to your business. Identify the single most important feature of your business that sets you apart from the competition and highlight it.

Because you are competing for the reader's attention as well as for space, keep your copy succinct and to the point. Emphasize the benefits of your product or service. Specify brand names and areas of specialization and emphasize information that sets you apart from the competition. Give special attention to your phone number.

Color & logo

When used, color can enhance your ad and creatively illustrate your product.

If you have a distinctive log, use it to gain attention for your ad. This also encourages people to associate your logo with your business.

Illustrations, borders

An illustration is one of the most effective ways to attract attention to your ad. Use large, graphically pleasing images. Use an illustration to break the border for added visual interest and appeal. Illustrations should always point to your ad, not your competitor's ad.

Borders can be very effective, especially if all of the other ads on the page use a bold or a hairline border and you choose the opposite.

Spot color, process color, white knockout

These pages capture attention regardless of ad placement on the page; the illustrations look more realistic. Ads that use these techniques make strong statements and stress unique selling points. These ads can also convey prestige.

With the average adult referring to the Yellow Pages about 1.8 times a week, and with almost 19 billion Yellow Pages references made every year, advertising in the Yellow Pages is clearly a must for any successful lawn or landscape business. □

—The author is vice president marketing services, Yellow Pages Publishers Association.

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The Irrigation Innovators

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Petelle leads OLCA in '98

Carl Petelle, Leisure Lawn, West Carrollton, Ohio, president of the Ohio Lawn Care Association, says the association plans to offer members more for their membership dollar. "We want to offer further education opportunities in agronomics and business," says Petelle. OLA's 1998 officers: vice president, Mark Grunkemeyer, Buckeye Ecocare, Dayton; secretary/treasurer, Fred Schillinger, Turf Doctor, Mt. Vernon. Board members: Gene Pool, Emerald Green; Don Gallagon, Buckeye Power Sales; Bill Clutter, TurfGard Co.; Doug Hague, Lawn Classics; John Lucas, Lucas Lawns; and Joe Popovic, Firelands Lawn & Landscape Co. □

ALCA's new leaders

Cynthia Peterson, CCLP, McCaren Designs, Inc., is president of the Associated Landscape Contractors of America this year. Other officers include: president-elect, Steven Glover, CLP, L&L Landscape Services; secretary/treasurer, Emily Thompson, ET Sales, Inc.; immediate past president, Judson Griggs, Lied's Landscape Design & Development.

Directors: Rick Doesburg, CCLP, Thornton Gardens, Inc.; Dale Elkins, CLP, ISS Management Services; Kurt Kluznik, CCLP, Yardmaster, Inc.; Gary Mangum, CLP, Creative Plantscapes, Inc.; Wayne Richards, CCLP, Cagwin & Dorward Landscape Contractors; Drew St. John, II, CLP, St. John & Associates; associate director: Gary Thornton, CCLP, Thornton Computer Management Systems; executive director: Debra Holder, ALCA; state association member: Barbara Scheibe, Wisconsin Landscape Contractors Association

Serving on the Exterior Landscape Council: chairperson, David Luse, Arteka Corporation; chairperson-elect, Dale Elkins, CLP, ISS Landscape Management Systems; vice chairperson, Kurt Kluznik, CCLP, Yardmaster, Inc.

Members: Bob Grover, CLP, Northwest Landscapes Industries; Don Jarratt, Ruppert Landscape Company, Inc.; Eric Keesen, CLP, Allen Keesen Landscape,Inc.; Chris Kujawa, CCLP, Kujawa Enterprises, Inc.; Ed Laflamme, CCLP, Laflamme Services, Inc.; Michael Rorie, Groundmasters, Inc.; Drew St. John,II, CLP, St. John & Associates □

[LM EXCLUSIVE INTERVIEW]

Write to 'President Gore' urges PLCAA's Delaney

Professional Lawn Care Association of America executive vice president Tom Delaney, in an exclusive interview with LANDSCAPE MANAGEMENT, urged PLCAA members and other Green Industry professionals to act *now* to prevent the Environmental Protection Agency's Food Quality Protection Act from removing useful control products from supplier's shelves.

The Food Quality Protection Act substantially changes the way pesticides are evaluated for their alleged—but still unproven—health effects.

