FOOTING OR BALL RESPONSE: CHOICES IN ATHLETIC FIELD CARE

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Athletics is an important segment of our culture. Societies that are not actively at war need athletic activities to channel the enthusiasm, competitive interest, and aggressive tendencies of its citizens. People of many cultures are motivated by a "cause." The challenge of a contest plus the desire to be for something or to take sides is inherent in human beings. Therefore, the therapeutic value of sports within a society has deep roots in the nature of man. As a result, many games have evolved to challenge and test a player's skill, conditioning, and training.

Sports that demand physical contact have attracted society's plaudits for centuries. The voluminous sports coverage in newspapers, the variety of sports magazines, and the TV time dedicated to reporting sports is indicative of the extensive interest in athletics.

The turfgrass surface of athletic fields is designed primarily for the "footing" of the players with less emphasis on ball response. Football, rugby, soccer, field hockey and lacrosse involve running, falling and body contact, as well as some ball response. The games of baseball, softball, and cricket involve less player contact but increased emphasis on ball response and player footing. Areas for volleyball, deck tennis, badminton and playgrounds receive intensive wear, but the response of the ball is of less concern. The maintenance of polo grounds provide an additional challenge due to the stress on the turf area caused by horses' hooves. However, each of these intended uses creates similar problems of turf growing and management, due to the compaction of soil and intense wear.

The maintenance of athletic facilities presents the turf manager with three major areas of concern: Conditions or health of the **turfgrass,** the firmness and uniformity of footing for the **player,** and the color and grooming of the turf surface for esthetic value to the **spectator.**

Accumulated surface water weakens turf and causes unstable soil. Soil surfaces, even when the turfgrass cover is worn, need to remain smooth and stable (as in basepaths, infields, or the center of football fields). Wear-tolerant turf is necessary for safety and appearance and should be achieved in spite of intense use that reduces quality and quantity of existing turfgrass as the season progresses.

The turf surface is important to the player as he runs, stops, turns, twists, jumps, falls and gets up. The player seldom has a controlled fall, but more likely is tackled, blocked, pushed, piled onto, rolled or stepped on. He may slip, slide or twist. Many athletic injuries are due to body contact between players. As a ball carrier is tackled, there is often extreme pressure on his feet and legs as he tries to advance. The opposing forces create upper body twisting and cause extra stress on the knees. The inherent "give" of natural turf reduces some of this stress.

Derived from Turf Manager's Handbook, published by Harcourt Brace Jovanovich Publications, 1 East First Street, Duluth, MN 65802. See book ad in magazine.

Maintenance of Athletic Grounds

A dense, wear-resistant turfgrass cover on athletic fields reduces the number and severity of player injuries, provides good footing for better game performance, and presents a pleasing appearance. The use of agronomic principles and good judgement can contribute to a successful maintenance program.

Correct timing of all maintenance operations is of prime importance; each practice needs to be related to the state of turfgrass growth, to varying ground and weather conditions, and to the projected use of the area.

The following concepts of grounds management relate to areas used for football, as well as parks, baseball fields, playgrounds and multiuse areas which have similar demands and requirements. The football player spends many more hours working or playing on practice fields than in the stadium. Therefore, there is a need for the best turf possible on the practice fields.

There are three general levels of athletic field maintenance determined by budget, available equipment and technology. Timing is vitally important; nature's growth processes require time. In general it is better to be early rather than late with management procedures.

Wear Tolerance of Grasses

Currently the improved grass varieties provide increased resistance to wear. Both ryegrass and tall fescue have a high fiber content, which provides increased wearability. Because of seedling vigor, the overseeding of ryegrass can provide a continuous new growth during the playing season. In California pre-germinated seed has been spread on the athletic field prior to a scheduled game. Following the game the field is covered with clear plastic sheeting for 6-12 days, depending on the weather. The young grass is green by the following game time.

