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Irrigation Mgmt. *continued from pg. 20*

inspect each sprinkler head to ensure proper turning, arc, distance of throw, and full retraction. Develop a repair list. Staff members should monitor the system during daily maintenance and report any variations. Recheck the system monthly and after aeration, heavy roller use, or any maintenance procedure that might damage the heads and/or pipes.

Note the rotation time of each of the heads under normal operating conditions. For syringing, you can then program the time for one rotation of the heads within a zone. Also, slower than normal rotation of a head or series of heads can alert you to a problem.

Water bubbles or puddling quickly signals a broken pipe. A drop in pressure when the system is operating will be harder to detect, but is often the first sign of a problem. If possible, include flow meters, circuit diagnostic self-testing, and other diagnostic aids to detect problems in the irrigation system design.

Striking the right balance

The timing and frequency of irrigation represent a compromise between the needs of the turfgrass and the needs of the field's users. There will be some give-and-take on both sides, but the users win more often than not. As Dr. Jackie Butler used to say, "There are no grass problems, only people problems."

For scheduled play, keep the field in the upper half of field capacity (for moisture levels), a bit on the dry side, but not bone dry and not saturated. A slightly drier field is less subject to compaction and it provides more solid footing. A saturated field is slick, too soft, and much more susceptible to wear damage.

Anyway you approach the matter, turfgrass needs the benefits of proper irrigation. So pick the most critical event day, or days within an extended event, and manipulate the irrigation program to deliver the optimal moisture levels for play during those most critical periods. Good luck! ❑

Ross Kurcab is turf manager for the Denver Broncos and is a member of STMA's Certification Committee.

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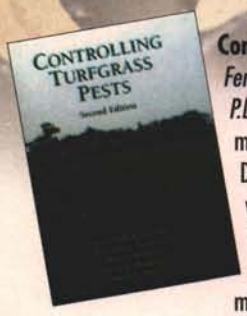

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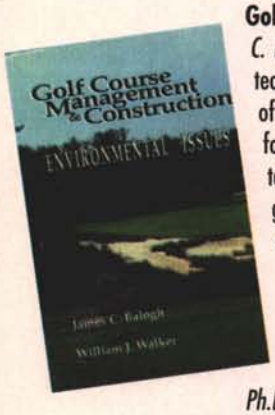

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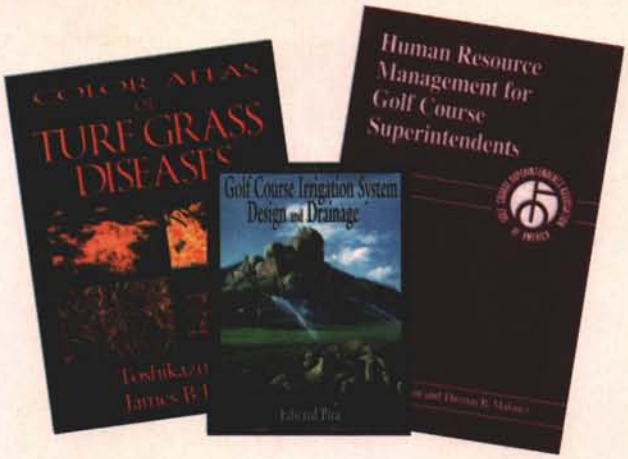

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Mid-Season Maintenance of Spring Training Facilities

by Steve and Suz Trusty

Spring training isn't the World Series, but for many players it's every bit as important. This is the starting point: the doorway through which you must pass on the road to the Big Leagues.

Spring training gives seasoned veteran players the opportunity to work out kinks and hone their skills. It gives newcomers an opportunity to test their talents and try to earn a slot in the line-up. It gives "wannabes" a chance to showcase their best stuff and try to prove they can make it in professional baseball.

For team managers, spring training is a time of promise. It's the first chalk stroke on the clean slate of a new season.

Pressure is intense. Spring training is the proving ground. It's the point where all the planning, plotting and negotiating should begin to pay off in the form of a winning team.

All these hopes and dreams rely heavily on the polished diamond and patch of perfect turf that make up the spring training baseball field.

