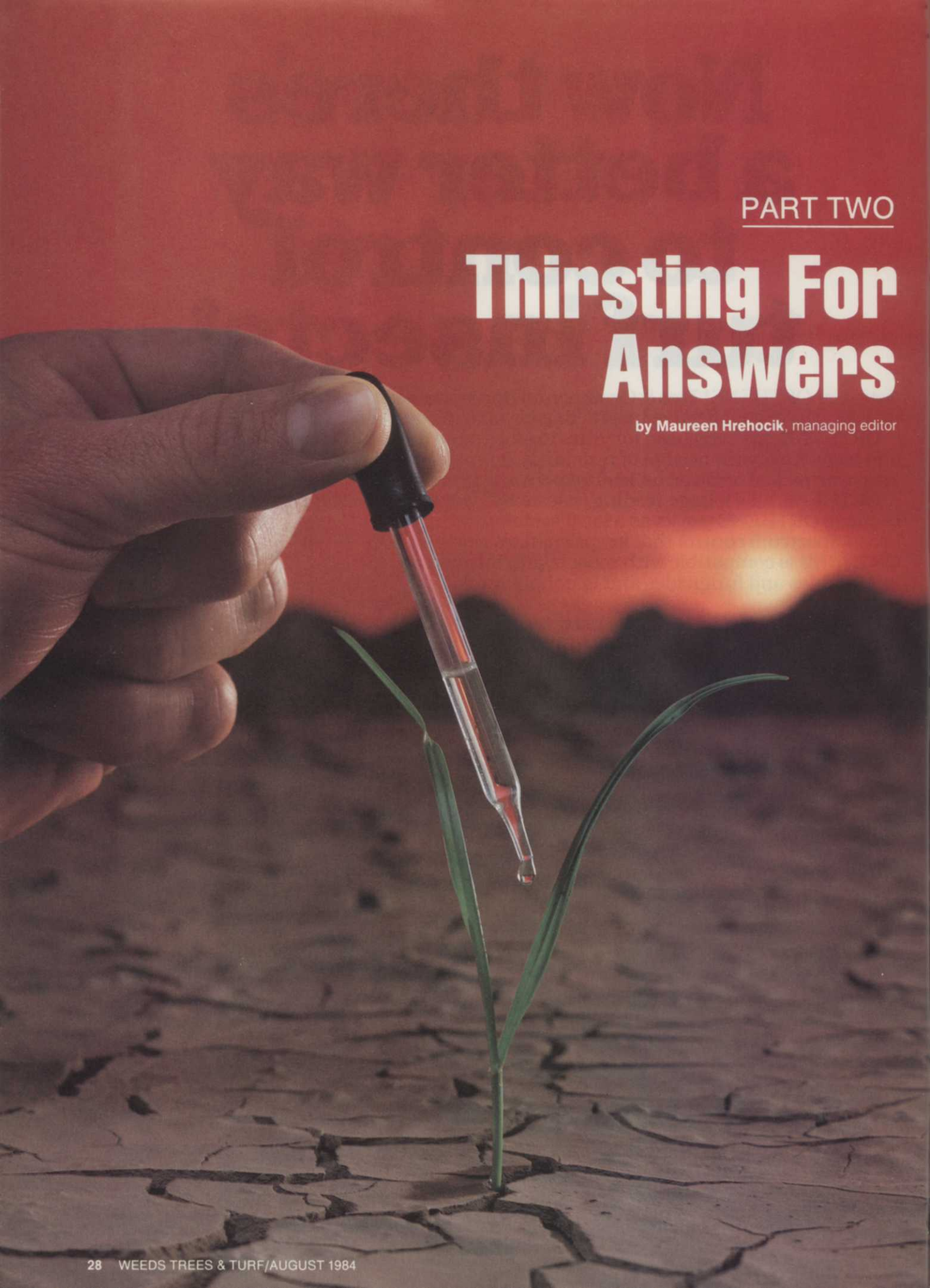


PART TWO

Thirsting For Answers

by **Maureen Hrehocik**, managing editor

One of the most critical challenges facing the Green Industry is an adequate supply of water. The lifeblood of this industry is slipping away through waste and pollution.

Last month WEEDS TREES & TURF began a two-part series on water use, conservation and quality in the Green Industry.

In "Thirsting for Answers, Part I," we examined water problems and issues in three key states; California, Texas and Florida.

In this second and final part, some solutions to these problems are offered through research, irrigation industry and Green Industry association involvement.

Development of low water use turfgrass is the kingpin in research currently being conducted.

University-level researchers across the country are currently trying to develop types of drought-resistant turf.

Backed up by concern for producing more efficient irrigation equipment from irrigation companies and financial and moral support from associations such as the USGA Green Section and Golf Course Superintendents Association of America, progress, slowly, is being made.

Tall cylinders *provide growing chambers for Dr. David Casnoff's root enhancement work study at the Texas A&M greenhouse in College Station. He is studying 11 warm season grasses.*

Research is kingpin in ebbing water woes

Dr. Jim Beard of Texas A&M, College Station, TX, oversees one of the largest turf water usage programs at the college level in the country.

With a staff of six, Beard's current research emphasis is water use rates, root enhancement, drought resistance and salt tolerance. His staff is doing interspecies work with 30 species. When that's complete, intraspecies work will be done.

