worked between two separate piles of the modified mix which had been pre-tested for sand content, gradation and pH."

The final grade was completed, and then the irrigation system was installed. "It was necessary to refinish the grade," explains Wirick. "The field is crowned with a gradation of 1.7 to 2.5 for improved surface drainage."

Though multiple trucks brought in the precast concrete and other heavy equipment was needed to complete the construction, the integrity of the field surface was preserved. Artificial turf was installed at both sidelines, stretching from one 30 yard line to the other for the team area and benches. A strip of turf approximately 3 feet wide separates this strip from the field.

"The contractor slice-seeded the new field with a bluegrass blend and stayed around through the second or third mowing," says Wirick. "Then, in the spring of 1991, it all became my responsibility, and panic set in. Actually, I'd been exposed to enough of the specialized needs of sports turf to realize I'd need some technical help — and that I'd have to be a fast learner.

"John Anderson, with Arthur Clesen, Inc. of Wheeling, IL, (and formerly with the Scotts Company) has been our unofficial consultant since the field's conception. And I have a terrific staff. My full-time crew, Don Baron and Tom Rosenbaum, and part-time crew member Steven Kerr are dedicated to getting the job done right. The school system's custodial department assists by handling some of the mowing at the satellite properties, and we have additional part-time summer help. My supervisor, Gordon Lorentz, director of grounds and building maintenance, has provided input and been very supportive."

With the initial game set for September 1992, Wirick and crew had the whole summer to establish playable conditions. However, the well water used in the irrigation system produced a fine sand that contaminated the sprinkler heads. While repairing the heads and installing a better filtration system, they used a 1-inch hose and self-propelled water cannons along with aboveground sprinklers to keep the grass growing through the summer heat.

By the opening kickoff, the field was in great shape. Wirick says, "Since that first game, the community, coaches, players and fans expect to have a fine playing surface."

Demaree Stadium gets a workout, hosting about 20 events a season, including 17 football games. The varsity, junior varsity and freshman teams all play their home games on the field. The district's two middle school teams play special games there. In addition, a Powder Puff game is held the night before homecoming. In 1994 Demaree Stadium hosted the local Punt, Pass and Kick Contest, a National Drum and Bugle Corps Contest and the fund drive kickoff for the local United Way. In both 1994 and 1993 the field was used for the Pop Warner National Finals.

It's not just on-site spectators who view all this activity. Games and special events get good coverage from the local cable and PBS television stations.

Field Maintenance

"Turf is a living, dynamic thing," says Wirick. "I lay out a master maintenance plan for the year, then adjust the scheduling as necessary to comply with weather conditions and field-use schedules. What I planned in procedures and timing may not turn out to be what we actually do. With nearly 100 acres of sports turf fields, we have to be flexible."

Following the close of the football season, Wirick core-aerifies the game field in four directions, drags to break up the cores and then removes thatch with a hand rake if necessary. This is followed with an application of 22-0-22 fertilizer.

Demaree Stadium hosts about 20 events a season, including 17 football games.

The basic turf is Medalist Premium Bluegrass Mix. Wirick overseeds at the rate of three pounds per 1,000 square feet in early November. He says, "I prefer the strong rooting and recuperative power of the bluegrass, so we stick with it as much as possible. We'll overseed with Medalist Gold Perennial Ryegrass at the rate of two pounds per 1,000 square feet during the playing season only if the turf canopy thins enough to warrant it."

Field manager Don Wirick (left) and part-time crew member Steven Kerr paint yard lines on the field.

Wirick runs a soil test every two years to adjust the fertility program. The pH levels have been running at 7.2, so he applies sulfur in late November and again in the early spring.

In late March, the field is mowed to a 1-inch height to stimulate early growth. That height will gradually be adjusted up to the in-season height of 1 1/2 to 1 9/16 inches. Wirick added a reel mower to the equipment arsenal last year. He's pleased with the clean, manicured cut — and the ability to add a distinctive five-yard striping pattern. The field is mowed three to four times a week during the off season, daily in season.

In late March or early April, Wirick again aerifies, then overseeds with the bluegrass mix and drags to break up the cores and work in the seed. This is followed by an application of 11-23-10 fertilizer. The first season, he included Tupersan preemergence control in this application. It hasn't been needed since.

