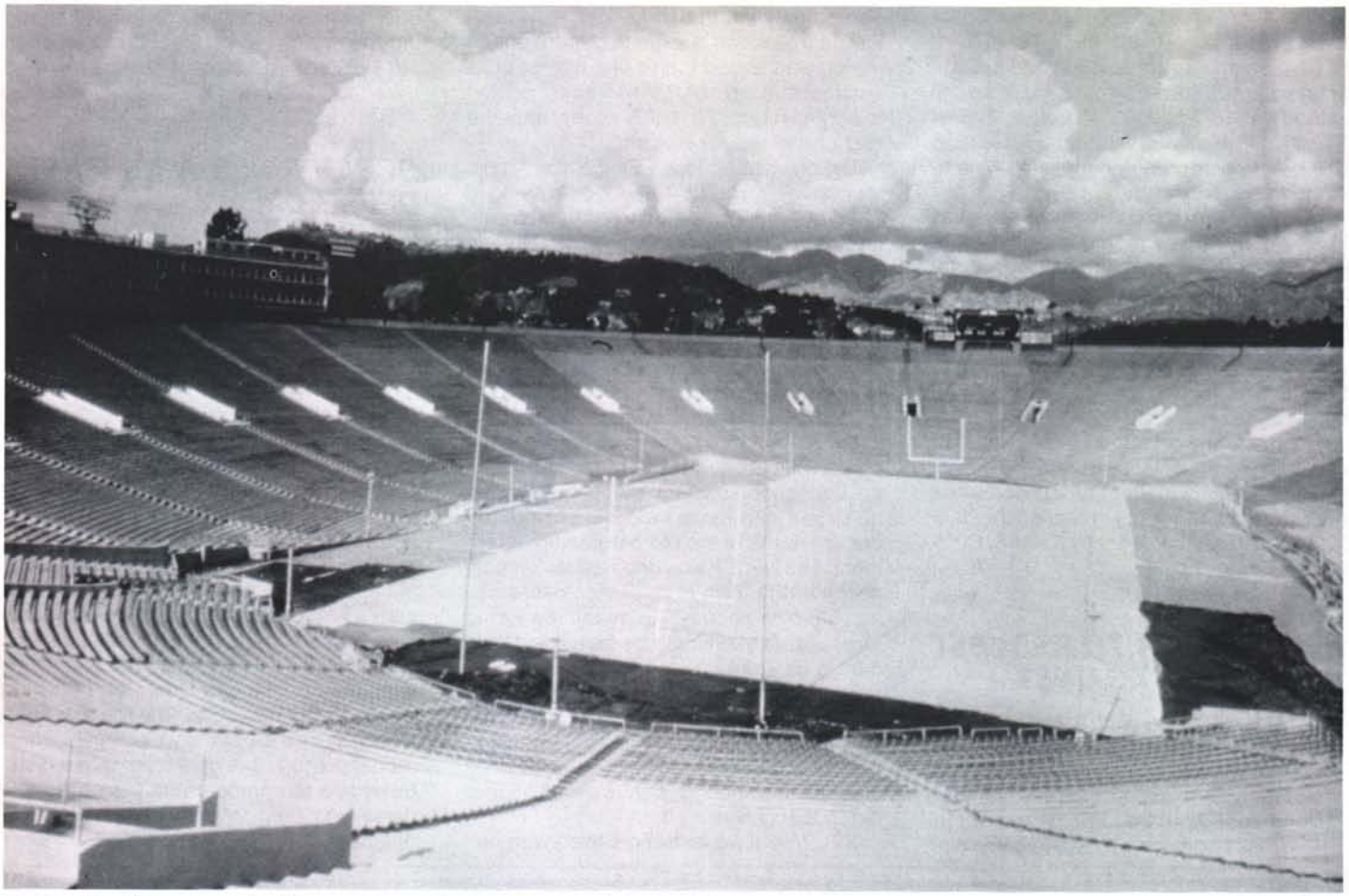

The Rose Bowl uses a germination cover to speed up germination of overseeded ryegrass.

TEXTILES
For Turf and Landscape

Foul weather is part of outdoor sports. From the damp, frigid winds whipping across the golf links in the spring and fall to the occasional blizzard during Thanksgiving Day football games, both athletes and spectators have devised ways to protect themselves.

