UNCERTAINTY MAY TEMPORARILY CURB STADIUM INVESTMENT

Sports investors in Phoenix, Baltimore and Oakland may be closer to their goal of having a National Football League (NFL) franchise in their cities in the next few years, following a recent federal court ruling that the NFL had violated antitrust regulations while competing with the United States Football League (USFL). On the other hand, uncertainty caused by negotiations with the television networks, players and the USFL may slow down any major new investment in stadium fields.

Although the court may have convinced the NFL that expansion is a good way to stay out of trouble, it's considered doubtful that the NFL owners will want to share television revenues with all USFL teams in the event of a merger. Analysts speculate that the major networks will not significantly increase, or may not even match, the last five-year contract worth $2.1 billion negotiated by NFL Commissioner Pete Roselle in 1982.

Some NFL owners have cut profits to the bone to pay players' salaries which have doubled since the USFL started a bidding war for talent. Meanwhile, the networks have been disappointed with ratings for many of the football programs they have aired in the past four years.

USFL team owners have put their proposed 1986 fall season on hold since they did not receive the enormous damages they expected to by proving that they had been damaged by the NFL's tactics. The jury awarded them a single dollar, which was tripled as required under antitrust law. They also are feeling the effects of high player salaries and disappointing television revenues.

In fact, had the USFL been awarded the $1.69 billion in damages it sought, the NFL would have faced hard times. Although the USFL plans an appeal, it appears that the court has secured the future of the NFL while getting the message across to expand and share television revenues. The remaining USFL owners may be hoping the appeal would provide leverage for them to gain first rights to any expansion franchises.

To complicate matters further, the NFL's contract with the Players Association runs out after this season. The players have listed free agency as their first priority. This would preserve the bidding war made possible during the past four years by a second professional league.

With all these concerns, owners will be particularly careful with money until these issues have been resolved next year. The financial horoscope for field investment is not good for the next year.

On a final note, municipal stadiums hosting current NFL teams may also be cautious about any major investments for two reasons. First, Los Angeles Raiders owner Al Davis won his case against Oakland, CA, in which a federal appeals court ruled this summer that franchises could move freely. Secondly, owners of some current NFL franchises may want to change cities during any possible expansion of the league. Instead of teams trading players, they may be trading cities.

FIRST SURVEY DOCUMENTS INCREASED TURF ACTIVITY

Managers of all types of sports turf reported, in their responses to the July/August **sportsPOLL**, that use of turf areas under their care had increased. All resort managers, stadium field superintendents and university grounds managers said their turf was experiencing greater play. More than 95 percent of park superintendents reported greater turf use as did 89 percent of golf course superintendents.

In general, park superintendents have the largest amount of turf to maintain with an average of 410 acres. They do this with an average of one maintenance crew member per 20 acres. Approximately two thirds of the turf area is irrigated and an average of three applications of fertilizer are made during the year. Sixty percent of the parks responding overseed for turf repair and winterseeding.

Golf course superintendents are in charge of an average of 165 acres of turf with one crew member for each 15 acres. More than two thirds of the course is irrigated. Fairways are fertilized an average of three times per year, tees eight times and greens 12 times. More than 90 percent of the courses are overseeded.

Resort grounds managers are responsible for an average of 150 acres, but they have more people to perform the work, one person for each five acres. More than 80 percent of the turf is irrigated and five to six applications of fertilizer are made annually. All resort grounds managers overseed to some extent.

University grounds managers care for 115 acres of turf on average. The normal crew size for this acreage is seven, for an average of 15 acres per crew member. Less than half (44 percent) of the area is irrigated and less than three applications of fertilizer are made each year. Furthermore, overseeding is performed on less than a third of the campuses.

Stadium field superintendents have an average of seven people to maintain 4.5 acres of turf. Often, the stadium is just one part of the superintendent's responsibility and the crew performs other tasks. Two thirds of the stadiums are irrigated and three applications of fertilizer each year are standard. Overseeding is practiced by all the stadium managers responding.

The **sportsPOLL** in this issue focuses on the number and type of athletic facilities managed by sports turf managers. We encourage you to participate in these surveys.

