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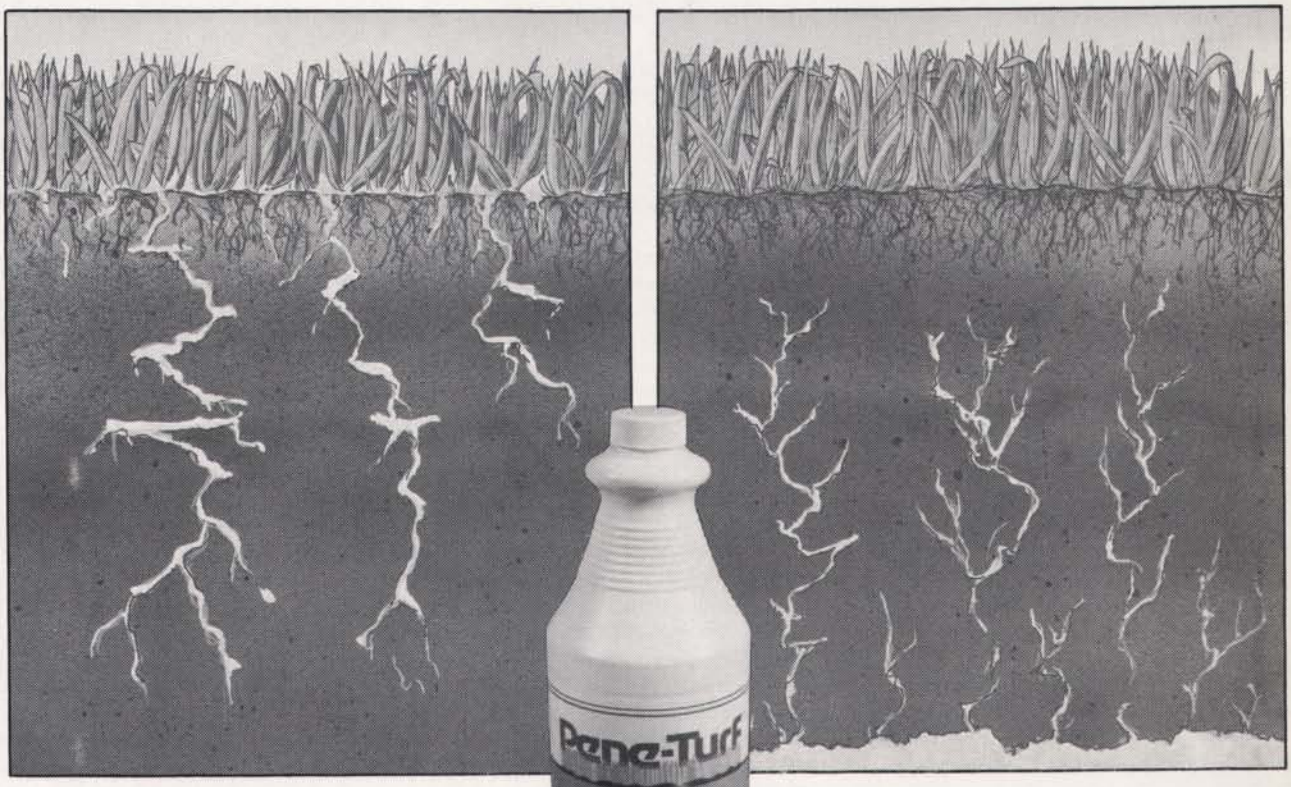

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PACE WAS FAST AT STMA/GCSAA SEMINAR

Sports turf managers attending the STMA sessions at the GCSAA Show were able to get answers to their turf problems from experts. Three of the experts were (left to right) Dr. Peter Hayes from England, Dr. Vic Gibeault from California and Dr. William Daniel from Indiana.

More than 30 speakers gave rapid fire advice to 100 sports turf managers during the Sports Turf Managers Association Seminar held in San Francisco recently. This first-time event, held in conjunction with the Golf Course Superintendents Association of America Show, filled the notebooks of those attending.

"I"ve never seen so many experts in one place at one time," said Sam Newpher, turf manager for the Atlanta Braves. I could get answers to nearly all my concerns directly from the leaders in the field, all in one room at one time. I made the most of the breaks between sessions and came home with a lot of answers."