Golfers don heavy sweaters and windbreakers to finish their rounds. Football, soccer and baseball players wear an extra jersey or two underneath their uniforms. Spectators bundle up with coats, blankets and heavy socks to fight off the cold as they watch their favorite team or player in action. The game must go on.

Fabrics enable both players and spectators to enjoy their favorite sports despite unfavorable conditions. Sports turf managers are beginning to realize that similar textiles can be just as important to turf and surrounding landscapes as they are to athletes and fans.

Textiles developed largely for the clothing or flooring industries can now be used for a growing number of landscape purposes. They can keep mud and silt from plugging underground drainage systems, prevent weeds from emerging in plant beds and stabilize soil on slopes and in drainage channels. They can also keep soil temperatures up during the fall for faster germination of overseeded winter grasses or in the spring to get bermudagrass out of dormancy earlier, prevent winterkill of sensitive turfgrasses in exposed areas and shelter turf from snow, debris, rain or traffic. New uses for textiles and membranes are being found every month in the sports turf industry. Their importance to the protection and maintenance of recreational areas is growing constantly.

> Textiles can now be used for a growing number of landscape purposes.

"Sports turf managers themselves have really pioneered the use of geotextiles," explains Emory Hunter, manager of specialty products for Warren's Turf Nursery, Inc. "Stadium managers and golf course superintendents looking for solutions to some of their most pressing problems actually come up with new uses for fabrics and then ask us to create the right product."

Hunter tells the story of finding a way to protect one natural turf stadium field for the Michael Jackson concert three years ago. David Frey, director of facilities for the Cleveland Browns, had a game three days after the scheduled Jackson concert. Covering the field with straw and plywood for nearly a week while the concert was set up and held was too risky. He started looking for a blanket that would cushion the turf from

equipment and thousands of fans and could also stay down on the field for nearly a week. Light and air had to reach the turf while it was covered.

Frey had seen geotextiles placed under plywood ramps along the side of the field so television cameras could move up and down the field during a game. He knew they distributed the weight of the cameras over a large area and prevented soil compaction. But covering the field and geotextile with plywood for a week was too much. It would block air and light from the green turf below. With most of the season yet to go, he needed to keep the turf growing. He wanted a cover that would protect the field, would let air and light through, and could take the abuse of dancing Michael Jackson fans.

Since Cleveland Stadium had been a longtime sod customer of Warrens, Frey called Emory Hunter and asked if he knew of any covers that could protect the field without plywood. Oddly enough, Hunter had been testing geotextiles for various turf and weed control uses. "That was the birth of TerraCover," reflects Hunter. The entire field was covered with the light gray blanket for more than five days without significant discoloration or damage to the turf. "If Dave hadn't called, we might not have had such an important test," reflects Hunter. "He also came up with the idea for the bench tarp, geotextile made in a 16 feet-wide by 75 feet-long piece that protects the turf in the bench area."

The fabric used to protect stadiums from compaction during rock concerts is a relative of the fabrics used for plant bed weed control and filtering out silt and clay from perforated drainage pipes. But it's only one of many types of textiles used by institutional landscape managers today.

There is a group of materials loosely termed "*geo*textiles" since they are used for a variety of land uses. This general term really needs to be divided into three categories explains Palmer Skoglund, manager of the BASF Fibers Group.

Geotextiles are really woven or nonwoven fabrics produced in a variety of widths and weights (ounces per square yard). While they are essentially flat, the amount of fiber in them and their thickness can be changed to provide a wide range of weights. If the fibers in the geotextile are not woven together, they are bonded together by heat, chemicals, a process called needlepunching or a combination of these. Geotextiles are usually made of either polyester or polypropylene.

Two other terms you'll hear from geotextile salesmen are continuous filament or staple. Continuous filament refers to a fabric that is constructed of long fibers woven or bound together. Staple does not refer to metal clips. Staple is a term used in the textile industry to refer to short lengths of fiber that are bound together when making a fabric. For example, wool is a staple spun into yarn.

