time. This is one reason why turf managers need to be careful with early spring applications of preemergence herbicides combined with fertilizers, cautions Dr. B. J. Johnson, weed control specialist with the University of Georgia in Athens. If these products are timed to prevent germination of crabgrass, the nitrogen stimulation can disrupt the transition of bermudagrass since it is too early.

Spring transition of warm-season turfgrasses is complicated further when they are overseeded with cool-season turfgrasses. The overseeded grass tends to shade the dormant warm-season turf in the spring and to delay its transition. Light verticutting to expose the dormant turf to sun and heat also opens up the turf for germination of annual weeds.

This will not stop the turf industry from overseeding. The decision to overseed is made for a reason: to provide an actively growing surface when the primary turfgrass is dormant. With this decision comes the responsibility to take extra steps in the spring to help the bermuda recover.

The same is true for preemergence weed control. It serves a definite purpose. If that purpose is valuable to the facility, then the turf manager must take the extra steps necessary to help the turf recover from any stress-related side effects. Once the threat of annual weeds subsides, then measures must be taken to bring turf back to full cover and quality.

The tremendous use of golf and sports turf today predisposes it to weed encroachment. The demand for recreational turf outpaces the natural ability of turf to recover and maintain density. At the same time, standards applied to turf are tougher to meet.

The only option to restricting use or lowering standards is to expand our knowledge of all available cultural practices so they can be applied for the greatest benefit of the turf. Preemergence herbicides by themselves cannot be expected to solve annual weed problems. Their use must be coordinated with all other cultural practices.

Sports turf is not as permanent as standard lawn turf. It needs to be replenished and renovated frequently. Sprigging, reseeding, and sodding come with the territory. Golf and sports turf also requires much greater attention when it comes to nutrition, irrigation, drainage and compaction. Managing sports turf is a constant battle of balancing stresses to maintain cover and quality.

Undoubtedly, there are some complicated decisions to be made based upon our growing knowledge of turf, chemicals and cultural practices. You now have important tools at your disposal. When used properly, they provide levels of turf cover and quality not possible a decade ago. But each of these tools has its own set of restrictions. Turf managers must learn what these restrictions are to use the right tools effectively. That's what professionalism is all about.

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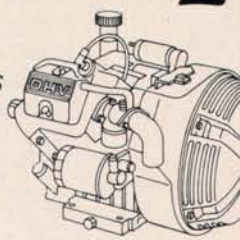

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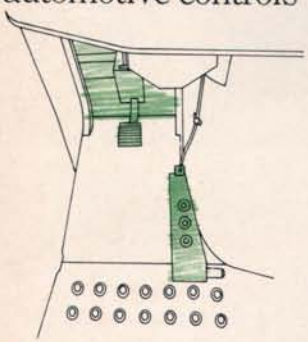

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GRACE TO DEVELOP AND TEST BOTANICAL INSECTICIDE

Grace Horticultural Products, New York, NY, has acquired the patents, trademarks, EPA registration and technology for Margosan-O concentrate. It is a nontoxic, natural insecticide extracted from seeds of the Neem tree, a tropical evergreen. Under a purchase agreement with Vikwood Botanicals, Inc., Sheboygan, WI, Grace has obtained all rights to the technology.

The insecticide has low-to-no toxicity for mammals and is believed to be effective against a broad range of insects which have exhibited resistance to many chemical pesticides. These include the sweet potato white fly, green peach aphid and western floral thrips.

Such resistance is not expected to develop with Margosan-O's principal ingredient, Azadirachtin, due to the complexity of the molecule and the diverse mechanisms by which it operates. Neem has been used as a pesticide for centuries with no observed insect resistance.

Grace has done extensive testing of Neem seed insecticide technology. The insecticide is currently undergoing further efficacy and phytotoxicity testing by seven university entomologists in the United States. Additional efficacy tests are being conducted in over 12 countries throughout the world.

RYAN AERATOR SELECTED FOR DESIGN AWARD

Kirk Reimers (left), chief engineer for Cushman, presents citation to Mark Lamb, project engineer for the GA 30 program.

Agricultural Engineering magazine has selected the Ryan GA 30 Turf Aerator as one of "The Agricultural Engineering 50"—outstanding innovations in product or systems technology for 1987.