Attendees also got a taste of sports turf management overseas from Dr. Peter Hayes, director of the Sports Turf Research Institute of Bingley, England. With limited fields and heavy rainfall, the British have been exploring well-drained field design for decades. They are heavy users of sand and soil amelioration. The trick with sand, Hayes told the group, is the fines must be less than 12 percent of the total or else the entire mix will waterlog. The Sports Turf Research Institute is conducting a variety of tests with a simulated wear machine. One involves a combination of artificial and natural surfaces.

Dr. William Daniel, cofounder of the Prescription Athletic Turf (PAT) system and retired professor of agronomy, Purdue University, provided a look at sports turf research in the U.S. Various plastics and geotextiles may have a place in reinforcing natural turf in the future according to Daniel. The artificial material provides resistance to ripping and tearing. Daniel said more research is needed before artificial and natural are successfully combined.

The audience applauded when Daniel said the low bid process is a significant barrier to improving sports turf in the U.S. He added that, for the most part, public agencies have unfortunately clung to outmoded field construction and maintenance. "We have the technology today to do a much better job of field care, if people would just listen," Daniel said.

John Macik, sports medicine coordinator for the National Football League Players' Association gave the sobering results of injuries on natural versus synthetic turf. "Since 1972, NFL players have played more than half their games on artificial turf. When the Colts and the Jets moved to artificial turf stadiums in 1983, their injury rates doubled," Macik revealed.

"Owners have been avoiding the issue as a point of negotiation for years, saying the actual stadiums are owned by the municipal governments. They finally conceded to have Stanford University do an independent study. Those results have been guarded, but they show the five NFL fields with the worst injury records are all artificial. The NFLPA, with 83 percent of its members in favor of natural turf playing fields, will continue to press the team owners during negotiations," warned Macik.

STMA's famed Long Ranger Award for the sports turf manager of the year was presented to Tony Burnett, grounds manager for Robert F. Kennedy Stadium in Washington, D.C. Honorary memberships were presented to octogenarians Fred Grau and Tom Mascaro for more than 50 years of service to sports turf each. John Souter, sports turf and golf course builder from Scotland, although "still a young lad," received honorary membership in STMA for his progressive building and maintenance methods applied around the world.

Nearly two busloads of sports turf managers toured the major sports stadiums in San Francisco and Oakland the following day.

The STMA Board voted unanimously to be a part of the GCSAA Show in Phoenix in 1987.

PARK INSTITUTE OFFERS SPORTS TURF SEMINARS

The National Institute on Park and Grounds Management is putting on two sports turf seminars this spring, one in Rhode Island and one in Virginia. The organization has been giving seminars for more than four years across the U.S.

The first seminar is set for Providence, RI, March 24-25. Dr. Richard Hull, Dr. Noel Jackson and Dr. C. R. Skogley from the University of Rhode Island will be the seminar faculty. Some of the topics scheduled include Diagnosing Insect and Disease Problems, Construction of a New Athletic Field Complex, Controlling Weeds With Herbicides, Maintenance and Renovation of Heavily-Used Turfgrass Areas, How Turfgrasses Use Water, Fertilization and Post-Season Renovation. The seminar will be held at the Holiday Inn, Providence.

Dr. John Hall, Dr. Richard Schmidt and Dr. David Chalmers of Virginia Polytechnic Institute and State University are the faculty of the seminar to be held March 27-28, at the Holiday Inn, South in Roanoke. Topics for this seminar include High Pressure Sodium Lights for Athletic Fields, Renovation of Existing Athletic Fields, Mowing and Irrigation, Compaction and Its Effect on Turf, and Selection of Turfgrasses.

TEXAS SPORTS CLINIC DRAWS EARLY INTEREST

"We've never had this much interest in an extension clinic this far in advance with so little publicity,' Bill Knoop of Texas A&M, Dallas, exclaims about the upcoming sports turf clinic scheduled for March 20, 1986, at Ranger Stadium in Arlington.

Knoop, an extension turfgrass specialist, spends a great amount of time helping Dallas-area schools improve their fields. He organized the one-day event in conjunction with Jim Anglea, field manager for the Texas Rangers. The Rangers are backing the event fully—the educational sesssions will be held in the plush locker rooms, a complimentary lunch will be served in the Rangers' dining room, and equipment and demonstrations will take place on the field. Chemical & Turf Specialties of Dallas is providing the lunch for athletic field managers during the event.