The primary advantage of geotextiles is

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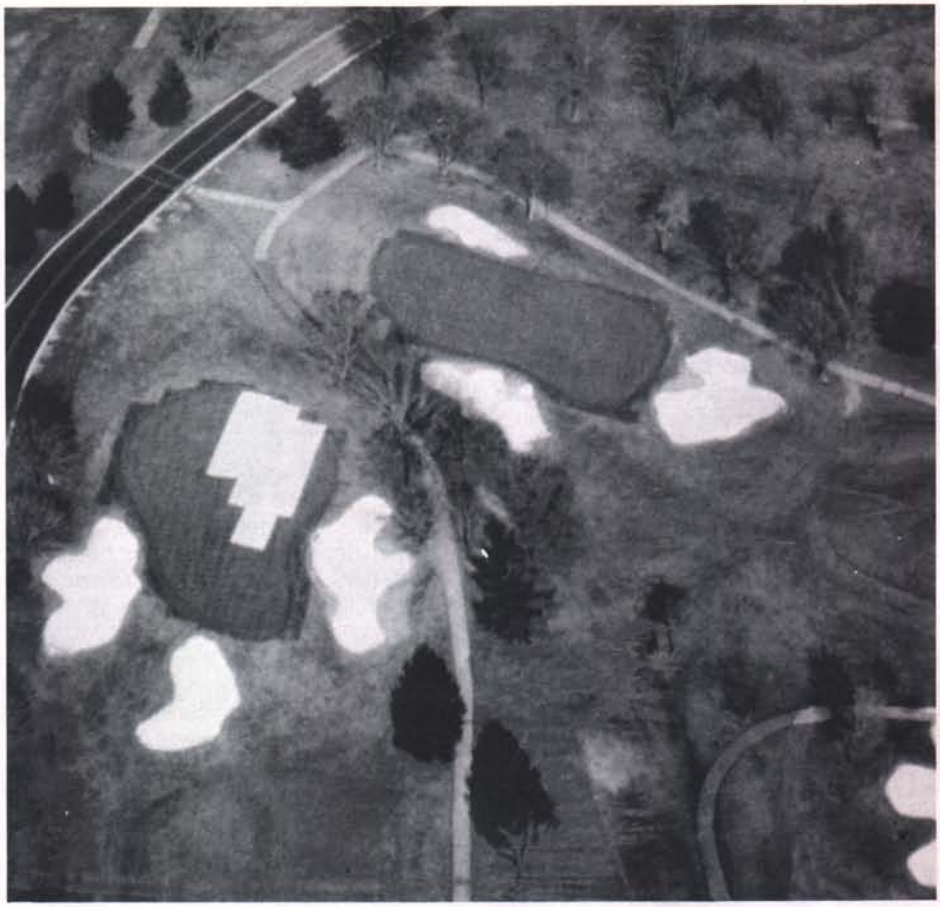


Aerial view of golf course with geotextile warming cover on part of one green.

Sports turf managers are beginning to realize that textiles can be just as important to turf and landscapes as they are to athletes and fans.

Small covers for the skinned portion of baseball fields are affordable options to full field covers.

that air and moisture can pass through the fabric in the space around the fibers. However, the fabric can be manufactured tightly enough to stop weed seedlings from growing through it. The network of fibers also absorbs and distributes any weight placed on top of the fabric without tearing. In addition, sunlight passing through geotextiles can be controlled by the color, density and thickness of the fabric. Since these materials are fibrous, they are lighter than solid sheets made from similar materials.

Geotextiles exposed to sunlight should contain an ultraviolet light inhibitor to extend their life. When used for weed control they should be covered with three inches of mulch to block out damaging light.

Geomembranes make up a second group. These thin sheets of extruded plastic (polyethylene) are impermeable to air and water. Clear plastic membranes allow sunlight to penetrate easily while trapping warm air and moisture. At the same time they keep out cold air, rain and snow. For this reason they are often used as greenhouse covers. They can do their job too well and subject plants they cover to high heat and disease-inciting humidity. Perforations can be made in these clear membranes to allow limited exchange of air, heat and moisture.

Black or dark plastic membranes block out nearly all light in addition to air and moisture. These traits have drawn some landscape managers to use them as weed barriers beneath mulch in plant beds or as pond liners. Geomembranes are also used beneath specialized root zones for greens and athletic fields to control moisture levels.

> Turf growing in geomatrixes will withstand greater traffic without damage to roots and crowns.