The recognition program is conducted each year by the magazine, published by the American Society of Agricultural Engineers. The competition is designed to emphasize the important role of new products in transferring technology to the marketplace for application by a wide spectrum of users in the green industry.

The Ryan GA 30 features several design innovations, including the fact that the operator rides on the unit and can adjust aeration-core spacing while "on the go." It can be used to aerate golf greens at a close spacing, then adjusted to a more open pattern for aerating fairways.

CIBA-GEIGY EXPANDS TURF STAFF

The Turf and Ornamental Products Department of Ciba-Geigy Corporation has doubled its staff to manage an expanded product line and meet the needs of the turf industry.

"The added personnel will provide increased support for customer needs," said Director Bill Liles in announcing the expansion.

Owen Towne will be product manager for the turf-fungicide division. He was previously responsible for market research at the firm's headquarters in Greensboro, NC.

The staff of field marketing representatives increased from seven to 12. Ron Johnson was promoted to national accounts manager.

Swing Joints—Vital Components of Valve-in-Head Irrigation Systems

Unless you work in Florida, you know this past winter was tough on irrigation systems. The Alaska Blaster wreaked havoc on unprotected pumps, backflow devices, valves, pipes and sprinkler heads deep into the South. Days of freezing temperatures, unusual for the Sunbelt, damaged typically undrained systems.

While many of these problems are simple to spot, it's the ones you don't see that will drive you crazy during another expected year of drought. Manufacturers of irrigation components suggest that superintendents and sports turf managers across the country devote extra time this spring to inspect their systems for winter damage. And while you're troubleshooting, you may want to take a fresh look at sprinkler head heights and the condition of fittings from the laterals to the surface.

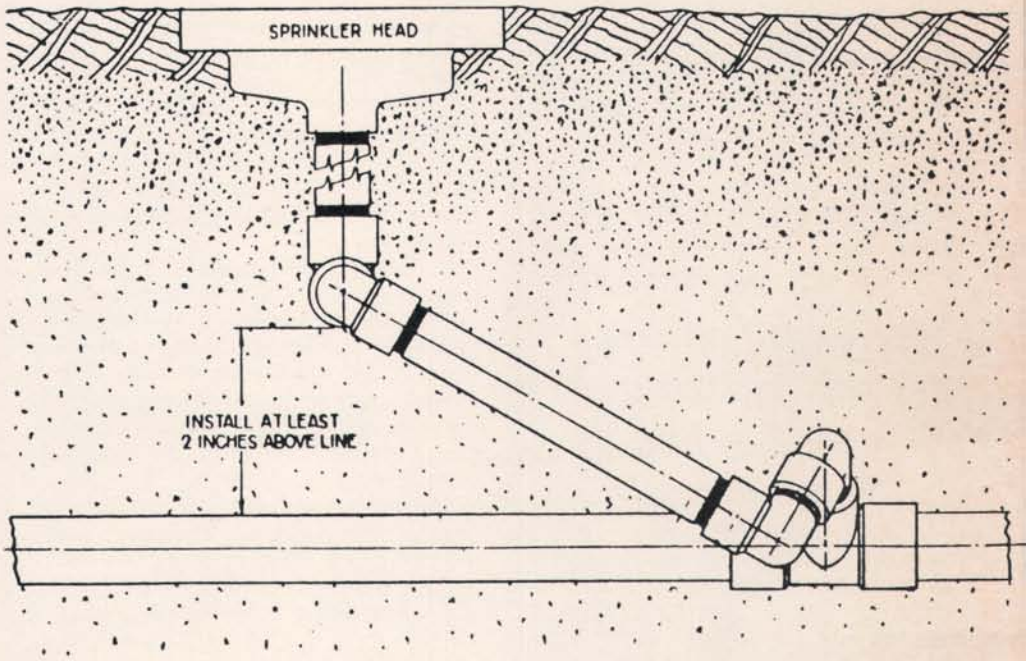
Fine-tuning an irrigation system is critical in maintaining uniform coverage at the greatest efficiency. Water and energy are two of the largest items in a turf manager's budget. Small leaks by themselves may seem minor, but when added together they represent a significant water loss and sizable energy loss, especially for pressurized systems with valve-in-head sprinklers.