Four clinics for field managers and grounds crew will be presented. Dr. Beverly Brewer, urban entomologist for Texas A&M, Dallas, will cover identification and control of insects that attack athletic fields. Dr. Rupert Palmer, Texas A&M, College Station, will then cover weed control for athletic fields. Proper mowing and aerification of athletic fields is the topic assigned to Dr. Garald Horst, associate professor of agronomy at the Agricultural Experiment Station in El Paso. Fertilization programs for recreational turf will be covered by Knoop. These sessions will be repeated if necessary during

the day so field managers can take attend each one.

Throughout the day, Jim Anglea, ranger field superintendent, will give "on the field" demonstrations on baseball infield care. Anglea has more than eight years experience with Major League baseball field management. "The best way to learn the important steps in infield maintenance is to see it done," says Anglea. "A few tricks can make a big difference." Anglea will discuss basepath construction and maintenance, fall overseeding, disease control, protection of turf during practices and other important keys to Major League infields.

Equipment for athletic field maintenance will be exhibited on the warning track for "hands-on" evaluation. Area distributors will be there to describe new products, chemicals and seed useful in sports turf programs.

To make the event practical for all levels of field management a price of $10 has been set for the event. This will provide entry to the field, all sessions, and free subscriptions to **sportsTURF** magazine and the new *Southwest Sports Turf Newsletter*. Interested field managers, coaches and athletic directors should contact Bill Knoop, Texas Extension Service, (214) 231-5362.

STMA RESCHEDULES FOR CHICAGO AREA

The Sports Turf Managers Association, which cancelled its one-day seminar in conjunction with the Landscape Expo in Valley Forge, March 5-7, is rescheduling the event for the third week in June in the Chicago area. Executive Director Kent Kurtz attributed the cancellation to inadequate communication between the organizers of the event, HBJ Expositions and Services, and STMA.

Steve Wightman, president of STMA and grounds manager for Mile High Stadium in Denver, CO, said interest is high in the Chicago area for a sports turf seminar. "We hope to schedule the seminar for the week of June 17," said Wightman. "There will be a board meeting in Chicago that week and we have the members in the Chicago area to help manage the details of the seminar."

"The success of the STMA program held in conjunction with the Golf Course Superintendents Association of America Conference in San Francisco," said Kurtz, "shows there is a great demand for information exchange in all aspects of sports turf management. The goal is to have similar programs in all major parts of the country."

SANDIN TESTS VERTIGROOVE AT ORANGE BOWL

A new concept in aerification, a groove instead of a core, is being tested at the Orange Bowl by Dale Sandin, grounds and turf manager. The device, which cuts very narrow grooves as deep as eight inches into the soil, has no moving parts. Tom Mascaro of North Miami, FL, developed the concept more than 20 years ago and only recently has Ransomes begun research on the product.

The grooving blades, usually two feet apart, slice into the soil and lift out a narrow section of soil. The soil is then removed or dragged into the grooves. This opens up the field for drainage and air. Mascaro has tried the unit on golf greens with success.

The Orange Bowl, one of a limited number of Prescription Athletic Turf (PAT) fields, is one of the most active stadiums in the U.S. Sandin reports the Vertigroove has improved greatly since earlier versions he tried for Mascaro. "It provides an option to sand slitting in some cases," Sandin stated, if the soil is removed and the grooves are filled with sand."

Ransomes is developing a number of prototypes for demonstrations this fall. The unit Sandin used was pulled by a tractor. A model attached to the front of a riding mower is also being studied.

Springtime First Aid For Bermudagrass

Spring dead spot appears as circular dead spots from six inches to two feet in diameter.

Brown patch kills large circular patches of bermudagrass from three to 20 feet in diameter.

Bermudagrass remains unbeaten as a natural surface for sports fields in warm climates. No grass tolerates traffic or recovers better than bermudagrass because of its extensive rhizome and stolon system. During most of the year, it has relatively few disease problems and competes victoriously with weeds.

However, some problems and diseases do occur on bermudagrass. Athletic field managers should be aware of these problems to manage their fields effectively.