FLOOD TESTS MILWAUKEE'S NEW DRAINAGE SYSTEM

With the anticipation of Noah, Harry Gill repaired and improved Milwaukee Stadium's old drainage system last fall between two home stands by the Green Bay Packers. Gill, the field superintendent, had planned the new drainage system for years and finally received approval last summer. Every penney spent on the drainage system was justified this summer when seven inches of rain fell on Milwaukee in less than two hours. . . the night before the Brewers were to start another homestand.

"At midnight on Wednesday, we had four feet of water on the field," Gill details. "By six a.m. the infield was dry and we started to pick up debris and mow for the game that evening. The field was ready for play by noon. We still had six inches of water in the clubhouse and my office and all my files were under water. But, the game was played without a hitch, as scheduled."

The new network of nine-inch deep sand-filled slits spaced 20 inches apart across the field had done its job. The drainage system, used on many European soccer fields, saved the Brewers from a rainout (See story in July/August sportsTURF).

"The newspaper and television people who had criticized the field heavily in the past suddenly were praising it," boasts Gill. One headline read "Gill Exonerated." "The stadium was the talk of the League that week.

TWO DEVELOPERS LINK UP FOR PHOENIX SPORTS COMPLEX

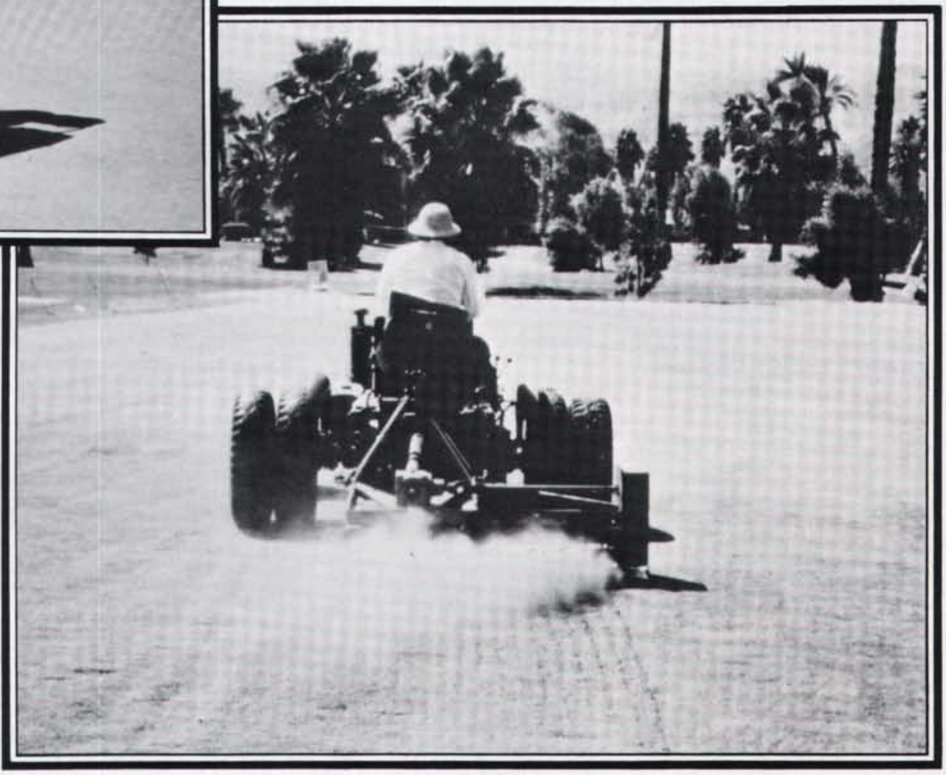
The Phoenix Professional Sports Advisory Committee has recommended that two developers, one from Phoenix and one from San Francisco, be awarded the exclusive rights to negotiate with the city for the design, development and operation of a $150 million, retractable dome stadium.

The two groups which would merge for the project are the Phoenix Stadium Group, headed by San Francisco developer Michael Blumenthal, and the Phoenix Sports and Entertaiment Complex, led by Martin Stone who is the majority owner of the Phoenix Firebirds.

The multi-purpose dome stadium would seat 73,000 for football, 47,500 for baseball and 25,000 for basketball. The complex would also feature offices, retail shops, residences and a hotel at an additional cost of $153 million. The dome concept, proposed by the Stone group, was combined with the surrounding commercial and residential development concept of the Blumenthal group. A 66-acre site in downtown Phoenix has been designated for the complex.

Overse
Bermuc
Tips For Achievi

The bermudagrass is scalped and the clippings are removed.