"Irrigation designers and contractors have experimented for years with the way heads are connected to laterals," explains Larry Workman of Lasco. Starting with old galvanized pipe, they devised a combination of nipples, street elbows and risers to join the laterals 18 inches to two feet below the surface with sprinkler heads. The intent was to provide a way to adjust heads after installation of the turf and to protect the laterals and heads from damage by surface traffic.

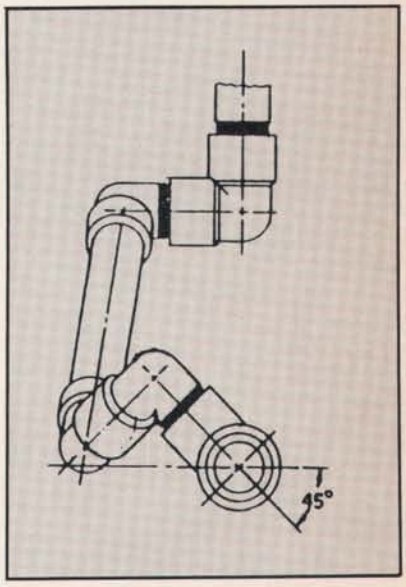
Those were the days of block or battery systems. Heads were placed into zones controlled by individual valves. The laterals between the valves and the heads were pressurized only when the valves opened. If the fittings between the laterals and the heads leaked, it was only for the short time that zone was operating. Fittings that were slightly loose so they could move were expected to leak to a degree.

The problem with galvanized fittings in some soils is they corrode and the joints freeze and become locked in position, explains Workman. Once this occurs, you are back to a rigid connection between the head and the lateral.

To overcome many of the problems with galvanized pipe and fittings, the irrigation industry started replacing them with PVC or polyethylene components. These plastic fittings did not corrode and remained flexible. But, like galvanized fittings, they would often leak slightly after being backed off.



Recommended installation of swing joint for sprinkler head application. Photo courtesy: Lasco Industries.



The irrigation specialist or contractor had to learn the difference between installing galvanized and plastic fittings. Most fittings and pipe have tapered threads. As they are tightened together, the male thread exerts an increasing amount of force against the female thread. If the same amount of torque is applied to plastic fittings as to galvanized, the plastic will crack and the joint will either be weak or leak. Furthermore, galvanized male fittings screwed into plastic female fittings will often be overtightened. When water hammer hits the weakened joint, it can't handle the load and bursts.

To complicate matters more, teflon tape and some joint compounds actually have a lubricating effect on plastic pipe, making it too easy to overtighten plastic joints. When the joint is loose, these compounds do not always seal the threads adequately. Compared to the ease and integrity of glued plastic fittings, seating threaded plastic fittings properly is difficult.

One company's research showed that standard fittings backed off one-quarter turn had a 50 percent chance of leaking. Backed off one-half turn, the percentage jumped to 80. The margin for error was simply too great for installation in the field on pressurized systems.

The world of irrigation was changing, especially on golf courses and parks. Automatic controllers opened up a whole new realm of possibilities and eliminated much

continued on page 36

Swing Joints
continued from page 35

of the labor and attention given to irrigation systems during operation.

To give the golf course superintendent control over individual heads around greens, irrigation manufacturers created valve-in-head and valve-under-head sprinklers. Advanced controllers and field satellites also provided the superintendent with a much larger number of stations so he could program many heads individually.

The significant point about valve-in-head or valve-under-head sprinklers is that the connection between the lateral and the head is pressurized. Instead of leaking for 10 or 20 minutes, loose fittings will leak constantly if not completely sealed. A steady, small leak can keep jocky pumps working overtime, waste water, and result in damage to the area around the head.

"95 percent of all new golf courses are utilizing valve-in-head sprinklers."

One way to overcome this problem is placing valve-in-head sprinklers in zones as before. The controller must be instructed to open two valves to operate a single head, the one in the head and another supplying water to the zone. This permits the lateral and the fittings to be unpressurized except when operating any of the heads in that particular zone. It is common in older irrigation systems that were retrofitted for valve-in-head sprinklers. Irrigation designers also include main valves in strategic areas for this and other reasons. But no golf course or park wants to pay for unnecessary valves.