Three weeks after the high phosphorus application, he'll fertilize with 22-0-22 and follow this with 30-4-6 in mid-May. Any broadleaf weeds are spot-treated in May.

If the field shows signs of compaction, Wirick will aerify in mid-June using a two-direction, criss-cross pattern. This is followed by an application of high potash fertilizer to bulk up the turf and help it withstand the stress of July heat. If temperatures are cool, he'll do another light aeration is July. If the heat is on, he'll skip it.

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Demaree Stadium

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"As the football season approaches, we move into high gear," says Wirick. "We'll make an application of 25-5-15 fairway fertilizer to improve turf color. A day or two before important games and special events, we'll apply a micronutrient mix, including iron, at the rate of 2 1/2 pounds per thousand square feet."

During football season, games are played most Thursday and Friday nights, and some Wednesday nights. On either Friday night or Saturday morning, the crew walks the field to replace divots, then irrigates heavily. Wirick says, "The players seem to get bigger and the games more competitive each season, and they can really kick up divots. Why waste that turf if you don't have to? We do have access to comparable sod from a local grower. So far, we've only needed it for a few spots along the sidelines."

The field isn't painted for every game but is for every varsity game. It takes three days to do the complete painting. A group of parents from the football team has volunteered to paint the team's Pirate head in the center of the field the night before varsity games. They use an indoor/outdoor stencil. The next day's mowing makes the lines crisp.

Sideline Drainage

Wirick says, "One of the problems we encountered following completion of the stadium was sideline drainage. Though provisions had been made for surface drainage, large amounts of storm water would shed off the stadium across the artificial turf team area. Surface drainage from the field would then collect on the sideline. The subsurface drains could move this amount of water, but the water failed to percolate adequately.

"We solved the problem in 1994 by adding three surface drains on each side of the field, one at the 50 and at each 35-yard line. Then we contoured the ground with topdressing to channel the runoff to these drains."

With nearly 100 acres of athletic turf and 700 acres of other grounds, Wirick and his crew always have plenty to do. Wirick is gradually upgrading the other varsity fields. He'd like to bring them all up to the level of the football game field, but, as with programs everywhere, staff and budget constraints make it a gradual process.

Wirick says, "The level of interest in the athletic program has increased tremendously. I'm sure the TV coverage has helped. The school district and the community do understand that our ultimate goal is to alleviate injury. The aesthetic quality is important, but it's secondary to player safety.

"After four years in this industry, I've become addicted to sports turf. This position demands lots of hours. My wife, Carla, understands my addiction and is really supportive. She also rallies the support of the kids, Jessica, age nine, Brian, age seven, and even two-year-old Joshua.

"The forethought of the administration and the commitment of the community to back the project and to maintain it at top level has enhanced the beauty of not only the complex but of the town of Merrillville. Without all the help this team has provided to me and my staff, Field of the Year status would have been a distant dream." ❑

Bob Tracinski is the manager of communications for the John Deere Company in Raleigh, NC, and public relations co-chair for the national Sports Turf Managers Association.

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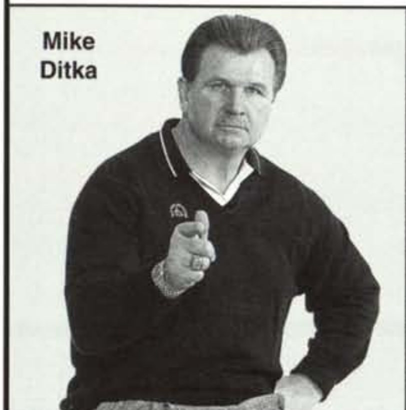