The third category is referred to as geomatrixes says Skoglund. These are three-dimensional materials with large spaces between heavy filaments or walls. The strength of the components provides a structure to stablize soil, roots or other materials. They are often used to stabilize soil on slopes, especially when plant roots grow through the material. The structure of geomatrixes can resist and distribute weight and wear placed upon them that might otherwise compact soil or damage plants.

Turf growing in geomatrixes will withstand greater traffic without damage to roots and crowns. Slopes, entries or areas beside paths can support turf with the extra protection afforded by the geomatrix.

Sports turf managers' first exposure to geotextiles was to canvas tarps. Made from woven linen, hemp or cotton, tarps were heavy and had to be treated with oils and other materials to make them water repellent, explains Bob Curry of Covermaster. Not only were they heavy and awkward to move to cover large areas such as baseball fields, they could not be left on top of turf for more than a few hours without causing damage. It would take a crew of 15 to 20 people to move a heavy tarp into position during or before rain or snow. Due to their weight, stadium managers had to use a number of tarps to cover the field, overlapping the edges to keep water from reaching the soil.

Canvas tarps are considerably heavier when wet or frozen. Removing them was a herculean task. They also took a considerable amount of time to dry. Stored wet, they were subject to mildew, tearing and rapid degradation. To solve moisture, strength and durability problems, manufacturers starting coating the canvas with vinyl. Vinyl-coated canvas tarps are still found at many stadiums across the country. However, they re-

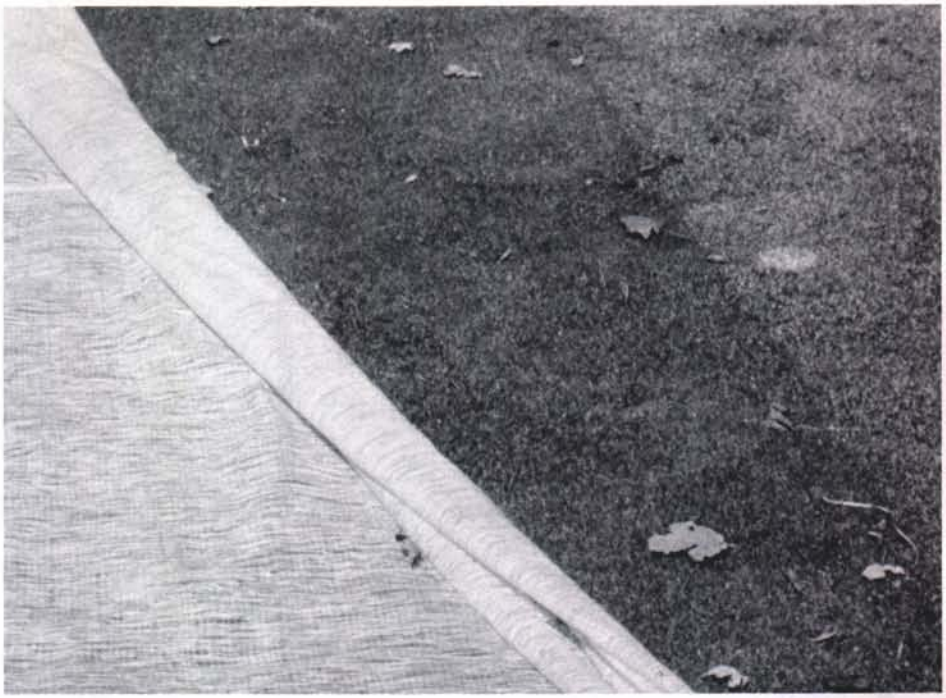
main heavy and hard to move. They are also among the most expensive tarps to purchase.

Canvas tarps were also used on golf courses, parks and campuses to protect piles of topdressing, sand and mulch. After prolonged exposure to sunlight and weather, these tarps would begin to deteriorate. Sports turf managers started to look for lighter, easier-to-handle tarps for storage purposes.

Their first attempt at a replacement for canvas was the geomembrane. Companies such as Amoco, Du Pont, Hoechst and Phillips began to explore various types of membranes and textiles for landscape and turf applications. To improve the strength and durability of polyethylene membranes the manufacturers experimented with thicker membranes and added chemicals to them to resist breakdown by ultraviolet light. The thickness of these covers is measured in terms of mils. One mil is 1/1,000 of an inch.