"The future of the turfgrass industry rests on this type of research," Beard says. "It is a sobering responsibility and tremendous challenge."

Also, according to Beard, the number of man-year-equivalents (number of Ph.D-level researchers) doing work has doubled in the water area, largely due to the support of the USGA Green Section, this year to the tune of $332,000 with an estimated $3 to $4 million being spent in this area in the next eight to 10 years.

"When I first started my work back in the '60s, I had a budget of $2,000," says Beard. "Our USGA grant this year is $85,000."

Add to that the $90,000 in capital Texas A&M University has supplied and a half-a-million dollar physical plant, and Beard's operation is impressive.

Work is done on the 14-acre turfgrass research farm on the A&M campus. Field and plot manager Doug Dahms is responsible for its overall operation, mowing and fertilizing.

Root enhancement

Dr. David Casnoff is a post-doctoral student working with Beard in the area of root enhancement and stomata, the parts of a plant that allow water to enter and exit the leaf.

He believes the key to turf water usage is in the root system.

Casnoff is looking at the maximum root growth of 11 warm season grasses including Tifway; Tifgreen; FB119; Tex Turf 10; Texas Common St. Augustine; common centipedegrass; Argentine bahia; Adalayd sandknot grass; Emerald and Meyer zoysia; and Texoka buffalograss.

"We're not only trying to describe the difference between growth rate, but also how different species respond during spring when in their maximum growth period," explained Casnoff. "The ones that have more new root tips at a lower depth will probably have more active surface area for uptake of water."

Casnoff is also doing research with stomates.

"Stomates could possibly tell us why some grasses use more water than others," Casnoff said. "We know the size and number of stomates on the plant leaf are inversely related to each other, but we don't know whether or not it's better to have more or less."

Casnoff's work dovetails with turfgrass stress work research associate Steve Griggs is doing.

"Steve will have the low water use data and I will have stomate data. We can combine the two, and hopefully, come up with some important discoveries. At this point, the negatives are as important as the positives."

Griggs is a research associate in charge of testing humidity, dewpoint and light in the university's turfgrass stress chamber. Known environmental conditions can be created in the chamber which holds individually planted pots or lysimeters, of different species of grass.

Griggs said denseness in grass is becoming more important than stomata.

"Drought tolerance and water use are two different things," Griggs explained. "Buffalograss doesn't need a lot of water, but it will use water if it's available."

Griggs' daily routine includes weighing the lysimeters to calculate grams of water used. Cutting height is also important. Three replications per week are done of several cultivars of different turfs—mainly warm season grasses.

Sam Sifers, a retired colonel with a degree in history, is another research associate involved with minimal maintenance turfgrass—water, labor, energy and equipment.

Sifers set out to prove grasses with low nitrogen grow and perform as well as grasses with a high nitrogen content to give breeders parameters to judge turf.

"I eventually want to deny nitrogen totally and see what happens," Sifers explained.

His work entailed studying four bermudagrasses that required high medium and low doses of nitrogen—Midway (high); Tifgreen (medium), and TexTurf 10 and FB119 (low).

"We analyzed many different aspects of the grasses; shoot density, spring green-up, shoot growth, things like that."

Spring root decline is another area that Sifers is involved with.

Beard discovered the phenomenon of spring root decline—the grass turns brown above ground, but the roots don't stop growing—in the university's rhizotron, an underground

Dr. Jim Beard *heads one of the largest turfgrass water use research programs at the college level in the country.*

Sam Sifers, Texas A&M, *College Station in the greenhouse with growing boxes that chart root growth, simulating conditions of the university's rhizotron.*

growing chamber that allows the roots of live, growing grass to be seen from behind glass-like walls placed in the ground. (Texas A&M's rhizotron was the first in the world and is only one of seven that currently exists). Beard describes the phenomenon as the most significant discovery of his career.

Sifers has duplicated the rhizotron conditions in boxes in the greenhouse to duplicate warm/hot springs.

"We've not really found any decline," he reports. "With a gradual warming trend, there seems to be no effect. That could be one reason why superintendents have such a hard time from year to year. One season the grass seems to die, the next it doesn't," said Sifers.

"Stomates could possibly tell us why some grasses use more water than others."

—Casnoff

The next phase of Sifers' experiment will be Carbon-14 testing to pinpoint at exactly what temperature spring root decline is halted. He'll also study the effect phosphate has on the vegetative establishment of grasses. Sifers has already found with stolons that phosphate at three pounds per thousand square feet gave the fastest establishment of grass. He will next test phosphate with sprigging and sodding.

Kisun Kim, a graduate student studying under Beard, completed a comparative evapotranspiration (ET) rate study of 11 warm season grasses under non-limiting (watered everyday) soil moisture and progressive water stress conditions.

He found that, in general, tall fescues used more water and zoysia, bermuda, and buffalograss used less. There was a higher ET rate when the leaves were erect, shoot density was low and there was a high leaf area. St. Augustine and Adalayd had the highest evapotranspiration rate among warm season grasses. Emerald zoysia, buffalograss, centipedegrass and Tifgreen showed a low evapotranspiration rate. The conclusions of Kim's study were that zoysia species, centipedegrass and buffalograss can be recommended as prospective species when water saving is a high priority.