Late winter and early spring are especially important times to manage bermudagrass. The ravages of winter weather and use become visible at this time. Quick action is needed to bring the bermudagrass back to health for spring and summer sports. These problems are more severe in the northern range of adaptation of bermudagrass, near or in the transition zone.

One common solution to winter dormancy of bermudagrass has been overseeding with perennial ryegrass. This decision should be based on when the field is used. Newer perennial ryegrasses have better color and performance than older perennial or annual ryegrasses, but they also tend to compete more with the bermudagrass as it comes out of dormancy in the spring.

If the field is used primarily for summer sports and fall football, overseeding is not necessary. Restricting field use in September during football season to overseed is difficult. If the field is not used heavily from December through April, why go through the phase-out of perennial ryegrass in the spring? It only complicates matters and takes the focus away from bermudagrass in the spring when it needs the most attention. Dyes can conceal the dormant tan color of bermudagrass during special events.

If the field is used for baseball in the winter and spring, then overseeding is a good idea. Damage to the dormant bermudagrass can be severe, certainly more severe than competition from perennial ryegrass in the spring would be. Again, the trick is finding a slow period in the fall to overseed without disrupting events.

Tools exist to discourage the ryegrass as bermuda comes out of dormancy. Mechanically the ryegrass can be knocked back by lowering the mowing height or verticutting. If the ryegrass persists, treatments with Kerb or MSMA/Sencor can be applied in the summer to restore the turf to pure bermudagrass.

Winter damage weakens the bermudagrass making it vulnerable to spring diseases such as spring dead spot and brown patch. Cold weather damage is most common in high-use areas: the center of football fields and the goal area of soccer fields. Areas that are shaded in the winter from nearby evergreen trees or buildings are frequently damaged by cold weather. Poor drainage or compacted soil compound winter kill and spring disease problems.

Cold damage can be reduced by using the most cold tolerant varieties of bermudagrass. Midiron and Vamont are known to be more cold tolerant and should be used in the northern range of bermudagrass adaptation. Common bermudagrass and many of the improved varieties such as Tifway will usually do well in more southern locations.

Good basic turf management is one of the best defenses against cold damage. Proper fertilization, with recommended rates of potassium and low rates of nitrogen in the late summer and fall, will increase the winter hardiness of bermudagrass. Turf managers are moving away from 3-1-1 fertilizers and are using instead fertilizers with

a 1-1 nitrogen to potassium ratio with applications of phosphorous as needed. Lower rates of nitrogen combined with aerification and vertical mowing during the growing season prevent the accumulation of thatch and help reduce the severity of spring dead spot.

Severe weed competition can slow the recovery of cold-damaged bermudagrass. A regular weed control program is therefore an important factor in bermudagrass recovery in the spring.

Some damage should be expected, however, during unusually cold winters. Turf managers should evaluate the damage early in the growing season to initiate a program to help the grass recover as early as possible in the summer. Damage from cold weather usually appears as large irregular-shaped dead areas or areas that recover slowly in the spring. Shaded areas and badly worn areas suffer the greatest losses.

The next greatest threat to bermudagrass in the spring is spring dead spot. This disease appears as small circular dead spots from six inches to two feet in diameter as bermudagrass resumes growth. It generally not does not attack young bermuda, but instead starts to appear in turf when it is three to four years old. This disease occurs most often in the northern range of bermudagrass adaptation and following unusually cold winters.

Weeds take advantage of these dead spots to get established while the bermudagrass slowly recovers. The disease often recurs in the same spots as they enlarge for three to four years. Some grass will survive in the center of the spots after two to three years resulting in small dead rings of turf. The disease usually disappears after three to four years, but may develop in other areas as the turf ages. Bermudagrass which has been overfertilized and developed excessive thatch appears to be more susceptible to spring dead spot.

The fungus *Leptosphaeria narmari* has been indicated as the cause of spring dead spot in some places. This fungus attacks the roots and causes the disease during cool weather in the fall or winter.

The fungicide benomyl has been used in some states to counter the fungus. However, it must be applied at high rates in the fall to areas that were previously affected to obtain results for the following spring. Benomyl is currently labelled for this use in only certain states.