"If you're not worried now, you're going to be worried later," said Delaney to members, and suggested that many lawn care applicators feel that the EPA will select only certain products for removal. The danger, reminded Delaney, is that the EPA's "Risk Cup" assessments apply to classes of pesticides, not just formulations.

Delaney suggested that letters also be written to Vice President Gore, who, as Delaney described it, supports EPA, and "wants to be president someday." According to Delaney, Gore has also suggested the EPA's Carol Browner would be a good vice presidential candidate, though not necessarily in an Al Gore administration.

Voter realization of Gore's role in support of the potential product purge, suggested Delaney, could dim Gore's hopes for life in the White House.

"[FQPA] doesn't stop and start with the insecticides," said Delaney. "Right now, it's the organophosphates; then come the carbamates, then, who knows what else."

Delaney told LM that the concern he sees among control product manufacturers over the potential upshot of FQPA is unprecedented.

"The manufacturers have the biggest push on this, bigger than anything I've ever seen before. To some of them, this is 'do or die,' as far as continued use of current products."

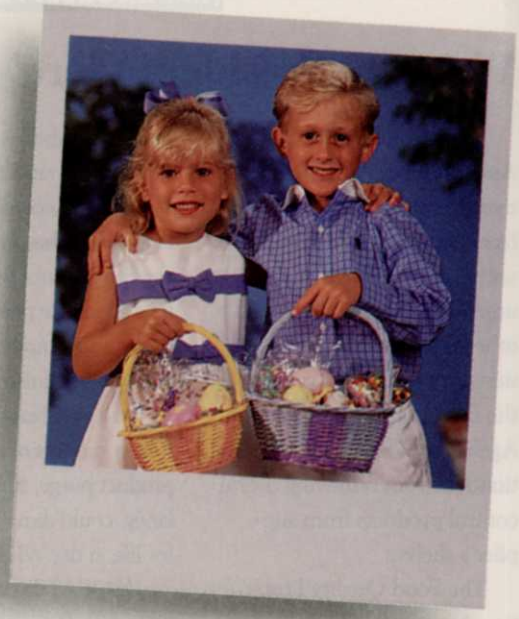
Manufacturers, said Delaney, are using lobbying, letters and postcards to get their customers to call or write to their legislators. Politicians too, said Delaney, are beginning to wonder how much the EPA will continue to flex its legislative muscles.

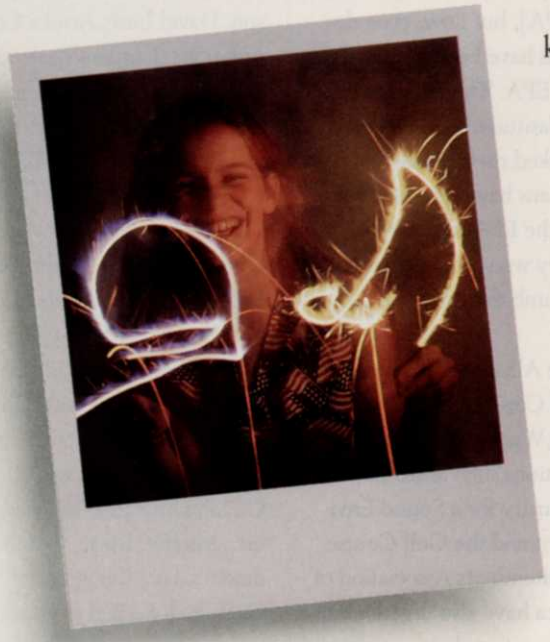
"Republicans have been scared [of EPA activity relative to FQPA], but now, even democrats have been sending letters to EPA. The EPA has too much latitude," said Delaney, who asked rhetorically whether politicians have lost their voice.

"Is the EPA so powerful," Delaney wondered, "that they can thumb their nose at Congress?"