Those grasses which had a low vertical leaf extension rate, high shoot density, low leaf area and prostrate growth habit, had a low evapotranspiration rate. All grass species showed higher ET rates when maintained at their respective optimum nitrogen level and cutting heights, primarily due to the resultant, more rapid shoot growth.

Wallace Menn, an instructor in the A&M turf program, as part of Beard's overall turf water use research, did a four-year study of St. Augustine using Cutless and Embark growth regulators.

He sprayed the lysimeters with dif-

ferent rates of the regulators and weighed them every 24 hours. He found growth regulators can save 20 to 30 percent in water use. Results from studies with bermudagrass were not as significant.

Salt tolerance

At the A&M research center in El Paso, TX, Dr. Garald Horst is evaluating zoysias, St. Augustine and bermudas for salt tolerance and water use rates. He expects the research to go on for another two years. Bluegrass, tall fescues and ryegrasses have been completed.

Horst conducts his salinity tests with grasses bred by Dr. Milt Engelke at the Texas Agricultural Experiment Station, Dallas.

"We have come up with some good germ plasms for salt tolerance, but the tests need some refinement and then we will test again. Horst analyzes 20 cultivars of each variety.

Ninety percent of Horst's work is oriented toward urban use.

"I think education and public awareness is the way to go," Horst maintains. "Lots can be changed by just altering people's water habits."

Horst also sits on the El Paso Park Board which oversees 630 acres of park land, and made a presentation to the board on water conserving grass.

"People are amazed that you can use less water and less fertilizer and still have the same quality grass."

University of Florida

Quantity of water isn't the problem in Florida, which averages 50 to 60 inches of rain a year. Quality is a problem. Because the soil is sand, there is a constant threat of chemicals leaching into the groundwater supply.

Still, Dr. Bruce Augustin of the University of Florida Institute of Food and Agricultural Sciences, Ft. Lauderdale, is trying to find ways of drought conditioning turf. He is studying nitrogen and potassium by taking recommended rates and going lower under different irrigation levels which include: daily (the type the typical homeowner would use) evapotranspiration replacement (twice a week or best "guestimate" of when to water); and wilt only (irrigates only when 30 to 50 percent of the turf plot is wilting.)

"The thrust of my work is on visual tests and common sense," says Augustin.

His testing has found that irrigation can be limited to an as-needed basis instead of sticking to a set schedule (which could cause over-irrigation) and produce better results. Also, water soluble nitrogen can be used as effectively as slow-release nitrogen with the added benefit of being less expensive.

Another problem in South Florida is the chemical content of the soil.

"We have some phosphorous but it doesn't move in the soil," said Augustin. "Nitrogen and potassium have to be added on a regular basis."

Augustin uses a Troxler density gauge for measuring moisture in the soil.

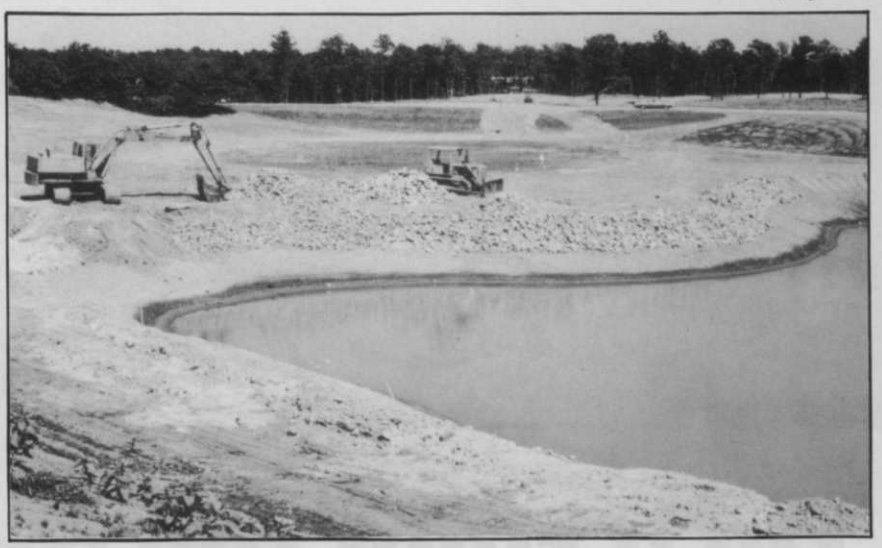
"I've found that homeowners and superintendents can tell how many minutes they've watered but not how many inches," explained Augustin. "In water conservation, the latter is more important."

University of Nebraska

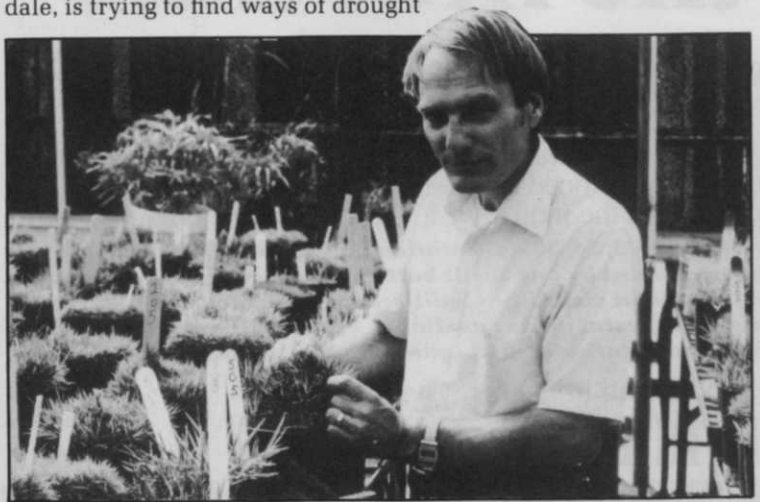
Dr. Robert Shearman at the University of Nebraska is trying to determine evapotranspiration rates for cool season turfgrass species and cultivars and is looking at drought avoidance mechanisms in the same grasses which include tall fescue, Kentucky bluegrass, fine-leaved fescues, perennial ryegrasses, creeping bentgrasses and annual bluegrass.