Brown patch has been observed on some bermudagrass fields in recent years. This disease, caused by the fungus *Rhizoctonia solani*, appears as large circular brown patches from three feet to more than 20 feet in diameter. These patches become evident as bermudagrass starts to green-up in the spring or during cool wet weather in the fall befor it goes dormant. The fungus kills the new shoots near the soil surface where they are attached to the stolons. A ring of dying shoots is often present at the edge of the patches during cool, wet weather. These shoots can be easily pulled from the stolons.

Brown patch can make a bermudagrass athletic field unsightly in early summer, but the grass usually recovers during the hotter weather and good growing conditions of summer. Fungicides have not given satisfactory control of this disease. A good turf management program that provides good soil drainage, proper fertilization and weed control has helped prevent this disease and encouraged recovery in affected patches.

Fairy rings are another fungus that sometimes develop on athletic fields. The large circular rings of very green or dead grass or rings of mushrooms grow from a few inches to several feet in diameter during the year. Once established, these rings remain for many years. Mushroom-type fungi that grow on organic matter in the soil cause this problem. These fungi damage the grass by releasing extra amounts of nitrogen or toxic substance from organic matter in the soil. They also are known to make the soil hydrophobic so that water will not penetrate the soil surface.

Fungicides are not effective in controlling fairy rings. Rototilling the soil in the affected areas and replanting healthy grass has been most effective in eliminating some fairy ring problems. Aerification of the soil and frequent irrigation will help reduce the damage from fairy rings in some cases. Do not incorporate large amounts of organic matter in the soil or bury organic debris such

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Springtime First Aid
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as building materials or stumps in areas to be used for athletic fields.

Helminthosporium diseases sometimes occur on bermudagrass and cause leafspot and root rot type diseases. The leafspot diseases are usually more prevalent during the late summer and early fall and do not appear to cause severe damage to bermudagrass. A good healthy turf should be able to tolerate the damage from leafspot. Root and crown rot caused by these fungi may cause damage on bermudagrass at times. Fungicides can be used to control these diseases, but a good managment program remains the best control.

Dollar spot is often seen in the late summer or fall on bermudagrass and especially on turf that is deficient in nitrogen. Spots are light brown to tan and are one to four inches in diameter. An application of nitrogen will help the bermudagrass recover from this disease. The diseased leaves will be mowed off as the grass grows. However, avoid applying more nitrogen than is needed at the particular time of year so that the winter hardiness of the turf is not reduced.

Another threat to bermudagrass is the nematode. These tiny worm-like pests are a major problem in the southeastern United States during the summer where bermudagrass is grown on very sandy soils.

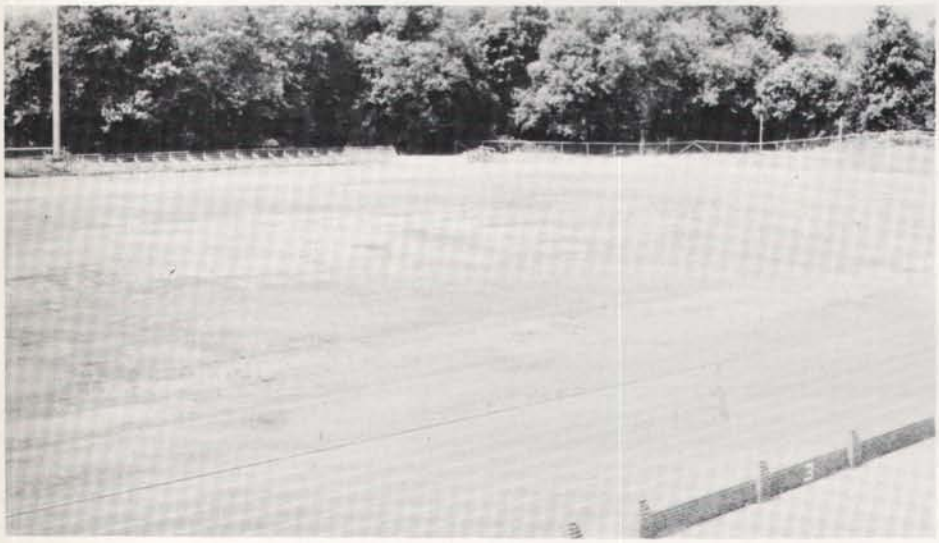
Symptoms of nematode damage are poor growth of turf following proper fertilization and irrigation and a thinning of the turf. These symptoms may be present over the entire field or in isolated patches. The roots of the bermudagrass will be short, stunted and brown rather than white and long.