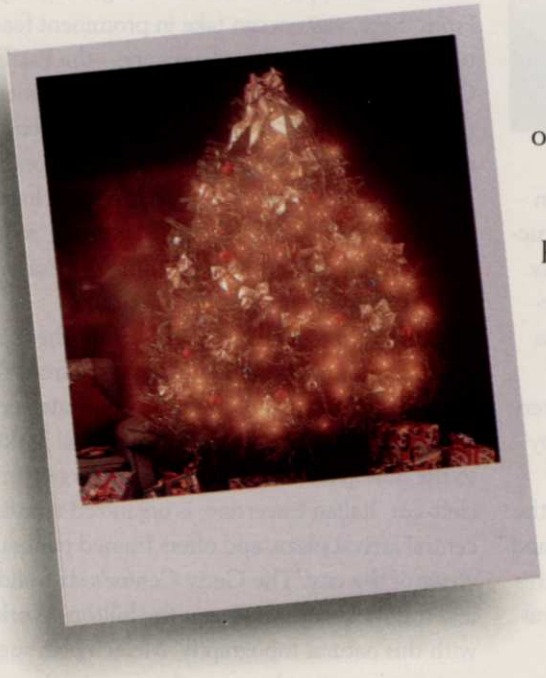
The Alliance for Environmental Concerns, Inc., (AEC),Warren N.J., and other associations such as Responsible Industry for a Sound Environment and the Golf Course Superintendents Association of America have also urged members to contact their representatives in Washington, to let them know how FQPA will affect business operations. □

With MERIT® Insecticide at the heart of your ornamental insect control program, you can have unsurpassed control throughout the season with just one application. Unlike other insecticides, which require several foliar sprays, MERIT can be applied as a drench or injected into the soil where it's translocated from the root system to the rest of the plant. This systemic action keeps MERIT in the plant to provide unsurpassed control of ornamental pests from spring throughout the summer. Protection that isn't subject to wind drift, and isn't washed off in





the rain or broken down by the sun's rays. And when it comes to reducing environmental impact, MERIT reduces exposure to the applicator, bystanders, pets and wildlife.



To find out more, contact Bayer Corporation, Garden & Professional Care, Box 4913, Kansas City, MO 64120. (800) 842-8020. http://usagri.bayer.com

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Getty project a mountain masterpiece

The landscaping at the new $1 billion Getty Center flows with the construction details of the world-class facility. The elements of landscaping and architecture unite to create a seamless design.

Eighty-six acres of landscaped gardens and terraces, including the Central Garden designed by artist Robert Irwin, provide sweeping views of the Los Angeles basin, the mountains, the ocean, and the surrounding 600 acres preserved in their natural state.

Architect Richard Meier collaborated with landscape architects Emmet Wemple, Laurie Olen and Dan Kiley to develop a master plan for the landscape that, according to Meier, "is, in some ways, as important as the buildings themselves."

The design naturally invites visitors to wander indoors and out, exploring galleries and gardens alike. The plan encourages visitors to come and go as they please, making their own routes, and pausing in the courtyard to listen to a fountain.

Inspired by the garden traditions of California and the ancient Mediterranean, the landscaping contributes to the Center's mix of ancient and modern artistry. Visitors are surrounded by recurring colors, textures and scents.

Under the direction of the design team and grounds superintendent Richard Naranjo, the landscape will evolve, "with the intent of creating an intimate, ever-changing tableau that enhances the visitor's experience of the Getty's artistic and educational mission," says Meier.

The view

Perhaps the most important element of the Getty Center is its hilltop site in the Santa Monica Mountains, just off the San Diego Freeway. From there, visitors can take in prominent features of the Los Angeles landscape—the Pacific Ocean, the snow-capped San Gabriel Mountains, the vast street-grid of the city, the Palos Verdes peninsula, plus sunsets over the Pacific Ocean.

Inspired by this interplay, architect Richard Meier sought to design the new complex "so that it highlights both nature and culture," he says.

The buildings

When approached from the south, the modernist complex appears almost to grow from the 110-acre hillside. Two three-car, computer-operated trams ferry visitors from street-level parking to the hilltop site. The campus, clad largely in cleft-cut, Italian travertine, is organized around a central arrival plaza, and offers framed panoramic views of the city. The Getty Center's six buildings follow a natural ridge in the hilltop. Working with this natural topography, Meier's plan suggests a connection between the organization of the Center and the layout of the city's grid. Galleries, offices and the Auditorium lead out to courtyards and terraces; all offices receive natural light. Because the Getty's neighbors requested that the complex be no more than two stories above grade, all of the buildings extend underground and are linked with subterranean corridors that facilitate the moving of artwork and other materials.

Stones

The use of stone—1.2 million square feet of it—is perhaps one of the most remarked-upon elements of the new complex. "This beige-colored, cleft-cut, textured, fossilized travatine catches the

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cont. from page 32L

bright Southern California daylight, reflecting sharply during morning hours and emitting a honeyed warmth in the afternoon," according to Meier.