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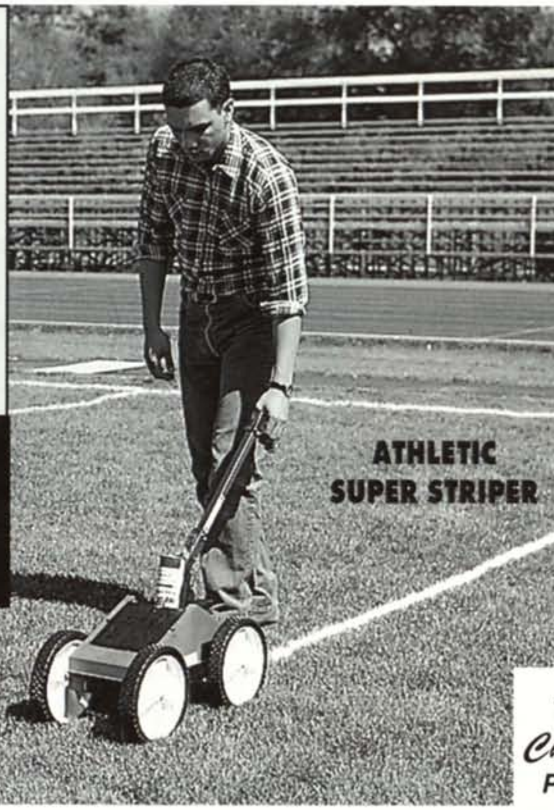

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Get a Grip on Your Irrigation Program

Precipitation rate is measured through catch cans placed near the sprinkler and halfway to the next one. The testing run time should be enough to collect 25 ml of water.

By Robert Walker, Mike Lehmkuhl, Gary Kah and Paul Corr

Good water management on sports fields results in irrigation efficiency, which is achieved when most of the water applied is used by turfgrass. Water savings from the irrigation system can be accomplished by using irrigation schedules based on a knowledge of the performance of the irrigation system and the plant's need for water. The results of good water management include:

- reduced water usage and fewer dollars spent on water;
- improved field appearance and fewer wet or dry spots;
- reduction of water loss below the rootzone; and
- reduced fertilizer and chemical requirements.

Good performance generally means applying the irrigation water as uniformly as possible without runoff. Good-performing systems are the result of an appropriate design, followed by maintenance to keep the design intact. Continuing good performance depends on adequate maintenance, financial support for the proper replacement commitment and the human resources required to make repairs and adjustments.

To determine the system performance characteristics of *distribution uniformity* and system *precipitation rates*, a landscape audit should be performed. An audit consists of a series of field procedures for collecting irrigation system data, then the use of computer software to evaluate system performance characteristics.

During the irrigation-audit phase, sites that demonstrate potential water savings are identified, and information about each site's technical characteristics and controller capabilities is obtained. Data, such as site maps, irrigation plans and water-usage records, is analyzed to determine which sites are using more water than necessary. Areas are then identified that will benefit most from improved water management.

The two phases of landscape water management, *irrigation audits* and *irrigation management*, can be broken down into a series of steps. They are:

Irrigation Audits	Irrigation Management
1. Select Sites	1. Implement Base Schedule
2. Tune System	2. Schedule Adjustment
3. System Tests	3. Track Water Use
4. Calculate Base Schedule	4. System Maintenance

Site Selection

When analyzing multiple-site water-management programs, the first step is to identify sites having maximum potential to save money. Reference evapotranspiration (ET) and rainfall data are essential. In California, the Department of Water Resources California Irrigation Management Information System (CIMIS) can be used as a source for ET. In other states, local water districts or government agencies, such as the Natural Resources Conservation Service (formerly known as the Soil Conservation Service) may be a source for rainfall and ET data.

Another factor in site selection is determining the maximum water allowance based on the area's reference evapotranspiration, the ET adjustment factor and size of the field. The amount of water recommended annually in the irrigation schedule should not exceed the maximum water allowance.

The water meter or billing records can be used to determine water usage at a particular site. Include all water meters at the site in the total. Determine any non-irrigation water usage and subtract this amount from total water usage. One way to estimate non-irrigation water usage is to use water records from months when there is little or no irrigation.

Water usage for each site in a group can be used to decide the order in which sites should be audited based on the amount of water the site used compared to the amount needed or to the existing water allowance. The table in Figure 1 shows how a site group was ranked. The average annual ET of 48 inches used in this example is for a specific location in California.