Grooves are cut into the topsoil to receive the seed.

By Arthur Bruneau, Joseph DiPaola, William Lewis, William Gilbert and Leon Lucas

Bermudagrass usually stops growing and turns brown after the first hard frost. It remains dormant until temperatures in the spring reach 60 degrees F. Each fall, many athletic fields are overseeded with cool-season grasses to improve turf appearance, traction, playability and wear tolerance during bermudagrass winter dormancy.

Preparing bermudagrass for overseeding is a year-long process. Bermudagrass must be healthy to withstand the harsh cultural practices and turf competition associated with overseeding. Careful management throughout the entire growing season is needed for successful overseeding.

Applications of lime, phosphorus and potassium based on soil test reports along with proper mowing, watering and fertilization practices should be followed throughout the growing season.

Late summer fertilizations should be low in nitrogen and high in potassium to insure that the bermudagrass will not be too competitive with the overseeded grasses and yet be healthy enough to withstand the overseeding process.

Thatch control and the prevention and alleviation of compaction through vertical mowing (verticutting) and aerifying (coring) during the growing season should also be practiced. All of these procedures are necessary to provide a good seedbed and discourage the need for heavy vertical mowing just prior to overseeding in the fall.

Successful overseeding can be done two to three weeks prior to the expected first frost date or when the soil temperature at the four-inch depth approaches 75 degrees F. Waiting until this time will minimize bermudagrass competition, optimize germination and establishment of overseeded grasses and reduce seedling diseases. Other factors, such as tournament play and special events, may dictate that seeding dates be altered.

The reduction or removal of bermudagrass thatch to insure good seed-to-soil contact is critical to the successful establishment of cool-season grasses in bermudagrass turf. Athletic fields seldom require the intensive preplant procedures applied to golf greens and tees.

Extremely close mowing just prior to overseeding is essential. Common bermudagrass, if sufficiently open, does not require heavy verticutting for removal of thatch. However, moderate verticutting, light slicing (rotating flat tines that slice through the soil) or coring and pulverizing of cores are advisable. Coring should be done several weeks in advance of overseeding. Cores can be broken up after drying by pulling a

eding agrass:
g Good Results

Seed is applied at a rate of 10 to 40 pounds per 1,000 square feet depending upon the site.

Clippings from scalping and thatch from verticutting are picked up with a vacuum before seeding.

chain link fence or mat over the surface.

Intensively managed areas such as baseball fields should be filled with original root zone mixture to bring them up to grade.

Annual and perennial ryegrasses are the major grass species used for overseeding athletic fields. Both are very quick to establish, relatively inexpensive and fairly wear tolerant. Common perennial ryegrass should be avoided because it is a hay or pasture type. Only 'turf-type' perennial ryegrass cultivars should be chosen. These grasses, sometimes used on golf courses, are finer textured, denser, more uniform, and nearly as fast to establish as annual ryegrass. They are also more disease, heat, and cold tolerant and make a smoother transition than annual ryegrass. They are also more expensive.

Another type of ryegrass, referred to as intermediate ryegrass, is now available. Cultivars of intermediate ryegrass are moderate in performance compared to perennial ryegrass yet superior to annual ryegrass.

Cultivars of perennial ryegrass differ in their fall performance and spring persistence. This is relatively unimportant to the homeowner yet may be of prime importance to those who maintain athletic fields. Cultivars that perform well in the fall and do not persist in the spring are the logical choice for football fields that are used heavily in the fall. Certain perennial ryegrasses, such as Barry, Derby and Manhattan, have these characteristics. Cultivars with late transition, such as Delray and Prelude, may be the logical choice for soccer fields receiving a lot of play in the spring.

Areas receiving heavy traffic may require wear-resistant blends accompanied with occasional reseeding. Entrances to soccer goals, areas in front of benches and turf between the hash marks are more subject to wear and tear than other parts of the field.

Sports turf managers should always specify at the time of purchase the minimum percent purity and germination that they will accept. Overseeding mixes should not contain annual bluegrass. Seed producers who certify their seed, test each lot of seed for germination, purity and off-type seed.

The only way to be certain of these facts is to buy certified seed and read the blue tag attached to the bag. Any crop or weed seed content will be listed. Crop is defined as any plant material that is grown for profit. Many difficult to control weeds, such as orchardgrass, can be found in this category.