The 16,000 tons of travatine used in the project were quarried in Bagni di Tivoli, Italy, 15 miles east of Rome. Split along its natural grain, detailed impressions of leaves, feathers, fish, and shells can be seen in the Canter's travatine; one particularly unusual piece holds the fossilized remains of a deer antler. Meier and his staff worked for a year with the Bagni di Tivoli quarries to invent a "guillotine" process that would result in a rough, textured finish. "About a dozen of these stones," Meier explains, "are incorporated into the regular grid for a change of scale and color—to break things up—and mark a key point."

Travertine panels cover not only the retaining walls and the bases of all buildings, but also serve as paving stones for the arrival plaza and Museum courtyard.

Dramatic arrival

Upon entering the front gate, visitors may notice the groves of sycamores planted by the entryway. The trees are meant to evoke the Getty Villa in Malibu, whose Canyon Drive entryway is also lined with sycamores.

The Lower Tram Station introduces visitors to the lush plantings that await them at the top of the hill. Beyond the station, picnickers can lounge on the grass, shaded by white-flowering wisteria on a lavender-colored trellis. Purple blossoms hang from the jacaranda trees, while across the tramway, a row of crepe myrtles bloom white. Through the leafy screen of a California pepper tree grove, one can see a view of the Getty Center.

From the tram, visitors can see the more than 8,500 native oak trees planted in rows on the hillside; deer, birds and other local wildlife are sometimes visible there as well. The hillside's ground layer has been planted with poverty weed, local chaparral and shrubs, in order to prevent erosion and fire and to preserve the natural environment. More than 100 Italian stone pines are planted along Getty Center Drive. The grid pattern of the oak plantings sets the tone for the organic order of the architecture on the hilltop.

Four tall stone pines stand at the center of the open Arrival Plaza. In years to come, these pines, which will be trimmed flat so as not to obstruct views from other points of the Center, are expected to produce a 50- to 60-foot wide canopy that will shade visitors from the Southern California sun. To the north, toward Mt. St. Mary's College, Aleppo pines appear just beyond the travertine wall; they are expected to reach 60 to 70 feet in height.

The warm yellow-orange of the agave and fresh green of cacti remind visitors of LA's desert environment.

Along the left side of the Museum steps, water cascades down into a fountain. A bed of blue-flowering ceanthos and rosemary follows the water's path, tumbling down, to and over the lower wall. Visitors ascending the stairs to the Museum catch glimpses of the foliage through portals in the travertine wall.

The cooler temperature of the campus' north side is reflected in the cooler colors of the plantings—pale greens, blues, purples and grays being the dominant hues. On the north side, in between the grass-covered helipad and the Auditorium, a series of terraces serve as shaded, outdoor "rooms"—separated by trimmed hedges and Italian stone pines—from which to observe the hillside and the southern face of the Getty Center.

At the Auditorium Plaza, a stand of purple- and white-flowering jacarandas echoes the colors of the Lower Tram Station. In the cool, shady "canyon" between the North and East Buildings, tree ferns, tall kantia palms, and Asian jasmine groundcover create a lush palm court. The East Building features its own outdoor courtyard—an open lawn shaded with flowering trees—where staff can gather and eat lunch. The walkway between the North and East Buildings to the Museum is connected by an "aerial" hedge of white crepe myrtle, Spanish lavender and star jasmine, all of which accent the colors and scents of the campus.

The star jasmine that borders the North Building walkway ends at the Museum's entrance with a grove of California sycamores. Inside the Museum courtyard, graceful Mexican cypress trees hang over the 120-foot linear fountain. A small grove of camphor trees rises from the dark green phittosporum groundcover. Come spring, hundreds of yellow daffodils will bloom here. Boston ivy climbs up one of the pavilion's travatine walls from a bed of fragrant jewel mint.

On the Museum's South Terrace, near a trellis covered with classic California red bougainvillea and hundreds of birds of paradise (Los Angeles' official flower), visitors can take in views of the city—a cactus garden is located at the southern end of the courtyard, the hottest and driest point on the Getty Center campus. Here, the warm yellow-orange of the agave and fresh green of the cacti are positioned to remind visitors of the desert environment from which Los Angeles has grown.