The membranes did an excellent job of stopping water, but they also stopped air and became brittle in cold temperatures. By adding dyes to the plastic, manufacturers would also block out light. The first commercial use of clear membranes was for greenhouse covers while dark covers were adopted for weed control in plant beds.

Again, sports turf managers started experimenting with the membranes for their own purposes. Both golf course superintendents and athletic field managers began to use the tarps, modifying them to fit their needs. The air-tight covers were very useful for covering greens and other prepared seedbeds for fumigation. They experimented with the covers to create mini-greenhouses over greens and fields to protect them from cold winter temperatures and winds.



Turf covered with geotextile greened up weeks sooner than uncovered turf.

Tony Burnett, field manager at JFK Stadium in Washington, DC, covered the bermudagrass field in the spring to wake up

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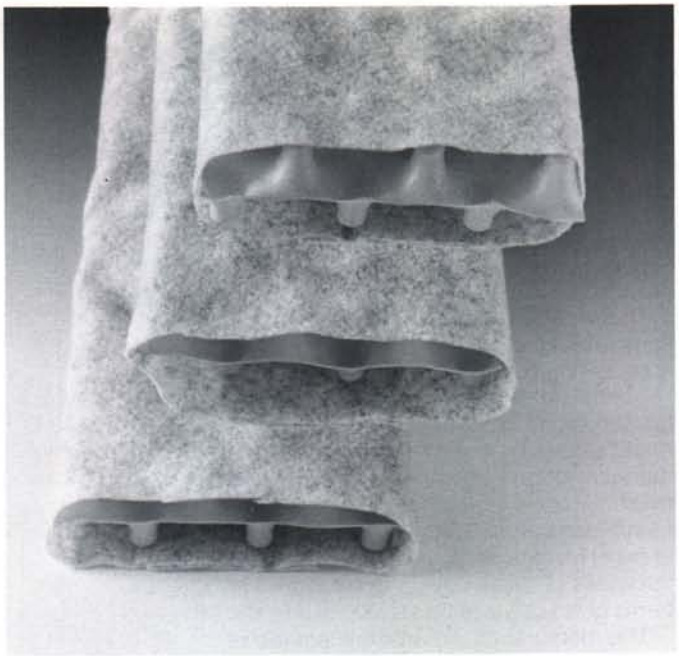

Geomatrixes can be wrapped with geotextiles to provide narrow drainage channels.

Textiles

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the dormant turf in time for spring exhibition baseball games. "Fields in this area are usually Kentucky bluegrass and ryegrass," explains Burnett. "When we rebuilt the field and put in a PAT system, we decided bermudagrass was better for football, so we had to make adjustments to help it during the winter. One of those adjustments was covering the field with plastic in the spring. Dr. Daniel (developer of the PAT System) suggested we punch holes in the plastic to allow air to circulate beneath the cover. This kept the field from getting too hot and reduced the chance for diseases." David Frey at Cleveland Stadium was also intrigued with the greenhouse effect of plastic covers. With the help of David Scherba, a balloon builder in Cleveland, Frey devised an air-supported greenhouse structure that covered the center of the field so he could germinate ryegrass in the fall. The structure covered just the area inside the hash marks between the 20 yard lines, the part of the field most damaged by football. "We wanted to cover more of the field but that's all we could manage the first time," explains Frey. "The temperature inside the greenhouse was ten degrees higher than the outside air. The ryegrass germinated fairly well and I was determined to try again." Frey built a larger air-supported structure this fall and pumped warm air from heaters into it. "Not only does the greenhouse warm the soil, you can work on the turf at the same time."