The most damaging nematode is the sting nematode which is limited to the sandy soils of the southeast. Treatment with nematicides will give good results if the sting nematode is causing the damage.

Other factors cause symptoms similar to nematode damage so soil assays from suspected areas are needed to confirm nematodes as the cause. Public and private laboratories will do these assays in most states.

Nematicides are very toxic chemicals and most are not labelled for use on turfgrasses. If a neamticide is labelled for use on athletic fields in your state, be sure it is applied by a licensed applicator and that the specified waiting period is allowed before using the field.

EDITOR'S NOTE: Leon Lucas is professor of plant pathology at North Carolina State University, Raleigh, NC.



Many southern athletic field managers face sparse turf in the spring suffering from diseases, winterkill and compaction.

CHALKBOARD

TIPS FROM THE PROS

The Right Basepath Mix

The best-looking baseball field strikes out if the basepaths turn to mud after a short rain. The appearance and condition of basepaths can make a big impression, much like the impact a cinder track has on a visiting track team compared to a freshly painted, rubberized asphalt track.

Some of the best-kept secrets of baseball field management involve basepaths. Local topdressing or topsoil suppliers often will not divulge the content of their basepath mixes. Insiders will tell you the best basepaths are a combination of sand and clay on top of a good drainage system.

Forget the mystery; basepath mixes provide that special finishing touch to a baseball field, while keeping it in play longer during rain and then back in play faster after a rain. The last two points are more important to managers of skinned infields.

A good basepath mix absorbs its own weight or more of water without changing texture. It holds this moisture longer than typical native soils, thus reducing problems with dust or powdering. The texture of a mix should permit rapid drainage and firm footing and should cushion the players as they slide. It should be free of stones, and easily worked and smoothed.

Jim Kelsey, president of Partac Peat Corp., makers of Beam Clay mix, recommends three inches of his mix on basepaths and four to six inches around the bases. This would amount to 120 tons of the sand/clay mix for construction of a regulation grass infield and 180 tons for a skinned infield. Kelsey suggests an additional one-inch maintenance layer in subsequent years. The basepath should be graded and scarified before adding the maintenance layer. He also stresses the need for good drainage underneath.

If you put a pencil to these figures, the initial investment in basepaths for one infield is approximately $5,000, and $1,600 in following years. It may sound high, but then figure the cost of a rainout(s).

Bill Wrobel, marketing manager for Turface by International Minerals & Chemical Corp. (IMC), also highlights the importance of drainage beneath the basepaths in regions of moderate to heavy rainfall. Turface, a processed calcined clay, is rototilled into the top four to six inches of existing soil. Initial amendment of an infield, pitcher's mound, and batter's box would require a total of 18 tons of Turface (25% of the soil volume). The paths are then graded and rolled.

Turface is recommended as an underlayment to infield sod and as a topdressing for wet spots in the outfield. IMC does not encourage the use of Turface in the batter's box since the resulting soil would be too loose for this area. Wrobel suggests using Turface to backfill drainage trenches.

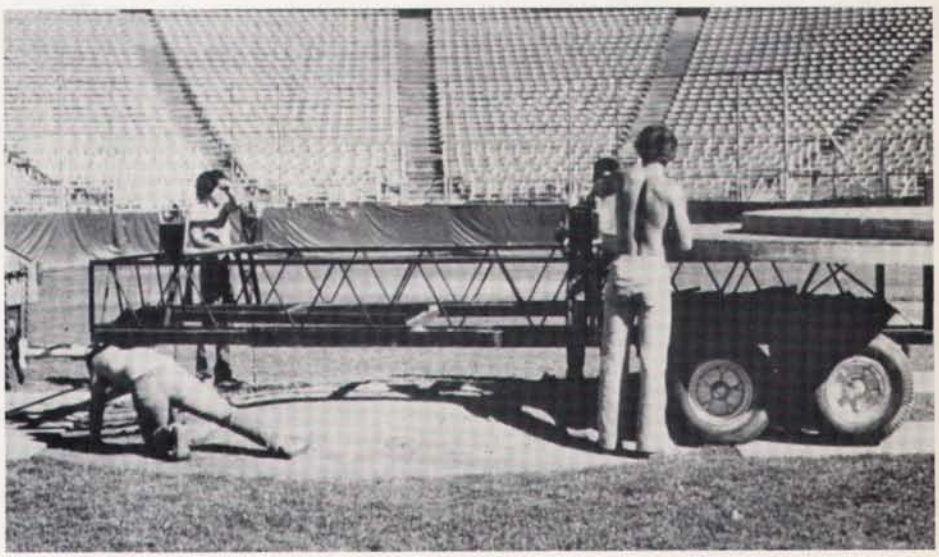
Another approach is to use a drying agent to dry out the basepath mix quickly after a rain. Chuck Lindstrom of Diamond Dry calls his product a natural organic drying agent. "It's not intended to be a major portion of the infield mix," says Lindstrom. "Its job is to dry out a wet field quickly so the game isn't cancelled."