Restaurant/Cafe and Upper Central Garden

Located to the west of the Museum entrance, the Restaurant and Cafe build-

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Sports Turf Managers Association

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"Promoting Better and Safer Sports Turf Areas"

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ing is set apart by a distinctive, lavender-colored trellis covered by white-blooming wisteria. Beside the trellis, at the Restaurant Terrace, diners can enjoy the shade of leafy London plane trees. During the winter, these deciduous trees allow sunlight in to warm the setting.

They were chosen for this location, in part, because they are close relatives of the sycamores planted at the Getty Center entryway and the Museum entrance. This theme continues in a line of sycamores that extends from the Restaurant Building to the Central Garden.

An intimate, ever-changing tableau that enhances the visitor's experience.

Central Garden

Robert Irwin's 134,000-square-foot Central Garden was commissioned by the Getty Trust as a work of art. The garden offers visitors constantly changing experiences, conditioned by the weather, the hour of day, the time of year, and the use of seasonal plants. A tree-lined walkway traverses a stream planted on each side with a variety of grasses and gradually descends to a plaza where bougainvillea arbors provide scale and a sense of intimacy. The stream continues through the plaza and ends in a cascade of water over a stone waterfall or "chadar," into a pool in which a maze of azaleas floats. Around the pool is a series of specialty gardens, each with a variety of plant material. All of the foliage and materials of the garden have been selected to accentuate the interplay of light, color and reflection. While Irwin's plan for the garden sprang from the powerful, controlled geometries of the architecture and from the site itself, he conceived the garden as a "conditional" work of art: In contrast to the more static nature of the buildings, the Central Garden is always in flux.

Water Gardens

The sound and movement of five distinct fountains and water features are at the heart of the architecture of the Getty Center. In addition to heightening the visitor's sensory experience, the location and design of each fountain and water feature is geared towards accentuating an important axis running through the site.

- The first water feature encountered by visitors is the cascading waterfall alongside the grand stairway connecting the Arrival Plaza to the Museum Entrance Hall. The water flows directly into a long narrow pool, built so shallow as to seem an extension of the Plaza floor. Within that pool, fountain jets shoot streams of water directly upward, creating a soothing sound which, Meier explains, "helps create the sense that one has indeed arrived in a refreshing place." The placement of this fountain is in perfect alignment with both fountains in the Museum Courtyard and the center of the round Museum Entrance Hall.
- In the Museum Courtyard, 46 jets shoot streams of water from right to left forming perfect arcs over the 120-foot linear basin, situated beside a row of Mexican cypress trees. The eye is directed both to the left edge of the fountain, which is the center axis of the site, and back along that same elongated line to the center of the large boulder fountain, whose center is in perfect alignment with the center of the Museum's circular entrance hall, the linear basin's edge, and the edge of the cascading fountain at the Arrival Plaza.
- In the tradition of Asian gardens, the boulder fountain at the south end of the Museum Courtyard is part sculpture, part reflection. The circular pool, with its sculptural boulders and "playful" water, is meant to contrast with the geometric design of the surrounding architecture, yet is placed not only on the center line to the Museum, but also the axis to the Scholar offices in the Research Institute.

Each boulder comes from Columbia, Calif., the heart of gold country, and was hand-picked by a design team that included Meier and the main landscape architects, Hickok and Olin, and staff members of the Getty. Blown smooth by the heavy blasting of old gold mining techniques, each rock was chosen for its sheer sculptural form, as a contrast to the rough textured grids of travertine stone. A calm pool reflects the curvature of the West Pavilion, outside the circular divide that separates it from the splashing waters of the fountains. Travertine blocks, spaced across the water like lily pads, form a floating bridge; with the water's surface less than half an inch from the edge of each block.

- Tucked between the East and South Pavilions, a smaller boulder fountain rests at floor level, almost an extension of the East Pavilion's lobby.
- The final water feature is located west of the Museum entrance, at the top of the Central Garden. It begins with a travertine headstone, designed by Meier, where a constant flow of water rises as if from an eternal spring. The water runs down the front of the headstone and along a dramatic chute, finally emptying into a hole that delivers the water to the Irwin's Central Garden. From below, the water trickles into a grotto of chiseled travertine. The extra-rough texture of the large dome shape "recreates the tranquil sounds of springtime rain," according to Meier. Aligned perfectly with the centerline through the Central Garden, the fountain not only connects the garden to the buildings, but serves as the source of its own stream.