Site Selection Ranking Table

A	B	C	D	E	F
Site Name ET_0 = 48"	Irrigated Area (sq ft)	Allowance (100 ft^3) ET_0 x 0.8 x LA x 0.00083	Water Use (100 ft^3) Water Bill	Water Use minus Allowance D-C	Priority
Central Park	233,500	7,442	8,272	8,272	1
East Park	195,300	6,225	5,660	5,660	3
Kid's Park	13,211	421	450	450	2

Figure 1

The larger the difference between the water usage and the allowance, the greater the potential for savings. Even the site where the amount of water being used is less than the allowance still holds some potential for savings, depending on the type of landscape plant material and the distribution uniformity of the irrigation system. One site, East Park, is using less than the allowance, while the other sites, including Kid's Park, are using more than the allowance. Use the total amount in excess of the allowance to decide which site should be audited first. In this example, Central Park should be audited first, followed by Kid's Park and East Park.

Prior to actual tests, a system inspection will identify obvious problems, such as broken sprinkler heads, sprinkler alignment and pressure problems. All obvious sprinkler system problems should be noted at this time. Look for valve malfunctions, sunken sprinklers, plugged equipment, lateral line drainage, slow drainage or ponding, and runoff. Check each sprinkler head to make sure the head is rotating. Leaks around seals and gaskets should be repaired.

Pressure Adjustment — Pressure always varies throughout a system; therefore, each station should be checked for the proper pressure setting. Standard pressure gauges, along with pitot tubes (for large sprinklers) or adapters (for spray or stream rotor equipment), are used to check the pressures at the sprinkler heads while the system is operating.

To obtain an estimate of the lateral pressure variation, take three readings in each zone — beginning, middle and end. If the pressure varies by more than 20 percent (highest to lowest pressure), the system should be evaluated by an irrigation expert who has a background in system hydraulics.

Pressure adjustments can be made easily on most electric control valves with "flow-control" stems. With the main line at "normal" pressure, open or close the flow-control stem until the expected pressure at the nozzle is achieved. Pressures can be reduced with this method (although excessive wear

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Sprinkler Auditing

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problems may arise if the valve is almost closed at the desired pressure). If the required pressure cannot be reached even with the valve fully open, a booster pump or system design change may be needed.

The procedures for system tune-up include:

1) Confirming availability of the sports field for audit. Make sure the field will not be used for a game or practice.

2) Obtaining and reviewing site plans for general orientation, plus location of important components, such as water meters, controllers and valves;

3) Locating the irrigation equipment, such as finding the point of connection (water meter) and first controller. Leave a person with a walkie-talkie at the controller;

4) Observing station operation by using a site inspection worksheet. Run each station and record observations; and

5) If possible, making the necessary adjustments and repairs to the system. This involves pressure adjustments, sprinkler repair and replacements, plus sprinkler alignment and adjustments.

Sprinkler System Tests

Once the inspection and system tune-ups are complete, system tests are conducted to determine irrigation system performance. Several methods have been developed to obtain the information required to analyze system performance.

With sprinkler systems, catch cans are used for measuring precipitation. Catch cans are placed near each sprinkler being tested and then halfway to the next sprinkler.

The next step is to start each station and flag the sprinkler heads, so they will be easier to locate. When testing multivalve groups, use different-colored flags for adjacent stations.

Each catch can should be horizontal and as low as possible. The catch can should be far enough away from the sprinkler to prevent the main spray from hitting the side of the can.

After the catch devices are laid out, each station is turned on for its testing run time until the entire test group has run. The testing run time should be long enough to collect 25 ml of water. When testing large rotary sprinkler heads, measure at least five rotations, then read whatever volume is in the cans. Two factors are recorded: the volume of water collected and the time in which it was accumulated (test time).

The volume captured in each device is estimated to the nearest milliliter. Hold the water at eye level and make sure that the catch can is horizontal. Read the "darker" lower line on the side of the can and estimate to the nearest milliliter.

Hydrozone Information

At the time of the system test, hydrozone information such as turfgrass species, planting density and station microclimate are recorded. This permits estimation of water demand in the station. Rootzone depth and soil type are recorded so an accurate irrigation frequency can be determined.

Soil Type — It is necessary to know the soil type for the landscape water maintenance (LWM) software to correctly determine the holding capacity and irrigation frequency. Use a soil probe at the site and define the soil type, then record the data in the appropriate worksheet location.