Diamond Dry is spread on top of wet basepaths. "We have turned a quagmire into playable basepaths in less than 45 minutes," says Lindstrom. "At Milwaukee Stadium, Diamond Dry is used during games to touch up wet spots in a matter of minutes after rains."

The Redbirds, a St. Louis Cardinal minor league club in Springfield, IL, use between 265 and 270 bags (40 lbs. each) of Diamond Dry each year to get them through the spring rainy season. After that, the sand/clay basepath mix doesn't require further amendment says Lindstrom.

"Park superintendents would love to know what major league turf managers do for basepaths. The problem is each guy does his own thing and there aren't any recognized standards. I think we should poll the players on what fields they like best and then find out what those turf managers do."

Denver's Portable Mound



Mile High Stadium crew hooks trailer chains to U-bolts on steel plate underneath the pitcher's mound for removal.

When a field is constantly switched from one sport to another, rebuilding the pitcher's mound can get to be a problem. Steve Wightman, turf manager at Mile High Stadium, has been using a portable mound since 1977. His crew can remove the mound in 15 minutes and install it in 30 minutes. Pitchers like the mound because it's solid and the same for each game.

The trick is a 1/4-inch steel plate buried beneath ten inches of mound mix. Rather than rebuilding the mound for each game, Wightman's homemade trailer lifts the entire mound eight inches and carts it from storage to its place on the field. The 13-foot-diameter steel plate, reinforced by two-inch angle iron, has four strategically placed U-bolts. Chains from the trailer attach to these bolts for lifting.

The portable mound plate is supported out on the field by a four-inch-thick concrete slab, nestled four inches below field grade. Guide pins are embedded in the slab. When the pins are matched with corresponding slots in the metal plate, the mound is in exactly the right position for each game. The edges of the mound are then dressed and packed.

For football and soccer, the mound is carted away and the four-inch hole over the concrete slab is filled with dirt to be level with the field. Thick sod is laid and topdressed with sand. This is one of the ways Mile High is able to host more than 100 events each year.

Rain Bird's Maxi III is a total irrigation system which will soon include an optional weather station.

Computerized Irrigation

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Software is a computer program written by a technician, but in a language that the user understands. It is then placed in the computer, either via a floppy disk (which looks like a mini-record) or directly into the memory banks of the computer. In either case, the format allows you to input your own data—how often you would like each station to water, for instance.

As shown by the Network 8000, a system using an IBM computer need not limit its functions strictly to irrigation. On some computers you can do all your billing, accounting and word processing, among other useful functions, as well as directing all the watering.

"There are those who say when you pay that much for a computer you should buy one that doesn't limit itself to irrigation only," explains Rain Bird's Shoemaker.

"The floppy disk on the Rain Bird computer contains the memory and is therefore more versatile than a dedicated computer," Shoemaker notes. "If you want to add another feature that isn't in the dedicated computer, it has to be programmed into the memory. It could be more expensive to update a dedicated system.

"However," he allows, "each individual needs to look at computers based on what their specific needs and requirements are."

Actually, the personal computers were chosen expressly because they did have the flexibility to provide other services in addition to water management.

Despite its high-tech capabilities, no computer is better than its sensors. According to Joe Shayovitch, international director of distribution for remote control systems for Motorola Irrigation, "Computer sensors can determine environmental conditions, allowing you to change regular irrigation procedures in the computer."

Sensors in the field measure water flow and pressure, wind speed, soil temperature and moisture. A sensor can quickly detect line breaks, uncontrolled open valves and other deficiencies and report these back to the central processing unit.