Spring training is just as much a proving ground for the sports turf manager as it is for the players and team managers. Here, Baseball City's grounds crew wraps up its maintenance procedures with some finishing touches. *Courtesy: Trusty & Assoc.*

Unlisted players

Spring training is just as much a proving ground for the sports turf manager as it is for the players and team managers. With careers in the balance, field conditions had better be near perfect. Initial field preparation begins long before that first "play ball!" of the spring training season, and the daily maintenance requirements are intensive, to say the least.

Spring training is all about playing ball. There's tremendous pressure to get in all the scheduled games, even when the entire season is plagued by an opposing force with the power of El Niño.

The weather this season has brought special challenges to sports turf managers and every member of their crews with excessive rain, damaging storms, fluctuating temperatures and prolonged cloudy skies. It's been harder and has taken longer to accomplish all the standard daily maintenance procedures - preparing the mound and homeplate area, grooming the basepaths, painting and lining, and mowing the turf.

In view of all that, this year's mid-season maintenance may be more important than ever.

The line up

Baseball is a game of inches. Part of mid-season maintenance is re-checking the accuracy of the field layout measurements. Using the apex of homeplate as the reference point, all the distances must be checked: to the mound, bases, foul lines, outfield fences, and so on.

Base settings must be verified prior to reworking the basepaths. Any adjustments to the on-field mound or the mounds in the bullpens must be made during mound renovation. Finally, fresh lines wrap up these maintenance procedures.

Mound renovation and rebuilding

For mounds, consistency is the key maintenance issue. Pitchers need to warm up and pitch the game from surfaces that are uniform. Any variation in the underlying firmness or the top surface of the mound will affect the throw and the pitcher's consistency.

Besides the key game field, spring training sites generally have multiple practice fields that are used almost

constantly. For each field, the infield mound and the bullpen mounds must not only meet regulations for height and layout, but must be identical in consistency.

Ideally, this consistency extends to all mounds on all fields used by a team. Daily use by different pitchers for different lengths of time makes it hard enough to retain this consistency. Factor in slight variations in sun and shade patterns, temperature, and precipitation within the micro-climates of each field, and the job becomes even harder.

Individual sports turf managers develop their own "ideal" mound material based on the preferences of players, coaches, the manager, and even the team owner in some cases. Managers must also consider the physical characteristics of the field or fields, climate and environmental factors, and available materials.

The material needs to retain sufficient moisture to remain consistent without becoming dry, slick or too moist, even in a doubleheader. It needs to resist drying and cracking, yet provide the firm surface necessary for good footing.

After selecting the preferred mound material, the sports turf manager must determine the precise moisture level within the material for mound building, renovation and repair. The moisture level will vary slightly to accommodate such weather conditions as heat and humidity levels.

At each specific moisture level, the sports turf manager must also determine the precise point of compaction that will allow each new layer to stick to and bond with previous layers. The mound must be one solid structure, but must retain the desired level of firmness.

Depending on weather conditions, the amount of play, and the window of workable time available, mid-season maintenance of the mound may range from a slightly more intense form of daily mound preparation to a stripping and reworking of the upper level of the mound.

Wear is greatest on the flat top plateau. Problem areas often form around the pitching rubber, on the first base and homeplate sides, and along the front slope that faces home plate. The edges where the mound meets the turf may also need attention. Wear in this area is greatest on the edge facing homeplate.

Minimal mid-season maintenance will include checking the level and seating of the pitching rubber. Any problems with slope will require removing the rubber and reworking the mound to whatever level is necessary to correct the problem.

If time and weather permit, the entire plateau area may be reworked to ensure proper bonding and a flat, level surface. Generally, the upper surface of the front slope will also require reworking.

Once the materials have been removed from areas that need to be reworked, repair procedures are the same as those used in regular daily maintenance: sweep out any loose mound material, fill in a small amount of pre-moistened mound material, and pack it in firmly. On the plateau, use a level or longer "level board" to ensure a flat, level surface. With any re-working, frequent measuring will be needed to maintain proper dimensions, height and degree of slope.

Batter's box repair

Mid-season maintenance generally includes reworking the batter's box area. If time and weather factors permit, homeplate can be removed and reset following the same general repair practices used on the mounds. If reworking is not possible, the sports turf manager must at least ensure that homeplate is properly placed, well-seated and level with the surrounding clay material.