"When valve-in-head systems became popular, those of us in the fittings business had to come up with a solution to leakage," Workman recalls. It was Lasco engineers who pioneered the development of the first prefabricated swing joints. By preassembling elbows with O-rings at the factory, Lasco was able to provide leak-proof joints that allowed movement for adjustment and traffic impact.

Tapered threads were replaced in the swing joint with stronger acme threads. The O-ring allowed more than a full turn of swivel without leaking. During installation, the swing joint is tightened all the way and then backed off one full turn before alignment. An assortment of accessories has been designed to adapt the swing joints to various sizes of pipe and heads. The preassembled joints not only eliminate the problem of leakage, they reduce installation time considerably.

Because valve-in-head sprinklers produce a shock when closing, the components are rated to withstand 200 psi of pressure, adds Workman.

"The first swing joints were single swing elbows," recalls Bob King, president of King Brothers, Inc. Then more elbows were added to make the joints adjustable in all directions.

KBI makes fittings for the plumbing industry as well. "The liability situation for both the institutional irrigation market and the plumbing industry is changing today," King adds. "You have to make sure your product works without fail. A fitting behind the wall of an apartment building must be reliable, just as a swing joint on a golf course."

King has found from experience that the weak link with swing joints is the threaded nipple used to join them to laterals or heads. For this reason the company recommends solvent glue joints at these locations.

Dura Plastics introduced a triple swing joint specifically for valve-in-head sprinklers in 1987. The company's engineers designed this swing joint with two O-rings to prevent leaks as well as intrusion of sediment into the joint. To help its customers distinguish its fabricated swing joints from ordinary fittings, the company's swing joints are colored gray.

The firm has devised accessories for its product to eliminate any extra joints. "You are better off to eliminate things like reducing nipples when possible," Roberts adds. "Don't use two or three fittings when one will do."

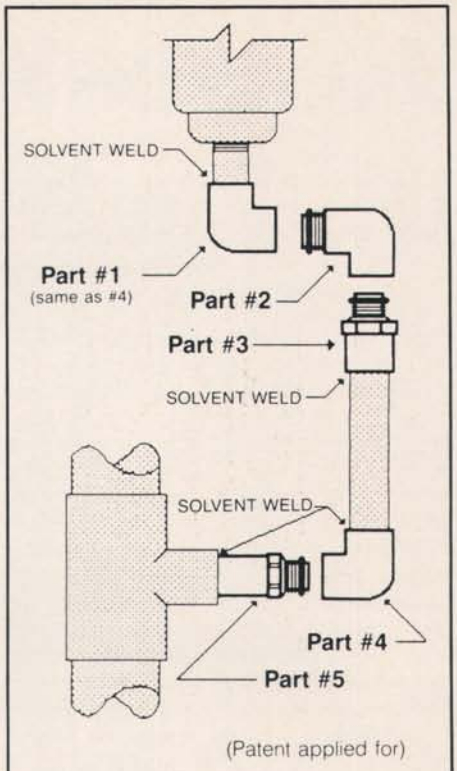
All the above manufacturers make swing joints in 1, 1¼ and 1½ inch sizes for golf course and institutional sprinkler heads.

Superintendents and sports turf managers should expect to pay a premium for swing joints. "They may add $4,000 to the cost of a half-million-dollar irrigation system," explains Lasco's Workman. But irrigation specialists are beginning to realize that the joints simplify installation, require little to no care, and will pay for themselves quickly in water and energy savings.

"Swing joints aren't for everyone," states Roberts. "They are designed specifically for valve-in-head systems in areas with heavy traffic, such as sports fields and golf courses. But then, 95 percent of all new golf courses are utilizing valve-in-head sprinklers," states Bob Roberts, sales manager for Dura. "Parks are also beginning to utilize valve-in-head sprinklers to a greater degree."

But the need for swing joints goes beyond the type of sprinkler head. All types of heads are subject to heaving in the colder regions of the country, remarks Don Cooper of Weather-matic. As subsurface water freezes it expands, pushing the soil and anything contained in it upwards. "If the head is attached to the lateral with a rigid joint, heaving can actually pull it off the lateral," Cooper warns. "It's important to place gravel sumps around heads to improve drainage in areas subject to heaving. Swing joints can definitely help."