Vertical cutting of turf of bermudagrass cultivars, such as Santa Anna, should be done when the conditions are conducive to rapid re-

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Economy Athletic Field Care

a. **Fertilize** in early fall (August 10 in Indianapolis). Use 60 pounds of nitrogen on a field or 100 pounds inside the oval track. Examples: 45-0-0 at 120-200 pounds or 16-4-8 at 300-500 pounds.
b. **Water** as needed. Consider the use of traveling type irrigation equipment with automatic cutoff. These are available in the larger turf-types with 400 feet of cord and 1-inch plastic hose or the smaller lawn types with 100 feet of tape and ¾ inch hose.
c. **Mow** often at a two-inch height (as high as practical rather than as low as possible). Maintain adequate leaf surface that will tolerate increased wear and produce energy within plants. Bermudas should be cut closer.
d. **Overseed** lightly before each home game. Spread 5 pounds of seed with broadcast seeder over the worn areas. Let the cleats push the seed into the soil.
e. **Mulch** thin areas immediately following the last game of the season with crushed corncobs or other organic material which favors soil aggregation as it decomposes.
f. **Fertilize** in late winter or early spring (April 1 in Indianapolis) to promote early grass growth.
g. **Kill broadleaf weeds** and knotweed before they compete with turfgrass (before June 15). Use 2,-4-D and dicamba combined. Follow label instructions.
h. **Prevent crabgrass,** etc. by the use of preemergent herbicides which can be applied (April) with fertilizer. Apply following the first mowing in the spring.
i. **Mow often** but with a high cut during the summer. This favors the production of deeper roots and builds reserves of energy in the rhizome.
j. **Spread wear** as much as possible to protect the center of field. Mark an extended 5-yard line where possible for optional practice (band and team).

Improved Care For Athletic Fields

a. Use turfgrass fertilizer high in N, low in P, medium in K. (16-4-8, 18-5-9, 24-4-12). When using slow release nitrogen apply two to three pounds N for each 1000 sq. ft. in mid-August.
b. Prior to August 15 irrigate (heavily) only when wilt starts to show. If in doubt, don't apply more water. After August 15, water lightly and frequently as needed to maintain optimum playing conditions.
c. Mow at a two-inch height during summer, then one and one-half inches after the first fall home game for bluegrass and ryegrass.
d. Overseed before each home game. Use newer, more disease resistant varieties of grasses.
e. Fertilize mid-fall to encourage new plant growth.
f. Mulch thin areas (immediately following the last home game) with one ton crushed corncobs or other organic material which, as it decomposes, favors soil aggregation and separation. However, additional fertilizer will be required the following year to offset the nutrients tied up in decomposition.
g. Fertilize lightly with a soluble nitrogen source to force growth in the early spring.
h. Kill broadleaf weeds and knotweed as needed.
i. Prevent crabgrass. See economy field care procedure.
j. Mow frequently and high.
k. Cultivate intensely once in mid-summer to loosen the soil, reduce compaction, bury crowns of the plants and aid in surface leveling (rental machines are available). Repeat treatments in one day; greensaire twice, aerify three to six times. Spread fine sand, shread the soil cores, drag, smooth and water as needed.
l. Extend yard lines to fence for maximum practice area. Use center for pass patterns only. Minimize practice on the field. Mark off 5-yard lines in other turf areas for band practice and wet weather use.

Best Care Program for Athletic Fields

In addition to the "economy" and "improved" care programs there are other maintenance procedures that aid in producing the best turfgrass possible.

a. Build up levels of N,P and K by the use of slow release fertilizers. Test composite 2-inch soil samples to determine needs. Use lime and gypsum only if needed.
b. Install an automatic pop-up, padded head irrigation system (consult reliable irrigation suppliers). Consider the use of three rows of full circle, or four rows, including two part circles, for the edges of the field. Use only as needed.
c. Mow frequently. Vertical cut and selectively thin, particularly at the edges of the field where thatch accumulates.
d. Repair divots following each game. Overseed before each game with ten pounds of seed. Consider resodding the field to newer disease resistant grasses.
e. Maintain a high nutrient reserve in the soil.
f. Use clear, perforated plastic sheeting over the turfgrass area to conserve heat, hold moisture, and reduce freezing.
g. Fertilize lightly with a soluble nitrogen source to promote early spring growth.
h. Prevent crabgrass, etc. See economy procedure.
i. Kill broadleaf weeds and knotweed as needed. Spray for leafspot control (four times a year) or as wet, humid weather dictates.
j. Mow in alternate direction (football fields) every five yards to produce a contrasting pattern.
k. Annually power slice as deep as possible; work from sideline to sideline; go up and down the slopes. Apply premixed topdressing material or washed fine sand following the last game, then aerify and loosen the soil.
l. To improve appearances the damaged areas of the field may be sprayed with colorants.
Note: It is reported that shorter shoe cleats, soccer types, less than one-half inch, are safer for players and do less damage to turfgrass.