He has overseen the work being done at Nebraska, another large uni-

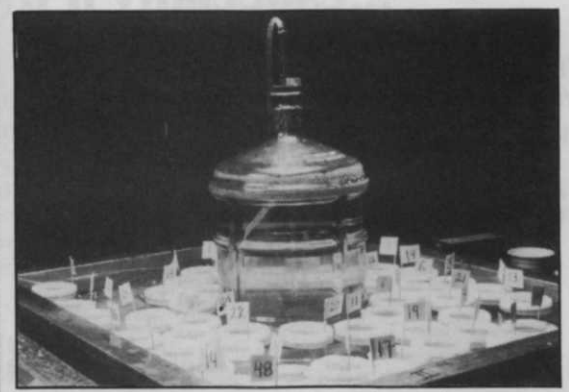
continued on page 36



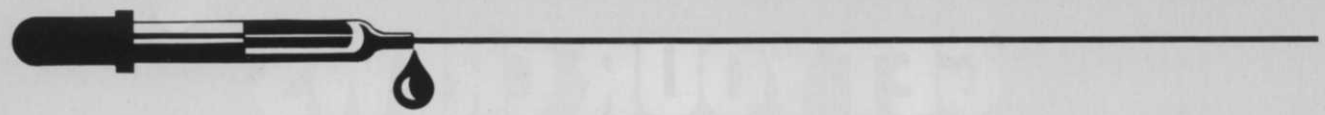
Surface water at Dennis Highlands *is piped into a retention pond in a low area of the course for future irrigation purposes. The pond also reduces wind evaporation of the water and adds to the surrounding scenery.*



Dr. Garald Horst, *Texas A&M, El Paso*



Turfgrass plants *are tested for their tolerance of salinity levels at Texas A&M, El Paso.*



versity-level study comparable to Beard's of A&M, for the past nine years.

"With the ET studies, we're looking at those grasses under optimum conditions, such as the best mowing height and best nutrition regime for each species and under uniform conditions. The key is trying to characterize the ET under cool season growing conditions."

Shearman's preliminary findings relating to Kentucky bluegrasses are: there is a wide range of water use rates in Kentucky bluegrasses with the cultivars or varieties differing greatly.

Shearman is also using modeling to predict ET rates.

In the Modified Penman method, various mathmatical equations or models can be used to predict ET rates.

"What happens is that we use climate data to predict what the ET should be for the plant. In determining the ET on a particular day, we can also calculate what we predict it to be and then compare the two and come up with an equation or model that a turf grower could use to schedule irrigation. Growers can then plug this information into their own computers and adapt it to their own crops."

The department also found growth regulators can significantly reduce ET rates compared to plants that hadn't been treated.

"We found a 25 to 40 percent reduction in water use after 14 to 28 days of treatment.

"Overall, we're looking for ways on a short-term basis to reduce water uptake through cultural practices," concludes Shearman. "On a long range, we're trying to identify grasses with low ET rates and deeper, more extensive root systems under turf conditions and the ability to redistribute the root system with changing soil moisture. This will tie in with our long range goals of breeding low water use, drought avoidance grasses."

University of California, Riverside

Editor's note: Much of the low water use turf research in California has been done by Drs. Victor Youngner and Victor Gibeault. Two weeks after WEEDS TREES & TURF interviewed Dr. Youngner for this story, he died of a heart attack. Because of the timeliness of his comments and the commitment Dr. Youngner showed to this industry over the past 30 years, his comments have remained in the story.

In 1966, Dr. Victor Youngner of the University of California, Riverside, released a bermudagrass cultivar he developed called Santa Ana. At the time it was hailed for its tolerance to smog and ability to continue growth right into the cool winter season. The fact that it was a water efficient grass was noted, but at the time, smog was a bigger danger than water consumption.

That has changed.

It was in the '60s, that Youngner began his research with the now retired Dr. Al Marsh, to determine the water requirements of turfgrasses. They chose two warm season grasses—St. Augustine and common bermuda and two cool season—Alta tall fescue and Merion Kentucky bluegrass. The two consecutive studies were done over several years. The study found warm season grasses to use much less water with virtually no effect on turf quality. Fescues also did well. Bluegrasses were stressed. The Youngner/Marsh test was the first time this data was produced.

This year, another Youngner zoysia cultivar will be released called El Toro. This is another turf with low water requirements.

Ongoing research, supported by the Metropolitan Water District, is looking at the survival ability of several grass species under severely reduced water levels. They include three warm season grasses (Santa Ana bermudagrass, *paspalum vaginatum* (Adalayd and Excalibur) and Jade zoysia) and three cool season (a blend of several bluegrasses, a blend of several ryegrasses and Alta tall fescue.)