Head adjustment is especially important in golf and sports turf. The majority of sprinkler heads are designed to be installed at grade. This provides clearance for maintenance equipment and prevents heads from interrupting play.



Lasco full circle swing joint kit.

However, there is a growing desire on the part of athletic field managers and superintendents to have heads set 1/4 to 1/2 inch below grade. Stadium turf managers frequently want heads on the playing surface set below grade so they can be covered with sand during games. Topdressing can also raise the turf around heads by as much as 1/4 inch per year.

Only a few types of sprinkler heads are designed to be set below grade or to be covered. All other heads must be adjusted periodically back to grade. This process is simplified by swing joints.

Smaller swing joints and flexible risers are available for more conventional sprinkler heads around golf courses, parks and schools—and standard fittings still dominate the irrigation market overall.

Regardless of their size, swing joints protect both heads and laterals from damage while saving water and energy in the process. They eliminate unstable wet soil around heads and simplify adjustment.

When you consider the investment your sports facility has in irrigation, swing joints make a lot of sense. They enable you to turn a potential liability into an asset. When replacing a green can cost $40,000 or a player's injury can result in damages of six or seven figures, any method of insuring the safety and integrity of an irrigation system is worth attention.

UNIVERSITY GOLF COURSE DOUBLES AS RESEARCH LAB

Amidst the boisterous, disparaging remarks of those who proclaim golf courses to be the ultimate enemy of water conservation, a voice in the desert quietly refutes this notion through its daily commitment to environmental concerns.

The Karsten Golf Course at Arizona State University (ASU), Tempe, AZ, slated to open later this year, is the site of two university-department research projects and a third proposed project. Resort Management of America (RMA), the operational management company retained by the Sun Angel Foundation to manage the course, is standing behind its commitment to water conservation and responsible use of golf course land.

The ASU Laboratory of Climatology plans to conduct tests to determine the effect of golf courses on the environment, according to Robert Balling, its director. "The department's projects will reinforce the fact that the ASU golf course can be used for research," he said.

Balling has proposed the installation of an automated weather station on the course to continuously monitor air and soil temperature, wind speed and direction, humidity, dew point, precipitation, soil measurement, and solar energy. The information will be used to calculate evapotranspiration rates and climatic information. These figures will tell RMA precisely how much water to use when irrigating the course in order to prevent waste. The data will also be used in turfgrass experiments which measure plant compatibility and survivability.

Research on redefining water usage on courses in arid and semi-arid regions, turf-disease control, and growth regulators will allow responsible use of resources. "Weather data from an actual desert course will provide this useful information, primarily to the researcher, but also to the golfer who simply wants to know about course conditions," Balling explained.

Henry DeLozier, RMA president, noted that comparisons between turf varieties and water usage will be studied to provide conservation information to other course managers.

Dr. Ralph Backhaus, an associate professor in ASU's Urban Horticultural Program, has begun studying the golf course's turf and desert vegetation and the use of effluent in irrigation.

"Various low-water-usage plants and alternate species for golf course ornamentation will be tested to see how they perform in this environment," Backhaus reported. If the plants prove effective in the desert climate, they can be grown in the university's nursery.

Other university-proposed research includes turf- and green-disease diagnosis and a study of native vegetation in the course's nongroomed areas. The use of an athletic facility as an environmental research center is unique to the Karsten Golf Course at ASU. The course can be used to establish a work/study program for students interested in golf course management.

"We are committed to discovering mutual benefits to the golfer and the community," said DeLozier. A similar commitment was made from the ASU course's inception. Pete Dye, known in the golf industry for designing courses that demand a great deal of care, said he had never seen a more barren wasteland than the Salt River bottom on which the course was built. "We've taken the sorriest piece of land in Tempe and turned it into a useful, appealing recreation facility," he remarked.

Ed Gowan, executive director of the Arizona Golf Association, has been a vocal proponent of water conservation.

DeLozier agreed, adding, "But we believe we have gone far beyond the minimum of conserving water to advancing the state of environmental research. Multiple use of the land to benefit our community is taking golf course management into the 21st century."