Sports turf managers should plan ahead and place their seed orders early enough to insure that the desired seed and seed quality will be available. Seed companies

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A granular fungicide is applied to avoid an outbreak of pythium during germination. No nitrogen is applied, just phosphorus.

Overseeding Bermudagrass

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are recommending that orders for specific varieties of perennial ryegrass be placed no later than spring since the latest seed harvest may not meet existing demand.

Treating seed with fungicides, such as metalaxyl (Apron) or etridiazole (Koban) or spraying before or after seeding with Koban or metalaxyl (Subdue) will reduce the potential for seedling loss due to pythium diseases. This is extremely important for early overseeding.

Remember to purchase extra seed for repairing small areas over the winter that may be damaged by pests, weather or traffic. Accurate measurement of the areas to be seeded and the seeding rate will assure that only the right amount of seed is purchased. Any extra seed should be stored in a cool, dry place to retain germination.

Seeding rates depend on the grass or grasses being used and the density of the turf desired. Grasses with small seed such as bentgrass and rough bluegrass can be seeded at lower rates compared to grasses with large seed such as annual and perennial ryegrass, yet still provide a comparable number of plants per given area. Areas receiving a lot of traffic will have to be seeded at higher rates compared to areas where winter color is the main objective. Higher seeding rates will increase cost but may enhance cover and establishment. Avoid planting at excessively low or high seeding rates to prevent thin, open turf and the incidence of disease.

Unlike bermudagrass, ryegrass does not have the ability to spread and fill in where seed does not land. A uniform green turf can only be achieved if the seed is applied accurately and uniformly. To insure uniform coverage, use a centrifugal (rotary) or drop-type spreader, applying half the seed in one direction and the other half moving at right angles to the first pass. A drop spreader is preferred for defining the margins of overseeded areas.

Athletic fields should be dragged with chain link fence, carpet drag or something comparable. Topdressing may not be necessary except on intensively managed or trafficked areas. All equipment and personnel involved in seeding, topdressing and matting operations should be confined to the area being overseeded to avoid spreading seed and to maintain clean definitive edges. Use carpet to clean shoes and equipment before leaving the overseeded area.

Intensively managed areas planted with untreated seed may need to be treated immediately after seeding with a fungicide for pythium control. Brown patch may also kill seedlings in circular patches. These diseases are especially active when temperature and humidity are high. Become familiar with seedling diseases and apply appropriate fungicides as needed.

As soon as possible begin to lightly water the new seedlings just enough to moisten the surface without causing puddling or movement of the seed. Do this four or five times daily for a week to ten days. Gradually reduce the frequency and increase the duration of irrigation until the ryegrass is well established. After establishment, irrigation should be deep and infrequent. Water to a depth of six inches and wait until you see signs of moisture stress, such as blue-green appearance, leaf curl or foot prints that remain on the turf. In cool weather, the ryegrass may need to be watered only once every two weeks.

Germination will depend on the type of overseeded grass and the age of the seed. Ryegrass germination can occur in less than seven days under favorable conditions whereas bluegrass may take as long as two to three weeks.

Begin mowing as soon as the new stand is 30 to 40 percent taller than the desired mowing height. Infields are usually mowed at 1/2 to 3/4 inches, while outfields, soccer fields and football fields are cut at 3/4 to 1½ inches. New seedlings must be mowed when relatively dry using a sharp blade. This will reduce the chance of pulling or damaging the seedlings.

Do not fertilize at the time of overseeding because this may encourage bermudagrass recovery. There should be sufficient fertilizer in the soil and food reserves within the seed to allow for proper germination. Begin to fertilize shortly after shoot emergence (three weeks after seeding) and continue until cold weather halts growth of bermudagrass. This normally requires the application of 1/4 to 1/2 pound per 1,000 square feet of quick release (water soluble) nitrogen every two to three weeks or 1/2 to one pound per 1,000 square feet of controlled-release nitrogen each month. Remember to maintain adequate levels of phosphorus and potassium for good plant

Greens can be lightly topdressed with sand to help cover the seed.

growth based on soil test results.

Wear from traffic should be minimized whenever possible. Reduce compaction on athletic fields by keeping field use to a minimum when wet. Postpone play or use an alternate site for team and band practice. Move non-stationary goals so that play will not be concentrated in a given area. Keep traffic off all areas whenever the ground is frozen, frost is present or shortly after surface thaws.