The texture (sand vs. loam vs. clay) of soil determines how much water can be stored within the rootzone of a plant. The structure (organic content, compaction) of soil influences the infiltration rate (how fast water can be returned to the rootzone). Compacted soils and thick thatch create low infiltration rates.

Rootzone Depth — Rootzone depth is another factor in determining irrigation frequency. To determine the rootzone depth, use a soil probe to take soil cores. If it is impossible to get a hand coring, an adequate depth can be estimated based upon plant type and stage of growth.

Lateral Pressure — Make sure test pressures are the same as normal operating pressures. Daytime demands may differ from nighttime demands, resulting in differences between daytime and nighttime pressure. Proper test pressure plays a large role in determining the success or failure of the catch-can test. Also look for variation, which is a potential source of poor distribution uniformity.

Pressure Checks on Different Sprinkler Types

The correct method for testing the pressure on *large rotor-type* sprinkler systems is to use a pitot tube. Stick the pitot tube directly into the nozzle. The key is to check for pressure differences between the heads. Each pressure reading will have about the same amount of error if each reading is taken the same way.

Spray and stream rotor sprinklers have adapters designed to fit under the sprinkler head. A pressure gauge is then attached to the adapter, and the pressure is read directly from the gauge. Pressure readings should be taken on each lateral being tested to provide a picture of the pressure uniformity on spray and stream rotor systems.

Schedule Calculation

Use the LWM software to calculate irrigation schedules for each station at the site. Stations are grouped by LWM into "programs" to facilitate controller programming. Implementation of these schedules can reduce water usage.

Once base schedules are created, they should be reviewed for practicality. Starting times should be arranged so that multiple programs are not running at the same time.

After the auditing process, you'll have a clear assessment of your irrigation system. With the increased distribution uniformity, you'll notice lower water costs and heightened turfgrass appearance. Periodic audits will ensure the irrigation system is working at its peak performance. ❑

Robert Walker is a professor of agricultural engineering at California Polytechnic State University, San Luis Obispo, and is director of the Landscape Water Management Program at the Irrigation Training and Research Center on campus. Mike Lehmkuhl is the irrigation project manager and trainer, ITRC. Gary Kah is a consultant to ITRC and president of AgTech Associates. Paul Corr is a consultant programmer to the ITRC.

Hydraulic mulching was used to establish this athletic field at the Punahau School in Honolulu, Hawaii. Photo courtesy: Dr. Charles Murdoch, University of Hawaii.

Establishing or Improving Turf with Hydraulic Seeding

By Daniel Ingham and Mike Augsdorfer

Hydraulic planting, which includes both sprigging and seeding, is a unique and effective means of establishing an athletic surface or improving an already established field. The process is somewhat like spray-painting a surface: The operator merely points and shoots the solution (called slurry) directly onto the soil. The slurry often includes fertilizer and mulch, along with water, so all the necessary ingredients for successful growth of turf are included in one application. The mulch and water help to keep the seeds or sprigs in place, resisting the erosion impact of irrigation and rainfall.

The cost of hydraulic planting falls somewhere between traditional mechanical planting and sodding. Basically, the tradeoff is time versus dollars. A facility that can afford to spend a great deal of money on establishing a new field — such as professional sports teams or major college athletic facilities — will usually opt for having the field completely sodded. A facility that must minimize expenses will usually go with mechanical planting, which is less consistent and takes more time. Hydraulic planting, however, is not substantially more expensive than mechanical planting and can provide a good-quality athletic surface with less "downtime" than mechanical planting.

Michael Lansdale, owner of Metamorphosis Hydroseeding in Santa Cruz County, CA, says hydraulic seeding is a very effective way to establish a consistent turf stand quickly and efficiently. "Hydroseeding is a process of blending seed with water and fertilizer and a mulch component and tackifier, a sort of organic glue," he explains. "It distributes the seed evenly and gives the seed protection. The mulch component gives it a moisture-holding ability."

Scott Johannes of Sanders Hydroseeding, Inc., in Santa Ana, CA, uses a similar method. "We add a mulch — either recycled paper or virgin wood — into the tank, and that holds moisture to give the seed a better chance of germinating," he explains. Johannes says that hydraulic seeding is a cost-effective method for seeding large areas and adds that hydromulch can act as a nurse crop around a spot sprigging to encourage the spreading of the turfgrass.