Jim Kelsey (left), president of Partac Peat, presents award to Ron Timpanaro.

Phillies Restore

continued from page 22

it is largely caused by the thick layer of thatch and mat that has built up over the years and the consistently warm temperatures over the winter. The rye is rooting in thatch instead of soil." Timpanaro asked Clay to treat the outfield every two weeks with Lesco Mancozeb DG. He intends to use Chipco 26019 as a backup fungicide.

The other two problems Timpanaro faced were mole crickets and fire ants. Again, warm weather kept the mole crickets active most of the year. Clay suggested an application of Oftanol in the spring, followed by summer treatments with Orthene. While fire ant mounds are treated with aerosol bombs, Timpanaro has found that Amdro bait and daily mowing have chased the ants away. "When you disturb their mounds every day, they finally give up and move," he reveals.

Ironically, Timpanaro depends so much on Clay because he can perform many of the tasks with his own equipment at a lower cost. But Timpanaro still has a standing request for an aerator, verticut reels and topdresser. "You've got to have them to really keep on top of the thatch," he remarks. He also hopes to buy a conditioning machine for the infield clay.

Timpanaro has made great strides with mowing equipment. The infield is mowed daily with walk-behind greensmowers with baskets to pick up clippings. For the outfield, he now uses a Jacobsen Tri-King and anxiously awaits verticut reels. The checkered pattern stands out to fans and players. "You can't mow twice a week and expect the same results," he advises. Mashek has been instrumental in helping Timpanaro obtain the equipment he needs since Mashek became general manager in 1987.

Not only does Timpanaro take care of the field, he assumes many of the responsibilities that would normally be handled by the stadium operations manager of a major league stadium. This includes researching, ordering and maintaining all field-related accessories, along with coordinating almost all events to make sure everything clicks. "When you work for the club and the club operates and maintains the facility, the groundskeeper or field supervisor has to perform many of the same duties as a stadium manager or head of parks and recreation," he points out.

Dale Long sees the rising investment in minor league facilities as a sign of new life for the farm system. "I'm aware of at least 20 new parks in the minor leagues!" he exclaimed recently.

"Minor league teams attracted more than 20 million fans last year," Long remarked. "We need the farm system for major league expansion in the next few years. Instead of building new major league teams by robbing players from existing teams, owners can start out by developing players at the farm level. Buffalo is a good example of this." Long thinks a farm system may be a prerequisite to major league expansion in the future.

If Long's theory comes true, the need for professional quality baseball facilities will grow, along with the need for skilled, dedicated groundskeepers like Timpanaro.

"I may not be getting rich," says Timpanaro, "but I love what I'm doing now. That's what counts the most for my family and me."

CHALKBOARD

TIPS FROM THE PROS

SPRING TRANSITION - REMOVING OVERSEEDED RYEGRASS

Overseeding warm-season turfgrasses with cool-season grasses to improve color, playability and durability during the fall, winter and early spring is becoming a common practice on golf courses and sports fields in the South. As more sports turf managers overseed, more questions are being raised about the competition between turfgrasses, especially during spring transition.

"Overseeding is a physically damaging process to a turf," warns Gil Landry, extension turf specialist for the University of Georgia in Athens. "In addition, the cool-season grass provides competition to the warm-season grass for sunlight, nutrients and water. Minimizing that competition during the sping can be very important."

Landry says there is very little scientific data to support management practices commonly recommended and used to encourage transition from overseeded ryegrass to a warm-season turf. Most of the research has been limited to bermudagrass putting greens. Other factors, such as intense traffic, can also have a harmful impact on dormant warm-season turf and need to be explored.