In the spring bermudagrass resumes growth when soil temperatures approach 60 degrees F. The aim is to aid the transition from the cool-season grass back to the bermudagrass. Some cool-season grasses, especially the new agressive, heat-tolerant perennial ryegrasses, can successfully compete with bermudagrass. This can result in poor spring transition.

When night temperatures approach 60 degrees F. begin mowing the overseeded turf lower. This will stress the ryegrass, reduce its ability to compete with the bermudagrass and help the soil warm up faster.

Avoid applications of fertilizer during spring green-up to prevent injury to the bermudagrass and to discourage the cool-season grasses. Maintain adequate soil moisture to encourage the rooting of the bermudagrass.

When cool weather delays bermudagrass greenup and the field needs to be perfect for a late spring event, some sports turf managers apply pronamide (Kerb) to selectively kill ryegrass in bermudagrass turf. The idea is to eliminate the competition of the ryegrass. Other grasses that will be damaged by pronamide are annual bluegrass, bentgrass, Kentucky bluegrass, red fescue, tall fescue and St. Augustinegrass. Bermudagrass, bahiagrass, buffalograss, centipedegrass and zoysiagrass are tolerant of the herbicide.

Other methods of increasing soil temperature to encourage bermudagrass greenup are covering the field to create a greenhouse effect and dying the turf so it will absorb more heat from sunlight. These techniques should be tried on a limited area first to gauge safety and effectiveness.

The overseeded area is lightly dragged with a piece of carpet to smooth the surface.

EDITOR'S NOTE: The authors are on the faculty of North Carolina State University, Raleigh.

AUSTRALIAN INVENTIVENESS CHANGES THE AERIFIER

Livingstone demonstrates the stability of his PTO-powered aerifier on the edge of a sand trap.

Seven years ago David Livingstone's creativity was limited to numbers on financial statements for an international bank in Sydney, Australia. The son of an inventor, Livingstone's mind would wander to some strange subjects for a banker. For example, why did the operator of the turf aerifier at his local "bowling club" have to walk backward? If he could design an aerifier that worked twice as fast, could his neighbor's contract aerficiation business be more profitable?

It wasn't long before Livingstone's daydreams turned into reality. While doing his neighbor's taxes he learned the business was for sale. It was his chance to test his ideas first hand. The deal was signed and Livingstone started to put his idea's for a better aerifier down on paper. But, in the meantime, he used the American machines to do his jobs.

"My only interest at the time was to get a marketing edge for my aerification service," said Livingstone. Manufacturing had not crossed his mind. "An associate took my sketches, which changed almost weekly, and started putting together this machine."

Livingstone had a list of things he wanted his aerifier to do. He wanted to eliminate the power source from the unit and use a light-weight tractor instead. The operator was to face forward. Moving parts were to be reduced to a minimum and all high-wearing parts were to be easily reached for service. He wanted a wider swath and a way to change the pattern of the tines.

In 1982, Livingstone's prototype was ready. He quickly discovered that conventional tines did not work well at the speed his machine ran. New tines were designed. He was working days aerifying any one of 120 bowling clubs and golf courses in the Sydney area and repairing his old aerfiers and inventing at night. He became extremely sensitive to occupational irritations like heavy vibration, leaking hydraulic lines and hard-to-reach lubrication fittings. Every unnecesary moving part was axed in his design.

He tried all types of aerifiers by calling on his golf course friends. When he finally returned to these golf courses with his prototype, he padlocked the lid so no one could see how it worked inside. When the lock was finally removed and the lid opened, the common remark was "It looks so simple."

There have been more changes since Livingstone started manufacturing his aerifier under the name CoreMaster. Today, GreenCare International in Fountain Valley, CA, handles manufacturing, distribution and marketing in the U.S. and Canada. "Now, the superintendent controls the machine, not the other way around," boasts Livingstone. He can vary the tine pattern and depth. Repairs are fewer. No longer does he have to go over a green two or three times to get the core pattern he wants. "We are giving the superintendent a fair go," he states.

There are a few lessons to be learned from Livingstone's experience. When you haven't grown accustomed to a certain performance from a machine, you are more likely to want to change it. Secondly, it helps those who design machinery to operate and maintain their prototypes to see practical shortcomings they overlooked.