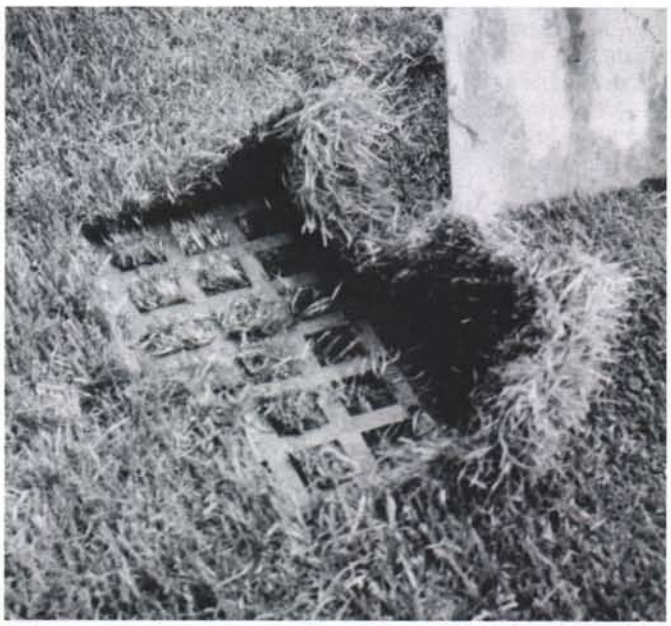
Superintendents in the Northeast started covering greens in the winter to reduce winterkill and accelerate greenup in the spring. But, they were also concerned about the effects of high humidity and temperatures on bentgrass diseases. To help answer some of their concerns, Dr. John Roberts at the University of New Hampshire started testing various covers. One of these covers was not a membrane, but a nonwoven fabric called Reemay from Du Pont being tested as a cover for vegetable gardens in the winter. "We got the same improvement in spring green-up and reduced winterkill on bentgrass as the membranes without some of the associated disease problems," Roberts recalls.

Roberts obtained samples of covers from various manufacturers so superintendents could test them on their greens. The results were very positive for a number of the covers and superintendents started asking where they could buy them. Roberts evaluated the covers for their benefit to the turf, and also for strength and transparency. "We were looking for a cover that could stay on the green all winter," explains Roberts, "and we found what we were looking for." Manufacturers responded to

the research results and started developing stronger and more transparent covers large enough to cover an entire green."

Some of the leading geotextiles for greens today are Typar from Reemay Inc. (formerly Du Pont), Evergreen from Hinspergers Poly Industries (HPI) and TerraShield from Warrens. These polyester geotextiles provide a high degree of transparency and strength while remaining light in weight and relatively simple to install. Also stemming from the work in New Hampshire are germination covers, light-weight geotextiles which serve to protect seed and seedlings during germination. They help moderate temperature and moisture extremes to increase germination rates of turf seed.

"One of the most important things a winter cover does for the golf course," says Peter Hinsperger at HPI, "is it keeps golfers off the greens during the winter. The cover tells the golfer the hole is closed so they won't try to play it."



Turf growing through geomatrix grids buried below the surface provide extra protection against damage in high traffic areas.

It was about this time that Frey discovered the anticompaction benefits of a geotextile for the Michael Jackson concert, actually a heavier version of the same type of geotextiles being tried in the Northeast for covering greens. This was the first use of Warren's TerraCover. Since then, Scherba has begun marketing a geotextile called Turf-Mat for concert protection. Furthermore, heavy, dark-colored versions of these geotextiles were beginning to replace membranes for weed control in plant beds. Geotextiles were rapidly gaining acceptance.

Word spread rapidly to stadium field managers and concert producers. Geotextiles are used today to protect both natural and artificial turf fields during rock concerts, mud bogs, tractor pulls, motocross and even religious events.

Since the geotextiles were lighter and stronger than the membranes, Burnett quickly switched over to HPI's Evergreen. In fact, JFK has three different types of field covers. It has a rain cover as required for all stadium fields by the National Football League. Burnett has explored new technology from Putterman & Co. with a two-sided vinyl tarp. One side of the tarp is white to reflect the sun in case the field must be covered during warm weather. The other side is black to absorb the sun's heat during the winter to melt snow or to warm the soil below.

Burnett has an Evergreen cover for two reasons. He covers the field at night during the fall to help establish the overseeded ryegrass. In the early spring he uses it again to bring the bermudagrass out of dormancy in time for exhibition baseball. In March and April, the cover stays on most of the time. "The roots of the ryegrass and the bermudagrass are almost three inches

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deeper than when we didn't use the cover," claims Burnett. "We also cover portions of the field for soccer from April through July. We can speed up the recovery of both the ryegrass and the bermuda in the goal mouths."