Wetting agents

Studies done by Dr. John Letty, also of the Riverside campus, on wetting agents, concluded that when soils repel water for whatever reason, (organics, thatch build-up, etc.) surfactants have been found to allow better water penetration.

Youngner agreed.

"Wetting agents are of use in water conservation to avoid runoff in areas with hydrophobic soils or thatch," he said.

Alternatives

Youngner's colleague, Dr. Vic Gibeault, an environmental horticulturist with the University of California Agricultural Extension, Riverside, is focusing his current work on studying alternative plant materials that would use less water than turf.

The facts tend to support this research.

In Southern California, where 60 percent of the state's population lives, 3.1 million acre feet of water is used by 12.1 million people. That figure can rise to as much as 3.6 acre feet. With the loss, however, of part of its Colorado River supply in a few years because of a water rights dispute, Gibeault explained that that would put the Southern California water supply right on line—no surplus.

"Because we would not be dealing with a surplus situation, restrictions could be placed on the water supply at any time."

There is also an estimated influx of 3 million people coming into the state in the next 16 years; a whopping 25 percent population increase.

"We started looking at turf usage and came up with 1.4 million acres of turf in California," Gibeault said. "Of those acres, 65 to 70 percent are residential and 35 percent are professionally maintained such as golf courses, parks, cemeteries and military bases. Lots of water is being used to irrigate turf."

"About five years ago, we started water awareness programs with those in the professional turf community. Our goal is to paint a long-term scenario. The professional industry is recognizing the problem very clearly. Some facilities have changed from cool to warm season grasses because of their water-saving qualities. Homeowner awareness is a great problem."

Gibeault also explained there's some hesitancy among golf course superintendents because of the dormancy of warm season grasses. Much of the zoysia work at the U of C, Riverside, is aimed at finding cultures with less dormancy to make the grass more appealing and acceptable aesthetically.

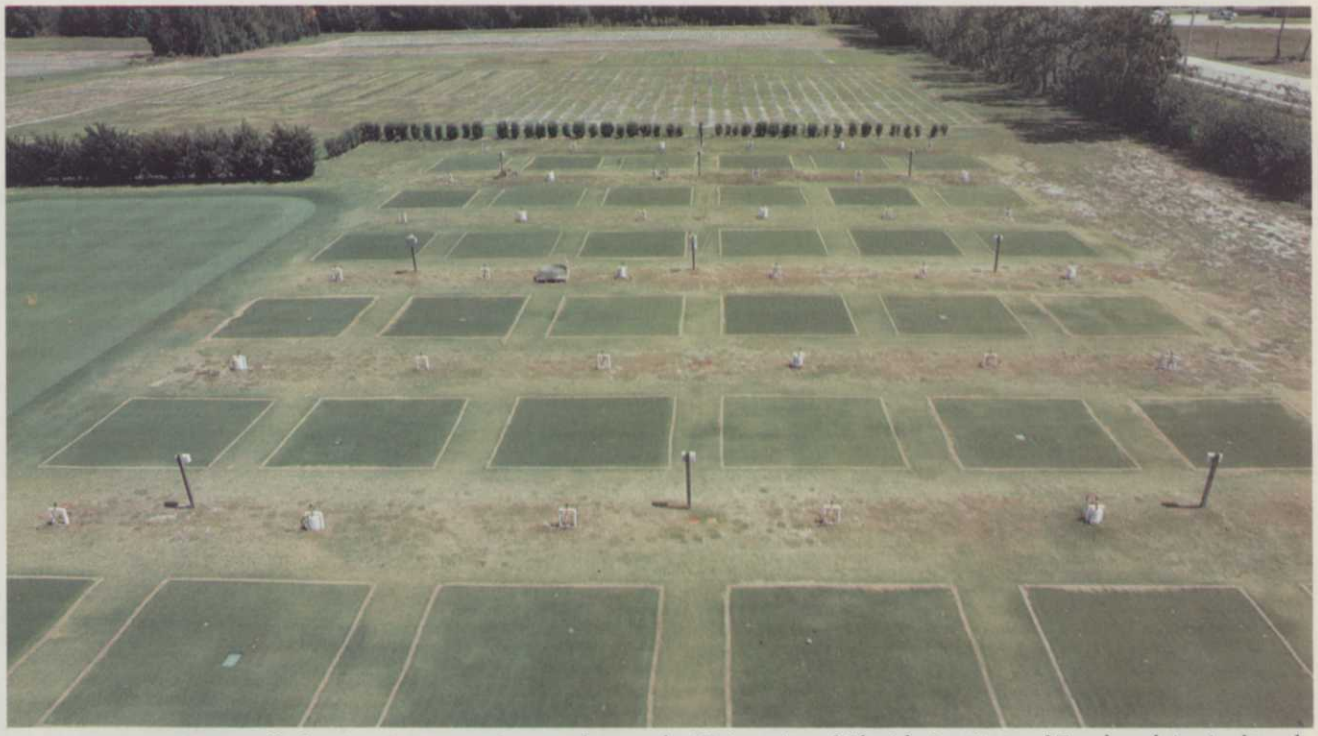
In the 1.4 million acres of turf in Southern California, within each area, such as golf courses and parks, if water use areas were identified, you'd come up with about 50 percent of the area in existing grasses. Gibeault maintains these areas don't "need" to be planted in grass.