Because Livingstone's exposure to aerifiers was brief before he started redesigning them, his standards were different. Things he saw superintendents accept, he rejected. As a contractor, his need for a fast, reliable machine was closely felt. The fact that this was his chance to prove himself as a private businessman made success very important to him. His lack of engineering background may have caused a few redesigns, but it brought new thought to a standard way of doing things.

But, when it came to marketing his invention, Livingstone wanted someone experienced in the existing international distribution structure of turf products. He met an American in Sydney who travelled extensively selling artificial turf to sports complexes in Australia, Korea, Malaysia, Indonesia and Europe. Livingstone created an international marketing company called GreenCare International and made the American, Dale Hansen, executive vice president.

Australian inventors are the source of much new thinking on aerifier design today. Banks Multicore is another Australian company marketing new concepts in aerification in North America today. The Toro Company purchased the marketing rights of Roh, a New Zealand manufacturer of aerifiers.

The Banks Multicore aerifier also originated in Australia.

The opportunity provided in Australia to serve hundreds of bowling clubs, golf courses and sports stadiums has brought new energy and technology to the aerifier business. The growing use of aerifiers in the United States has made this market attractive to Australian companies. These companies are bound to influence the competitive business of aerifier manufacturing in the coming years.

Taking the Guesswork Out of Water Conservation

Thousands of years have passed since the Romans constructed their vast network of aqueducts to deliver water from remote rivers to fields and cities where it was needed.

Although the feat of constructing such aqueducts was impressive, the concept of getting water from its source to where it's needed was very simple. Since then, we have greatly refined water delivery methods. We have harnessed rivers with dams and piped water thousands of miles for use in cities and farms. From there, water is further propelled by pumps and computers to precise locations where it is needed. From rivers to tiny drip tubing, we control the delivery of water.

We have concentrated nearly all our energy and resources on getting water from one place to another with tremendous success. Now, some of these resources are being redirected to a more complicated yet equally important concept—turning the water off when a plant's needs have been met.

This has been Bill Pogue's mission for more than five years. Pogue. president of the Irrometer Company, knows it's only a matter of time before moisture sensing devices become an integral part of all large landscape irrigation systems.

"With rising labor, energy and water costs, irrigation system management has to improve," stresses Pogue. "No longer can we delegate operation and maintenance of valuable irrigation systems to seasonal or unskilled workers. Irrigation has become considerably more complex in the past ten years. As a result, training is an absolute necessity. Once a person is trained, he is more valuable to his employer and should be paid accordingly."

Landscape contractors and golf course superintendents have reacted slowly to rising water costs and water shortages in general. On many golf courses, maintaining lush, verdant turf has taken precedence over the cost of water. Recently, superintendents have begun to restrict irrigation in response to research proving that overwatering encourages diseases and weeds. Communities, after experiencing droughts, have encouraged golf courses to be more responsible about water conservation.

Typical moisture sensing "location." One "short" and one "longer" probe to monitor both the shallow and deep portions of the root system.

Municipalities and parks, however, have become extremely concerned about use. Their irrigation systems tend to be vast and located in many separate areas. The labor alone to keep huge systems functioning properly is expensive. Municipalities with limited tax bases will let some areas go without irrigation rather than pay rising water and labor costs. However, they have also been willing in many cases to invest funds in advanced irrigation controls to reduce labor costs in the long run.

For the most part, irrigation system operators have been guessing how long and how frequent irrigation cycles should be. Even the latest computerized irrigation systems are originally programmed according to guestimates. The first time an irrigation manager turns on his computer he faces a convenient, organized format of blanks. But, before the system will apply the first drop of water, he must fill in these blanks with estimates and data from his previous controller. Later, he can adjust the program based upon field observations. With 50 or more heads that refinement can be very time consuming.

Once all cycles are adjusted to average weather conditions, various sensors can be added to alert the computer to increase or decrease irrigation based upon weather conditions. For example, a rain-activated switch can signal the central controller to turn off irrigation in progress. Evaporation indicators can tell a central controller to irrigate more or less frequently. Data from a local or on-site weather station can be fed into some advanced computers to adjust irrigation cycles.

As water becomes more scarce and more costly, there is a definite trend today toward using sensing devices to turn water on or off. By the nature of their task, however, these devices are more complicated and require more knowledge to operate.

Only in the last 15 years have universities started research into the water needs of turf and ornamentals. Armed with the new information gleaned from this research, soil and plant scientists have developed formulas based on weather conditions, solar radia-