Basepath care and lip removal

Lips develop when infield clay builds up in the turf bordering skinned areas. To avoid ball "hops" and protect player safety, there should be no difference in feel when stepping into the transition between the skinned area and the turf. Ideally, regular daily maintenance with a rake or broom along the inner and outer edges of the basepath will have minimized lip buildup.

Consistency is key to mound maintenance. Pitchers need to warm up and pitch the game from surfaces that are uniform.
Courtesy: Trusty & Assoc.

If lips are present, pressurized air from a blower or a high-pressure stream of water from a hose can be used all along the baselines. Follow with the normal daily broom or rake treatment.

Most sports turf managers check the baseline during mid-season maintenance. Run a string line first along one side of the basepath, and repeat along the other. Cut away any turf that is growing into the basepath with a hand edger, and that spot is repaired.

Mid-season maintenance generally requires a deep working of the skinned material in the basepath. After working up the surface with a scarifying drag, additional material can be added if neces-

sary. Again, each sports turf manager has a preferred material for this area. Adjustments in the mix may be made during this reworking to compensate for unusual weather conditions.

After scarifying, use a leveling drag to correct any high or low spots and level the surface. General daily maintenance procedures provide the finishing touches for a firm, lower surface and a light, looser top layer that will allow players' spikes to get a good hold without pulling out chunks of clay.

In the turf

Turf bordering the baselines should be free of skinned area material following lip repair. Any mound material that has worked its way into the surrounding infield turf should be cleared away with a rake or broom.

Wear and compaction are greatest in the area between the mound and homeplate. Again, time and weather conditions dictate which procedures can be used to reduce the stress. Maintenance in this specific area may include spike aeration and topdressing with a soil conditioner, deep tine aeration, or water injection for compaction relief. Core aeration is generally useful only if the compaction is severe enough to warrant the surface disruption the procedure causes.

Bullpen mounds must not only meet regulations for height and layout, but must be identical in consistency to the infield mound.
Courtesy: Trusty & Assoc.

In normal conditions, turf in other areas of the field shows minimal wear. Repairs should be made to any high or low spots within the turf areas. Follow normal in-season schedules for fertilization, irrigation and mowing.

Wrap up mid-season maintenance with painting and lining, and the polished diamond is once again ready for play. ❑

Steve and Suz Trusty are partners in Trusty & Associates based in Council Bluffs, Iowa. Steve is executive director of the Sports Turf Managers Association.

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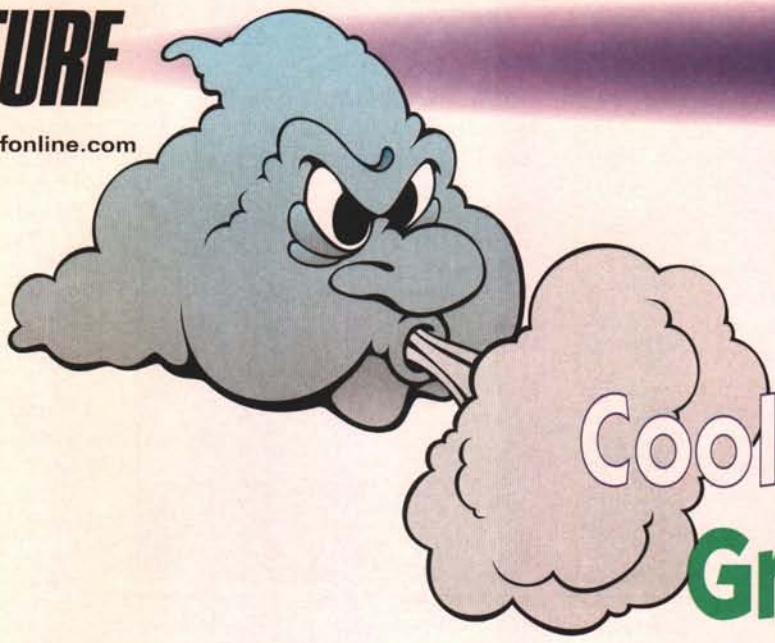

Cool-Season Grasses

Selecting the proper seed variety can improve the overall performance of your turf.

by Victoria Wallace

Turfgrass selection affects the density, uniformity and overall consistency of your playing surface. Correct selection can improve a field's quality and playability, and can greatly reduce potential concerns of sports turf managers.