"We plan on studying alternatives that use less water and are just as pleasing to look at," he said.

Gibeault feels there's an issue that even overrides the type of turf selected in areas where water is precious—and that's irrigation equipment design.

"We always have to deal with the driest spot. If a system isn't designed well it wastes a great deal of water. Up until now, water has been too cheap to go with a more expensive system. In most cases, we're using twice as much water as we really need."

Major irrigation companies in the U.S. couldn't agree more.



Moisture sensor-controlled *irrigation on turfgrass plots at the University of Florida Institute of Food and Agricultural Sciences, Ft. Lauderdale, under the direction of Dr. Bruce Augustin.*

Irrigation: putting water where it's needed when it's needed

One area where water conservation awareness is a top priority is in irrigation equipment manufacturing companies.

The overriding concern is convincing people that a professionally-installed irrigation system is one of the best and most efficient ways to put water where it's needed and only when it's needed.

Ninety percent of all irrigation companies in the country are located in California; that includes three of the largest, Toro, Buckner, and Rain Bird. Located in a Dallas, TX, suburb is another, Weather-matic.

Rainbird

Rainbird's Mike Baron is product development manager and says the company's philosophy is to make its products more efficient.

"Water conservation is very important to us," says Baron. "We don't want to wait until government mandates come down before we start confronting the problem. We (irrigation industry) will probably be targeted first (for any type of restrictions)."

Baron said there are two schools of thought—one is 'I'm going to water less but stay wasteful" and the other, 'I'm going to water more efficiently and make it do more.' The latter is what Rain Bird and other irrigation companies espouse.

"What it boils down to is the selection of equipment designed so as to avoid waste and the proper installation and maintenance."

—Putnam

Baron also believes the manufacturer must play a role in educating landscapers and contractors in the latest in equipment and in the type of equipment that would best suit their needs and those of conservation.

"In 1982, we developed a pressure compensating bubbler installed on a fixed riser," said Baron. "We determined the reason why it hadn't taken off faster with contractors was because it was new, installation was different and they were wary of it."

From January through April, the characteristically slow season for irrigation contractors, Rain Bird provides distributors and managers with slides and notebooks to educate their contractors on the latest methods and equipment.

The reception to the pressure compensating bubbler has improved considerably.

"Pressure regulation is the key because it allows transition from the design to whatever the contractor has planned for it. This type of bubbler is able to balance the precise amount of water coming out."

Baron pointed out the controlling system is also important.

"With the new solid state designs, you can be more precise with when you want to water than with mechanical dials. The slight fluctuations (in mis-timed controllers) do add up."

Rain Bird was the first irrigation manufacturer to have matched precipitation rates across nozzle sets, which means the amount of water going onto an area is the same regardless of the trajectory pattern.

The Toro Company was the first to introduce matched precipitation rates, but Rain Bird was the first to match it across sets—saving designers time and money, according to Baron.

Toro

John Skidgel, golf marketing manager of Toro Irrigation, Riverside, CA, agrees the secret to efficient irrigation is in the controller, and at press time, the company was scheduled to introduce a new one.

"The future of the industry is computerization," predicts Skidgel. "We already have gotten away from drawing boards and use computer-aided design for our systems. The future of our business is meeting the needs of different groups and doing it with conservation in mind and still maintain a nice-looking turf."

Buckner

At Buckner Sprinklers in Fresno, CA, energy conservation is as highly regarded as water conservation in the company's irrigation systems.

Sprinklers and valves requiring less pressure require less horsepower and therefore less electricity.

The company, according to golf marketing manager David Truttmann, is also incorporating in its system design, a reduced angle of trajectory so that water gets to the soil faster and that there is less of chance for the wind to carry off water spray.

Buckner's controllers have their own video control system which permits watering only when necessary.

They are also teaching designers and users about the equipment and what equipment works best in various situations.

"Energy and water conservation have always been a concern to the ag industry, but only recently have they become important to turf," commented Truttmann.

Weather-matic

Charles Putnam is vice president of sales for Telsco Weather-matic, Garland, TX, and is incoming president of the Irrigation Association. He worries about the industry "over technologizing" itself.

"We need to educate the public to put water where it's needed," says Putnam. "Even if it's inexpensive, an automatic system is better because it's more efficient."

Seventy-five percent of the company's business is in the commercial market and Putnam says business is great.

Weather-matic fully supports an irrigation licensing law that went into effect in 1973 and is the most advanced law of its kind in the country.

The Texas Board of Landscape Irrigators was one of the driving forces behind it.

"Basically, it protects the consumer and protects the supply of potable water," Putnam explained.

Of the 900 would-be irrigation contractors who take the test, only about half of them pass. The test includes designing an irrigation system with water conservation in mind.

Putnam outlined the company's philosophy on water conservation.

"What it boils down to is the selection of equipment, designed so as to avoid waste, and the proper installation and maintenance."

Putnam also believes that down the road controllers will become obsolete.

"Systems will be developed that waters only when the ground needs it," he said.

The company's Rain-stat comes close to that. The device overrides the controller so that when it gets to a certain level of rainwater, it turns the system off.

"In the future we'll see more input from landscape architects and local codes. These are the things that will dictate water usage. There'll be much greater municipality control," Putnam concluded.