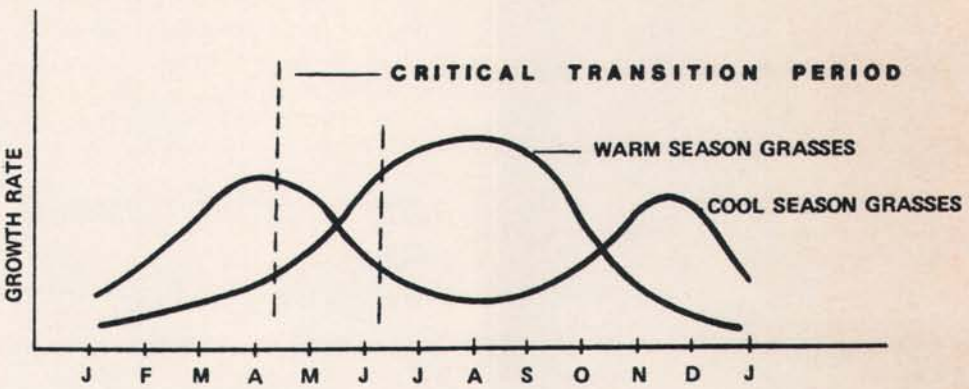
Based upon current research, the following suggestions are provided by Landry for your consideration. The accompanying graph illustrates the seasonal growth patterns of both warm-season and cool-season grasses. Note that late spring and early summer are critical transition periods for warm-season turfgrasses.

The following spring cultural practices should enhance warm-season growth while discouraging the cool-season grass:

- Lower the mower height several weeks before expected spring green-up. This reduces shading, warms the soil, and sets back the overseeded grasses.
- Core aerify weeks before expected spring green-up to promote turf growth by warming the soil.
- Wait to fertilize until two to three weeks after spring.
- Maintain good soil moisture for the new roots being produced by the turf.

"However, probably the most important factor relating to a successful transition is proper management throughout the entire growing season, not during the transition period," Landry advises. "Proper mowing, fertilization, irrigation, pest management, thatch control, and traffic control during the summer and fall are very important to transition the following spring." The condition of the warm-season turf as it enters dormancy has a big influence on its competitiveness the following spring.

SEASONAL GROWTH PATTERNS OF GRASSES



Some research suggests that plant growth regulators such as mefluidide (Embark) are a possible means of hastening transition. Herbicides are also being tested for use in smoothing transition. Recent research by Dr. B. J. Johnson at the University of Georgia demonstrated that an April application of either pronamide or paraquat decreased the percentage of ryegrass during the summer by 20 percent or more. Untreated check plots were still 30 percent ryegrass in July (see table).

Meanwhile, seed producers are beginning to select ryegrasses with lower heat tolerance for overseeding so they will not compete as vigorously with the bermudagrass in the spring. Certain ryegrasses are so heat-tolerant and disease-resistant they can hang on almost year-round. At the same time, some turf managers are beginning to lower fall overseeding rates, sacrificing the deep green color of dense seedings for lower ryegrass population in the summer.

Research by Dr. Vic Gibeault, which is nearing completion at the University of California in Riverside, will reveal the competitiveness of certain cool-season grasses and will show the effect of wear during fall and winter on both dormant warm-season turfgrasses and overseeded cool-season ones.

Good spring transition, according to Landry, begins the previous growing season. Springtime practices which encourage warm-season turf growth include low mowing heights, drying wet soil, irrigating dry soils, and properly timed fertilization. As more research is carried out, a clearer picture of spring transition will emerge.

Editor's Note: This month's Chalkboard was adapted from an article by the same title by Gil Landry of the Extension Agronomy Department at the University of Georgia, Athens, in the Winter 1989 edition of Turfgrass Topics.

Influence of Herbicides on Transition From Overseeded Ryegrass to Bermudagrass, 1987.

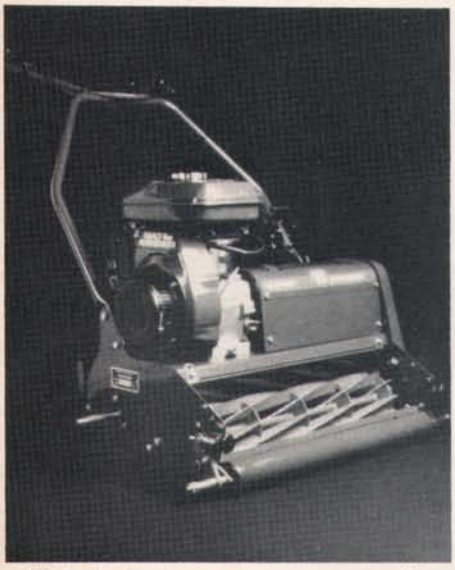
Treatments	Ryegrass to bermudagrass transition (%)					
	May		June		July	
	Bermuda	*Rye*	*Bermuda*	*Rye*	*Bermuda*	*Rye*
Untreated	50	50	60	38	68	30
Pronamide	53	47	60	40	88	11
Paraquat	66	8	85	9	94	1

B.J. Johnson. Journal Amer. Soc. Hort. Sc., 113 (5): 662-666. 1988
Herbicides applied April 20, 1988

ROOKIES

PRODUCT UPDATE

GREENSMOWER



With the features necessary to produce consistently high-quality greens, the Ransomes Super Certes greensmower delivers a precise, meticulous cut.