Hydraulic planting is most popular in the Southwest, particularly for establishing bermudagrass fields with sprigs. Metamorphosis Hydroseeding and Sanders Hydroseeding are just two of several companies that perform complete hydraulic planting services in California. "We do sports fields all the time," says Lansdale. "It's very effective with all sorts of turfgrass varieties." The company recently used common bermudagrass to seed a football field for Piedmont High School, east of San Jose, CA.

Johannes says Sanders Hydroseeding has also been involved in a number of sports field projects, including several practice fields at Citrus College and a youth athletic park for the city of Mission Viejo. The company also does extensive work on golf courses, including hybrid bermuda sprigging on the south golf course at Coto de Caza, CA.

Another company that has worked on a variety of projects throughout California is Southern California Hydroseed and Hydromulch, Inc., of Temecula,CA. The company has worked on a number of different landscape projects, including high school athletic fields in Bakersfield and many golf courses in Southern California. Owner Mike Santoro uses "rotor-stator" pumps that can handle sprigs with minimal damage and maximum productivity. "These pumps can push through as much as 1,000 feet of 1 1/2-inch hose, allowing the applicator to move freely about and minimize the distances traveled by the heavy equipment on prepared surfaces," he explains. Santoro adds that large areas can be sprayed from the perimeter, so workers and equipment will not disturb the final grade.

Of course, California isn't the only place where hydraulic planting is popular. TransAmerica Hydroseeding of Vermont handles projects throughout the New England states. "One reason is the places you can get to and, more generally, the price," says Yvon Montour, president of TransAmerica Hydroseeding. Montour says his company can seed or sprig up to 10 acres per day with results that are as good as or better than standard mechanical seeding or sprigging methods.

Briargreen, Inc., of Kent, WA, handles many hydraulic-seeding projects in the Pacific Northwest. "A lot of the surfaces are sand, and one of the advantages of hydraulic seeding is that moisture retention agents can be added, so the seed can be kept wet," says Carol Davis, general manager of Briargreen, Inc. "We have trucks that shoot about 250 feet, so we can access the whole field from the perimeter. A typical three-acre field can be shot in six hours." For overseeding Davis recommends mowing the areas to be overseeded very short. The hydraulic-seeding mixture is then made thinner, so that it will slide around the established grass and settle. Briargreen recently completed a 12-acre project at a junior high school in Federal Way, WA. The company has also worked with Lakota High School in Federal Way and various Little League fields throughout the state.

Hydraulic seeding is also an effective means of overseeding areas of thin or worn turf. Photo courtesy: the Broyhill Company.

Mike Hebrard, president of Athletic Field Design in Portland, OR, recommends hydraulic seeding for large areas of turf. "If you have proper irrigation, you're going to be in good shape," he notes. "It gives you better protection

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Hydraulic Seeding
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from wind, excessive rain, birds, etc." Hebrard says many times hydraulic seeding is specified for a particular project, especially if the job involves growing grass on slopes along the side of a field. In many cases hydraulic seeding is used to establish fields that are not irrigated in the fall because rain is so plentiful at that time. "Some guys will let their seeds soak in the tank overnight to get some germination," he adds.

Do It Yourself

Although hydraulic planting is usually contracted out to a company that specializes in this type of work, turf managers who frequently overseed or need to reestablish fields from time to time may want to consider purchasing hydraulic-seeding equipment and doing the job themselves. Hebrard thinks hydraulic seeding may be the easiest way to establish turf. "Anyone seeding for the first time can get better, more even distribution with a hydroseeder than with a dry seeder," he concludes.

Hydraulic seeding is the most cost- and labor-efficient method of seeding, once you have the equipment. Landscape contractors have found it easier and cheaper to hydraulically seed turf than to plant it the old-fashioned way. It is also cheaper than sodding, while offering some of the benefits.

A hydraulic seeder consists of a mixing tank, a pump, a motor and a hose. The prime power source is commonly a gasoline or diesel engine used to drive a pump and agitating system, which keeps the slurry mixed within the tank.