Drip irrigation

Drip irrigation, (water comes out precisely where the emitter is with no spray) while prevalent in the agricultural industry, is not as popular in the landscaping profession.

Skidgel from Toro says that most landscape areas are well-trafficked and that having drip emitters in those areas would not be practical. Toro, does, however, market a brand so its distributors will have it to offer customers.

"It (drip irrigation in landscaping) is a coming thing, no doubt," Skidgel said.

Rain Bird is making clear its position in the drip market. Says Baron, "We have a line of drip irrigators and some lines under development. We want to be in the forefront of products using localized irrigation."

Weather-matic's Putnam is more pragmatic.

"An increase in water rates will increase interest." **WT&T**

Associations add money, support to research

The United States Golf Association Green Section is the leader in low water use, minimal maintenance turfgrass research funding.

This year alone, it has made a $332,000 commitment for research and a $3 to $4 million commitment within the next eight to 10 years.

National Director William Bengeyfield says research has become one of the Association's main goals.

"We have formed a Turfgrass Research Advisory Committee to direct a long-range program to develop minimal maintenance turf for golf," explained Bengeyfield. "Lower water use, use of effluent for irrigation and breeding are all included." All of the projects are long-range, especially the breeding program which is a 10 to 20 year project.

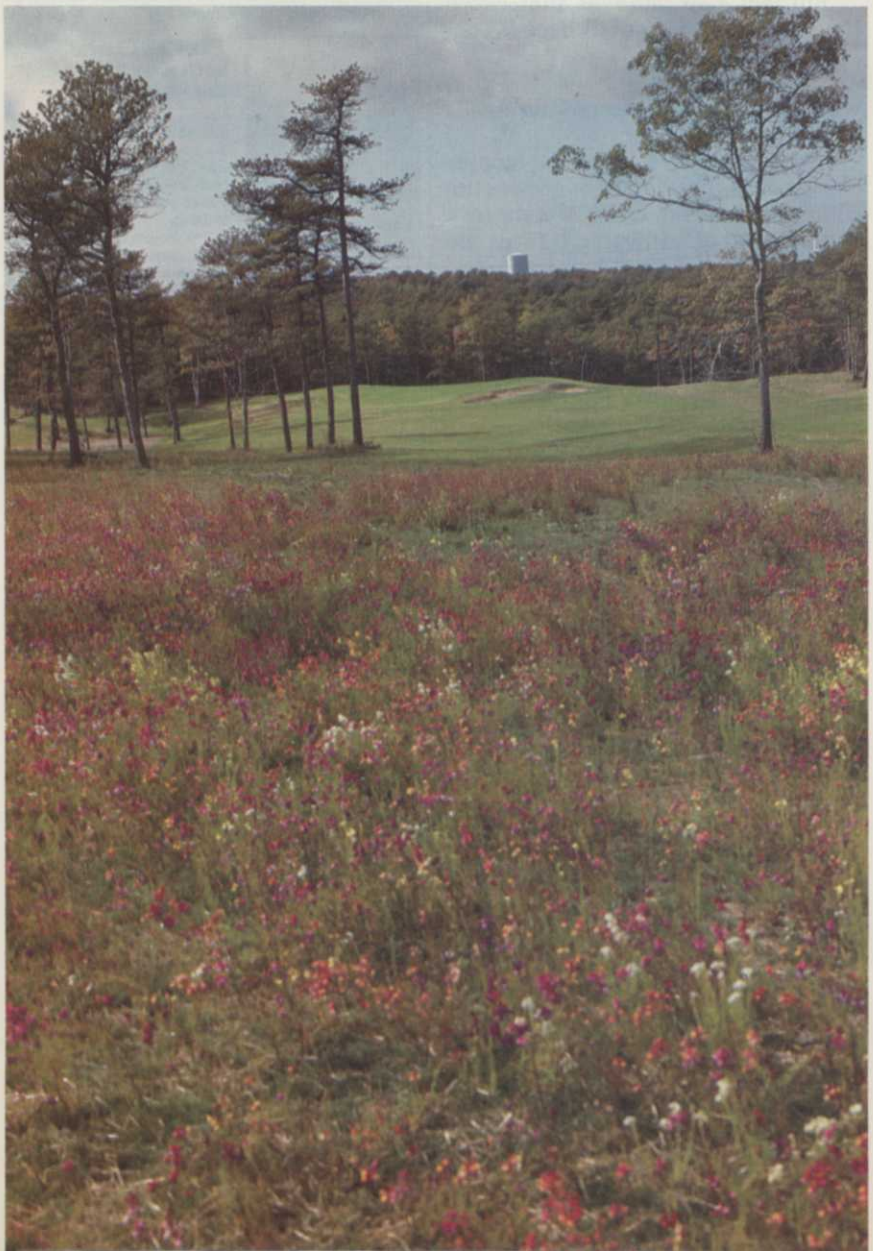
The nine member Advisory Committee, made up of researchers, association personnel and others involved in golf, meets four or five times a year to discuss progress, problems and other related matters.

Besides funding individuals at various universities across the country, the USGA has brought together a computer data base research library at Michigan State. Under the direction of Dr. Richard Chapen, director of libraries at MSU, the library is attempting to bring together all available information on turf research ever printed.