In cool-season climate zones, the sports turf industry relies primarily on Kentucky bluegrass, perennial ryegrass and tall fescue. Over the past 20 years, turfgrass breeders have provided athletic field managers and other landscape professionals with vastly improved cultivars of these turfgrasses.

Kentucky bluegrass

Kentucky bluegrass (Poa pratensis) has long been a favorite of athletic field managers. Known for its ability to spread vegetatively via tillers and rhizomes, Kentucky bluegrass produces a dense turfgrass surface.

Its rhizomes contribute to the turfgrass' tensile strength and allow the plant to recuperate from injury easily. On sports fields, capacity to re-grow and recover from divot injury is crucial to turf density and overall uniformity.

Kentucky bluegrasses exhibit excellent cold tolerance, and can survive well into the USDA's Hardiness Zone 2. However, compared to other cool-season turfgrasses, Kentucky bluegrass can be slow to germinate and establish itself from seed.

Soil temperatures cause tremendous variations in germination. If soil temperatures are above 60 degrees F, germination can occur within 10 days. However, cool spring temperatures of less than 55 degrees F can result in a slower germination range of 14 to 21 days.

Kentucky bluegrass generally requires moderate to high levels of fertilization to maintain its density and overall health (3 to 4 lbs. per 1,000 sq.ft. per yr.). If bluegrasses are maintained at lower fertility levels, turf is subject to greater environmental stress and pressure from pests.

Over 120 cultivars are listed in the current NTEP High Maintenance Kentucky Bluegrass Trial, and this is only a partial representation of the numerous varieties on the market. Varieties differ in color, blade width, heat tolerance, aggressiveness, seed yield, plant height, density, pest resistance, green-up, and fall color retention.

Aggressive bluegrass cultivars, such as Limousine, P-105 and Touchdown, exhibit the most dense lateral growth. They have excellent recuperative potential, but may produce excessive thatch unless managed properly.

For fields that host spring sports, early green-up is an important consideration. It indicates that the turf has resumed its active growth. Varieties such as Dellwood, Washington and Georgetown green-up more quickly than other bluegrasses. They start growing earlier in the spring season, so they are better able to recover from injuries associated with spring sports.

On the other hand, bluegrass varieties such as Ram I, Classic and Challenger retain their color late into the fall season. This indicates that they have an extended season of active growth, which makes them better able to tolerate stress and recover from late season injury associated with fall sports.

Varieties such as P-105, NuGlade, Limousine and Ram I exhibit better persistence under a low height-of-cut, and still maintain density and recuperate from wear easily. This can enhance playability, foot traction and ball roll in such sports as field hockey and soccer.

Eagleton, Ram I, Nustar, Belmont, Dellwood, Midnight and Preakness have faired well in the low maintenance category. They show good tolerance to heat and drought stress, low fertility soils, and pest pressures. These varieties are useful in the Mid-Atlantic and transition regions of the U.S., where heat tolerance is particularly important. They can delay the window of summer dormancy and allow active growth to continue longer

into the season, so turf exhibits improved recuperative growth.

Perennial ryegrass

Turf-type perennial ryegrass (Lolium perenne) has long been a staple of sports turf managers across temperate regions and transition areas in the U.S. Its ability to germinate and establish quickly allows perennial ryegrass to get a foothold while other grasses wait to germinate. Seeding with perennial ryegrass can extend the window of opportunity for overseeding, and can add some flexibility to the seeding schedule of the athletic field manager.

Recognized for its excellent wear tolerance, perennial ryegrass performs well on heavily used fields and on areas of intense wear within individual fields. Ryegrasses tolerate compacted soils and are able to compete with weeds such as annual bluegrass.

There are approximately 100 entries in the current NTEP Perennial Ryegrass Test. The top rated varieties include: Palmer III, Pennant II, Premier II and Brightstar. They provide a high-density turf that can compete with Poa annua.