The walk-behind unit is available in either 20- or 24-inch cutting widths. Other features include a high-speed, ten-knife reel that produces 126 cuts per yard; a cutting height that adjusts from 1/8 to 1/2 inches; and a polyethylene grass catcher that holds 1½ bushels of clippings.

The mower virtually eliminates turf marking, because of its tapered land roll and two-part, machined-aluminum drive roller. Power-driven transport wheels attach easily and help speed the machine from green to green.

RANSOMES, INC.

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NEW CREEPING BENTGRASS

Cobra is a new variety of creeping bentgrass developed jointly by International Seeds, Inc., and the New Jersey Agricultural Experiment Station. In tests over the past four years, Cobra has performed well in terms of texture, color, competition against annual bluegrass, resistance to dollar spot, and drought tolerance.

According to International, the bentgrass thrives with frequent low mowing, moist soil, and moderately low nitrogen and phosphorous levels. It provides a high-quality surface when mowed as low as 5/32 inch on putting greens or as high as 5/8 inch on fairways. In both percentage of cover and shoot density it was judged comparable to Penncross, Penneagle and Pennlinks. Its dark green color is especially noticeable during cooler months of the year.

Cobra responds well to aeration, cultivation and topdressing. A seeding rate of one pound per 1,000 square feet is recommended for putting greens.

INTERNATIONAL SEEDS, INC.

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RECIPROCATING TRIMMER

The two reciprocating blades on the Red-Max Reciprocator/SGC220DL each contain 20 teeth that cut easily through heavy weeds or brush. The blades operate safely because they eliminate the danger of flying debris, the kickback from striking fixed objects, and the possibility of a fractured blade becoming a projectile. The blades stop immediately when the engine is switched off.

Solid-state, electronic ignition assures quick starting of the high-performance, 22.5cc engine. Weighing only 14.1 pounds, the unit handles smoothly in hard-to-reach areas. In addition, the reciprocating motion prevents weeds and brush from wrapping around the blades. The cutting blades can even be submerged to trim under water.

KOMATSU ZENOAH AMERICA, INC.

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EQUIPMENT CARRIER

Groundskeepers and golf course personnel can carry mowers and other equipment from location to location with the Cushman Equipment Carrier Set.

The unit attaches to the stake pockets of the Cushman Turf-Truckster short box, where it is secured by pins. To load the carrier, the operator merely raises the Turf-Truckster box, which lowers the equipment carrier to ground level. A mower or other equipment can then be rolled onto the carrier. Lowering the dump box raises the carrier and tilts it slightly forward to hold the equipment during transit.

Constructed of expanded carbon-steel mesh, the carrier's bed is covered by a rubber pad to protect the equipment being carried. The weight capacity is 400 pounds, and the dimensions are 49½ inches wide and 36½ inches deep, with a front panel that is 30½ inches high.

The unit is equipped with a rubber bumper, which rests against the turf-vehicle short box in transport position to cushion the load. Rubber cords, which can be wrapped around the equipment to secure it in the carrier, are included with each unit.

CUSHMAN DIVISION OF OUTBOARD MARINE CORP.

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FERTILIZER SPREADERS

Full stainless-steel hopper bottoms and metering slides are featured on Gandy fertilizer spreaders.

The stainless-steel components afford longer service life while complementing the unit's precision metering. Cam gauges on all models adjust the hopper openings to assure uniform, full-width application across the entire swath.

Spreaders are available in models six to 12 feet wide. Included with each applicator is a factory-calibrated rate chart for current commercial products. Upon submission of sufficient material it will calibrate granules on request. High flotation on standard tires is optional.

GANDY COMPANY

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