"Eventually the library will be developed so that extension personnel and superintendents can tap into the library for all the latest information," says Bengeyfield.

Bengeyfield credits former National Director Al Radko with conceiving and implementing the original project.

"It was really Al's vision from the beginning."



A brush burial site *is planted with wild flowers near Hole No. 16 at Dennis Highlands golf course on Cape Cod. Golf course architect Michael Hurdzan used flowers to reduce maintenance, lower water consumption reduced mowing and minimium fertilization requirements.*

American Society of Golf Course Architects

Dr. Michael J. Hurdzan, president of the American Society of Golf Course Architects and a partner in Kidwell & Hurdzan, Inc., Columbus, OH, is very aware that people are looking to his profession to find many golf course-related water saving answers.

"Although golf courses appear to use a lot of water, they don't really because of the area they cover," explains Hurdzan. "Because of the evapotranspiration rate, courses can lose up to 1/4 inch of water a day."

Hurdzan estimates an average 18-hole course can use up to a million and a half to two million gallons per week to irrigate tees, greens and fairways, depending on the weather of the area.

"There are ways to conserve on greens which are the highest water-use areas," he says. "How the substructure of the green is created makes a difference." The three substructures Hurdzan referred to are the Purr-Wick (P.A.T.) system, the USGA method and the Modified Greens Construction method.

Selection of cultivars can be another area of water savings.

At Dennis Highlands, a course in Cape Cod, MA, that Hurdzan's firm is working on, he was confronted with high, sandy soil, water from an underground aquifer and a community very aware and concerned about groundwater pollution.

Hurdzan used a seed mix of low nitrogen hard fescue and chewings fescue for the rough, since after the first year, almost no nitrogen would be needed and that would lessen nitro-

gen escaping into the groundwater supply. Also, very little irrigation would be needed as well as little mowing.

"It also affords a different color and texture than the fairways."

For the fairways, Hurdzan used a bluegrass blend of about 15 percent Mystic, 15 percent Bensun, 15 percent Touchdown, 25 percent Ram I, 15 percent Jamestown chewings fescue and 15 percent Prelude ryegrass. This blend, too, is high in nitrogen and conserves water. The far rough areas are planted with wildflowers and sheep fescue.

Other water conserving areas were driveways being drained into a central pond and ornamental grass windbreaks such as Chinese silver grass, fountain grass and love grass.

"The time a golf course uses the most water is when it's being established," says Hurdzan. "New plants need a lot of water to grow. It's not uncommon to irrigate eight to 10 times a day. To conserve in this area, we use a straw mulch. It's expensive, as much as $500 an acre, but again, the benefits can be felt down the road—less erosion and water conservation benefits.

"Water conserving elements add initially more cost to a project, but the money is recouped later," concludes Hurdzan. "It's important to find clients who feel a certain stewardship to the earth."

Dr. Michael Hurdzan, *president of the American Society of Golf Course Architects, and partner in Kidwell & Hurdzan Inc., Columbus, OH.*

Golf Course Superintendents Association of America

The 5,000-member Golf Course Superintendents Association of America has been "aware of an impending crisis" for quite some time, according to President Jim Timmerman of Orchard Lake Country Club, Orchard Lake, MI.

"With the rate of new courses being built in the South and Sunbelt states, the water situation can only get worse," says Timmerman.

That crisis could come as quickly as within the next 10 to 15 years.

"When a water crisis does occur, one of the first industries to go will be recreational," predicts Timmerman. "We (golf courses) don't want a bad guy image. Golf courses are beneficial to the environment even in as much as they provide oxygen in the air."

The GCSAA has always supported turf research, ranging from $25,000 to $35,000 a year to various programs and researchers. They finally decided to put their resources into one, three year program under Dr. William Torello of the University of Massachusetts. He is doing tissue culture and genetic work leading to genetic manipulation of turfgrass cultures.

"We (irrigation industry) will probably be targeted first for any type of restrictions."

—Baron

Regional golf course superintendents' associations are also lending a hand.

The membership of Baltusrol Golf Club in Springfield, NJ, felt so strongly about the need for research that each member will donate $2 annually to the USGA Turfgrass Research Program.

"Hopefully, other clubs will see the same need," said Timmerman.

Members of the USGA Research Committee *are from left, Dr. Paul Rieke, of Michigan State University; James G. Prusa, GCSAA associate executive director; George M. Bard, USGA Executive Committee; Alexander M. Radko, USGA (retired); Monty Moncrief, Athens, GA; Dr. James R. Watson, vice president, Toro; Charles W. Smith, Club Managers Association; Dr. Marvin Ferguson, Texas A&M University; and William Bengeyfield, national director, USGA Green Section and chairman of the Research Committee.*

Irrigation Association

The Irrigation Association, headquartered in Washington, D.C. represents more than 1,000 irrigation equipment manufacturers, distributors, contractors and technical personnel involved in specialized irrigation.

They have put their effort into lobbying before Congress for tax incentives for those who convert to more efficient-type irrigation systems, thus conserving water.

Tom Schiltz of the Irrigation Association doesn't hold out much hope, though, at least with the Reagan administration.

"Basically this isn't going to happen with the current administration's stance on tax reform. It would never even entertain the idea of the kind of incentives we're talking about," Schiltz said. "There is a big problem ahead and if we (this industry) don't take care of it ourselves, the government will." **WT&T**