Tank agitation systems use either a recirculation pump or rotating paddles to keep the slurry mixed within the tank. Recirculation systems agitate the tank solution by using the main pump to divert some of the flow back into the main tank. While this method is efficient, recirculation pumps can damage some of the seed when the contents of the tank are circulated through the pump impeller.

In the paddle system, the motor, in addition to driving the pump, also drives a slow-speed paddle that gently keeps the seed slurry mixed and in suspension. However, paddle-system machines are generally more expensive.

Tank capacities range from 100 to 6,000 gallons, and the small units can be mounted in the back of a pickup truck or on a small trailer. The cost of these small pickup truck- and trailer-mounted units today ranges from about $2,000 to $10,000.

Slurry Composition

Hydraulic seeding is not complicated, but the process is not well-understood either. The procedure entails mixing grass seed, mulch material, fertilizer and materials such as tackifiers with water. This mixture is sprayed under pressure onto the desired surface. A green dye is also mixed with the material to allow the operator to see where it has been applied and for aesthetic value until the seed germinates.

Better seed-to-soil contact and the addition of fertilizers to the mix helps to increase the germination rate. Presoaking seeds in the tank can help speed germination as well.

Repair, renovation and overseeding are easily accomplished by prepping the area prior to application and reducing mulch levels to avoid smothering existing grass. Preparation consists of cutting grass very short prior to application; dethatching and aerating will increase soil-to-seed contact and promote quick, deep rooting. For these types of applications, a reduced amount of mulch will allow the seed/mulch mix to settle between existing grass for better seed-to-soil contact.

Hydraulic planting mulch is the material that makes hydraulic seeding possible. This water-laden mulch travels farther than either the water or seed alone would. Once on the soil, the mulch creates a "mat" that holds the seed in place, retains soil moisture, resists wind and water erosion, and creates a favorable environment for seed germination.

Seeding results are directly proportional to the application rate and density of the mulch used. More mulch is usually better than less. Mulch materials can be wood fiber, chopped newspaper, chopped corrugated cardboard, paper mill sludge or some combination of these.

A tackifier is a powdered organic glue that, when added to the seed slurry, serves to keep the mulch blanket in place and help it to withstand wind and rain erosion. On a flat surface, such as a sports field, tackifiers help reduce dust and prevent high winds from drying out the mulch or blowing the seed away.

Virtually any fertilizer formulation can be incorporated into the hydraulic-seeding slurry. Applying fertilizer and other material through a water solution offers materials flexibility, application flexibility, and reduced manpower requirements. Even dusty, hazardous materials such as soil sulfur, necessary for the correction of high calcium situations, can be spread through hydro-fertilization. Other materials can be applied, including insecticides and herbicides. Also, soil amendments such as lime and gypsum, or organics such as sludge and humus can be applied with or without the seed.

Because many small seeders are designed similar to a standard sprayer, they can be used for purposes other than hydraulic seeding. They can be used to apply large amounts of liquid fertilizer, herbicides, wetting agents and liquid-soluble soil amendments if other sprayers are not available or out of service. They can also be used for emergency irrigation if the regular irrigation system shuts down for any reason. A change of nozzles is all that is required for some of these alternative applications.

Whether you do it yourself or contract the job out to a company that specializes in this type of work, hydraulic seeding is an effective way to establish turf for a new field or to overseed a previously established field. Hydraulic seeding is particularly useful in areas that are vulnerable to erosion by wind or other natural events. If complete sodding is too expensive, hydraulic seeding is a cost-effective alternative for establishing turf on an athletic field. ❑

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Easy Lawn, Inc.,	(800) 638-1769
Finn Corporation,	(800) 543-7166
GeoQuip, Inc.,	(800) 848-1212
Hydro Turf Inc.,	(708) 551-1555
Hydro-Turf & Associates,	(612) 452-6749
James Lincoln Corp.,	(800) 551-2304
Jiffy Equipment Corp.,	(812) 333-2428
Klusmeier Inc.,	(800) 659-9967
LESCO Corp.,	(216) 333-9250
Reinco Inc.,	(800) 526-7687
TGMI, Inc.,	(800) 241-8464
Turf Products, Inc.,	(612) 452-6749
White Outdoor Products,	(216) 273-7786