With this information feeding back into the computer through the field units, the entire system can be shut down at a moment's notice by pressing a single key on the computer. Such action can minimize water loss and possible damage. Motorola's MIR-3500 also has a paging system to alert ground maintenance personnel to the problem.

Skidgel notes, "With the new Network 8000, you enter design, weather/climate, geographical and agronomical information. Network 8000 then automatically computes the operating times for all stations, based on the evapotranspiration rate, modified by any applicable rainfall."

Rain Bird is putting finishing touches on a "weather station" for its Maxi III. "The data recorded by the on-site weather station is fed into the computer to adjust irrigation cycles," says Shoemaker. "Humidity, evaporation, and information from other sensors help the computer instruct the system to apply only the water needed, when needed. The computer operator can also increase or reduce the amount of water applied by percentage from the central controller."

Each manufacturer has developed some unique product features. The Solar Wind System 390 uses only two number 14 wires, no matter how big the project. "When designed in a loop configuration," Marion notes, "the computer will continue to operate all FSTs, even if the communication wires are cut."

Marion affirms, "Projects such as the City of San Clemente Golf Course, Salt Creek Golf Course in Laguna and Hughes Aircraft in El Segundo, all in California, have found a great cost saving by using such simplified wiring."

Canterbury feels that versatility is the prime factor in the computer's capabilities. For instance, a video central computerized system can be programmed for a large park where the park manager wants to use it for shrubbery and turf separately, using two completely different programs. It can also be programmed for particular problem areas, such as slopes.

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Toro's Network 8000, available this fall, will enable the turf manager to do business functions on the computer while irrigation programs are running.

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"Each station is programmable from 0 to 59 minutes or from one to nine hours," adds Canterbury. "There is also a syringe program that can be incorporated into the computer."

The syringe cycle is a cooling cycle that is run for a short length of time, usually in the summer, just to cool the grass.

The capabilities of a computer appear to be boundless. For instance, some computerized irrigation systems can be programmed to incorporate fertilizers that are dispensed on command.

Along with its water-conservation and labor-saving capabilities, the computer runs on low power. This not only saves energy but has other advantages as well.

"If there is a power failure in the central and there is no power failure in the field, the computer will continue to monitor the field—because it is operating under such low power," explains Motorola's Shayovitch. "If complete power failure occurs, you can still program the computer because it has a battery backup."

Should there be a failure of any kind, the field controllers can be switched to stand-alone mode and allowed to operate from their internal programs.

Should there be a failure of any kind, the field controllers can be switched to stand-alone mode and allowed to operate from their internal programs. No longer need an entire irrigation system be brought to a standstill because of a broken cable or a blown fuse.

Many large projects have switched to computerization. The Motorola system manages agricultural drip irrigation for more than 10,000 acres on each of the islands of Kauai and Oahu in Hawaii. Company headquarters, such as those of Mary Kaye Cosmetics in Dallas, Texas, TRW in San Diego, Calif., and Allergan in Irvine, Calif., all have decided on computerized irrigation systems.

"Motorola's MIR 3500 system was made to think like a superintendent," says Shayovitch. "In that way a superintendent does not have to think like a computer."

"The program is so flexible that it will even turn out the lights. If you have an automatic gate, the computer can open and close it. In fact, it can even be used as a burglar alarm."

Reliability is another great selling point for computers. "The solid state controllers that are used with a computerized system are much more accurate and conserve more energy than mechanical clocks," according to Hoover at Irri-Trol.

"They don't have all the electrical devices that require power and can malfunction," he explains. "There are significant variations in accuracy from an electromechanical clock."

Even before its inclusion in the Network 8000, the light pen was a popular feature of Toro computers. Skidgel says, "You only need to point it at the screen. The computer will take its instructions from the light pen." Toro's full-color screen has also been featured for some time.

Since pioneering its Maxi, Rain Bird has further explored the computer age. With technology changing so rapidly, the company has taken the position that it can better serve the needs of its customers by offering a reliable IBM computer as part of its system, and was among the first to use the IBM-PC.

"Random access is a feature that is unique to us," says Shoemaker. It allows the user to address any device in the program, such as a sprinkler or a sensor, at any time—without interfering with the rest of the program.

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