Recent breeding efforts have developed many positive improvements in turf-type perennial ryegrasses. Some of these include: a rich, darker green color; finer blade width; lower growth profile; improved disease resistance; improved heat and wear tolerance; and improved mowability. Also, most new perennial ryegrasses contain an endophyte that provides resistance to surface feeding insects and improved turf vigor.

Tall fescue

Turf-type tall fescues are popular athletic field grasses in the Mid-Atlantic and transition regions of the U.S. They are becoming increasingly popular in cooler, temperate regions, and on multi-use fields with heavy play and limited supplemental irrigation.

Recent tall fescue releases have improved upon the coloration of past varieties. Their dark green color matches more closely with that of Kentucky bluegrasses and turf-type perennial ryegrasses. New turf-type tall fescues have improved tolerance to the traffic and lower heights-of-cut associated with sports fields.

A study completed at Rutgers University in 1995* identified different categories of tall fescues and examined the wear tolerance of the tall fescue groups. The group labeled "lower growing vigorous" types contained a lower growing, but more vigorous tall fescue than the "dwarf" type. They proved to be excellent for athletic field use.

These types, such as Rebel Jr., had a greater number of tillers per unit area than the other categories of turf-type tall fescues. In general, tall fescues perform best when a one- to two-inch height-of-cut is used for sports fields.

Tall fescue prefers to grow in warm soils. In northern climates, where soil temperature cools early in the season, the active growth of tall fescue turf will slow more quickly. The turf will possess a decreased ability to recover from injury during the fall season. If a heavy fall schedule is permitted on tall fescue fields, the turf cannot actively recover from injury.

Mixtures

Perennial ryegrass compliments Kentucky bluegrass nicely in top-quality sports turf mixtures. Perennial ryegrass' rapid rate of germination, wear tolerance, endophyte presence, and lack of thatch production add to the recuperative potential, cold tolerance, and natural winter injury resistance of Kentucky bluegrass.

Mixtures of the two species can vary based on the level of intended activity of a field and on planned maintenance schedules. For high maintenance fields with minimal to moderate activity, either 100% Kentucky bluegrass or a blend of 80% Kentucky bluegrass/20% perennial ryegrass (by weight) is recommended. Fields with moderate maintenance schedules that must tolerate moderate to heavy levels of play should be seeded to ratios of 70-60% Kentucky bluegrass/30-40% perennial ryegrass.

When adding Kentucky bluegrass to mixtures, moderate to aggressive

varieties should be included (Limousine, P-105 or Touchdown). They have proven their ability to recover from injury quickly.

A higher percentage of ryegrass is recommended on heavy-use fields, where wear can be critical and there is less opportunity for the turf to recover. 100% turf-type ryegrass blends are recommended on fields where play is heavy, maintenance is low to moderate, compaction is prevalent, and a turf cover needs to be maintained.

Ryegrass may be repeatedly overseeded on areas that are particularly worn, even if the remaining portions of the field continue to use a bluegrass/ryegrass mixture. For high-use fields, overseeding is strongly recommended with all mixtures or blends.

Typically, tall fescues can be used in combination with Kentucky bluegrass and/or perennial ryegrass. A popular formula has combined 80% turf-type tall fescue, 10% Kentucky bluegrass, and 10% turf-type perennial ryegrass. Because tall fescue spreads only via tillers, the rhizomatous bluegrass helps keep the turf knitted together while the ryegrass provides additional wear tolerance.

Be aware that over time, the species population within the turf of a given playing surface will change due to a variety of factors, such as wear, overseeding, and susceptibility to environmental stresses. Also, bear in mind that turfgrass selection cannot prevent or alleviate problems associated with a poorly constructed field, or problems associated with compaction from unrelenting and incessant, heavy use.

However, proper seed selection can improve the overall performance and density of your turfgrass. This goes a long way toward providing a safe playing surface. ❑

Victoria Wallace is technical agronomist for Lofts Seed, Inc., and public relations co-chair for the national STMA.

**References: Ventola, M. W. 1995.* Wear Tolerance and Recovery of Tall Fescue Cultivars under Selected Maintenance Regimes. *Master of Science Thesis. Rutgers University.*