Since JFK is a popular site for concerts Burnett also has Warren's TerraCover, a heavier cover than TerraShield. "We've had this cover down for nearly a week without problems," says Burnett. "Even folding chair legs won't punch through the cover, but sometimes they will leave dents on the field. After the event, we pull the cover and top-dress with sand to fill in the dents. Since we have the PAT system, we can keep the field on the dry side before the concert."

Barney Barron, superintendent of park maintenance for San Francisco, also has three covers for Candlestick Park. "Protecting the field with covers has made a big difference at Candlestick," says Barron. "It never gets very warm at Candlestick. Using the germination cover has helped us get soil temperatures up when we need them up for germination or for helping the turf recover from a game."

It's important to note that geotextiles have not eliminated the need for waterproof membranes. Manufacturers have improved field covers by making them lighter, stronger, two-sided and more economical. Reinforced vinyl covers have increased the durability and tear-resistance of tarps. "A field tarp has to withstand strong winds and even abrasion from snow plow blades," explains Joan Koza, vice president of M. Putterman & Co. The company has also pioneered zipper-like seals that make the edges of adjoining tarps watertight.

"If anything, protecting artificial turf is more difficult than protecting natural turf," says Koza. "It's relatively easy to repair a cover compared to artificial turf. Rock concert covers must prevent damage by concert-goers or chairlegs.

Tarp makers are developing products that more colleges and high schools can afford. Covermaster recently introduced a cover kit for the skinned portions of baseball fields. "There is no doubt that sports turf managers at many colleges, schools and parks would like to have a tarp if they could afford it," remarks Bob Curry of Covermaster. "Since the dirt is more important than the grass in baseball, the cover kits fit a need at a very low cost."

Lightweight tarps are also growing in use, especially at spring training camps in the Sun Belt. These tarps, usually with one white or silver side, fit the needs of southern field managers who don't have to put up with snow. They are lighter and less expensive than the heavier vinyl tarps but do an equal job of protecting the field from rains. "These tarps are within the price range of a greater number of sports facilities," says Koza.

The use of geotextiles continues to grow. Two of the most widely-accepted new uses are as mud filters for drainage and as soil separators underneath cart paths, parking lots and entrances to utility buildings. The geotextiles have the ability to separate fine soil particles from water. Initially turf managers wrapped perforated drainage pipe and lined gravel in french drains with the fabric to keep mud and silt out so the drains wouldn't become plugged. Then geomatrix materials were wrapped with the fabric before being inserted upright into narrow trenches and covered with gravel. Suddenly drainage could be installed or corrected by digging a two-inch wide trench instead of a much wider one. This reduced handling of dirt and sped up the installation process.

Soil separation is an older use borrowed from the construction industry. Since the geotextiles filter out silt and mud, they can prevent these materials from infiltrating sand traps, gravel paths and lakes. These materials also help distribute weight which prevents rutting and uneven settling. The combination of soil separation and weight distribution can greatly extend the life of cart paths. One of the most recent uses for geotextiles (heavier versions) is to block tree and plant roots from extending below important turf or paved areas. By inserting the fabric filled with gravel into trenches surrounding important areas, roots can't penetrate, explains Gary Anderson of Reemay Inc. By blocking the roots from these areas, heaving and surface roots are prevented. Anderson says the geotextile barriers will not disrupt drainage as solid root barriers can.

The root-blocking ability of geotextiles has been put to use by manufacturers to replace geomembranes. Since membranes will not let air or water through, a space had to be left around plants to permit water to reach the roots. Weeds would then grow through the uncovered area around the plants. Geotextiles can cover the entire soil area around plants without affecting water and air exchange while still blocking weed growth. The list of manufacturers with weed control geotextiles and landscape fabrics grows each month.

A few golf course superintendents are lining ponds and irrigation lakes with heavy geotextiles to control aquatic weeds without chemicals. The filtering ability of the fabrics also keeps soil from entering the water. Reemay is introducing a product that is a geotextile lined with a membrane. The membrane prevents water loss through the pond bottom.

Geotextiles not only give sports turf managers a widely adaptable tool for turf and landscape maintenance, they give the turf the same defense against weather and nature that fans and athletes have always had. The results are evident on greens throughout the Northeast, on stadium fields across the country and at a growing number of university and minor league facilities. Textiles are becoming an everyday tool of sports turf managers.