covery (early summer). Cool season grasses may be vertically cut any time during the season in the outer areas of the athletic fields that receive less wear, provided there is time and conditions are favorable for recovery before heavy use or natural dormancy.

The wear tolerance of the turfgrass increases as the green vegetation increases per unit area. Moderate amounts of thatch provide protection to the turf by the cushion effect, which improves wear tolerance. Wear tolerance of turfgrass is favored by application of a moderate quantity of fertilizer rather than an excess, slow release nitrogen rather than soluble, medium moisture level rather than an excess wetness, adequate potassium supply rather than low, open sunny area rather than shaded, and a balanced nutrient level.

Most turfgrass species have an optimum height at which they should be maintained for maximum quality turf. A turfgrass mowed at one inch (normal for species and conditions) may have several times the wear tolerance of the same grass mowed at one-half inch (stress).

Research by Beard, Anda, and others of Michigan State University, using a wear machine, has contributed information concerning species relationships.

In a specific wear tolerance test of 18 blue-

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Athletic Field *from page 42*

Relative Wear Tolerance of Turfgrasses When Grown in Their Respective Regions of Adaptations:

	Turfgrass Species	
Relative Ranking	*Warm Season*	*Cool Season*
Excellent	zoysia	—
	bermuda	—
	bahia	—
Good	—	perennial ryegrass
	—	tall fescue
	—	Kentucky bluegrass
		red fescue
Medium	St. Augustine	
Poor	carpetgrass	creeping bentgrass
	centipede	colonial bentgrass
		Poa annua
		Poa Trivildes

grasses (five year old sod), the remaining verdue (green wet weight) ranged from 7.9 to 1.6 grams and the reduction in verdue varied from 18 to 66 per cent.

In areas where compaction is a problem, such as golf tees, centers of football fields, volleyball courts, etc., it is desirable to maintain sufficient crowns and stolons so that regrowth provides continuous and uniform turfgrass cover.

In heavily trafficked areas where the turfgrass is worn enough to destroy crowns of grass, resodding is generally the wise solution. Seedlings seldom survive in areas that are receiving heavy wear.

Topdressing

Many turfgrass areas for athletics are initially constructed with limited resources. As the area is used, demands or requirements for the area increase. Topdressing can be used to improve the surface. Organic materials (peat, manure, crushed cobs, fine barks, hulls or composts) can dilute tight soils and, as they decay, aid in granulation and structural improvement of the soil (when a hard surface is not required).

Apply topdressing materials to

1. protect the crowns of growing grass,
2. level the surface,
3. increase resiliency of the playing surface,
4. improve soil structure,
5. increase water holding capacity of the soil,
6. increase water infiltration and percolation rates,
7. improve the nutrient level of the soil,
8. increase cation exchange capacity of the soil.

Topdressing materials should be spread evenly over the field or the portion of the field as needed. After the topdressing is spread, the field should be intensely cored. Depending on design, coring machines can be used over an area 2-6 times in one day. The cores should be shredded and distributed by dragging, to aid in smoothing and leveling the surface.

Extra nitrogen fertilizer may be required as the organic matter decomposes, but nitrogen will later be released as the organisms causing decay die.

Soil Warming

Heating the turfgrass from below the soil surface will extend the length of the turfgrass growing season and allow increased use of an area. The benefits include (a) enhancement of root and shoot growth, (b) reduction in frozen soil (c) protection from light frost, (d) aid in snow removal, and (e) improved winter grass color.

Soil warming research began in England and Sweden about 1960, and at Purdue University (Indiana) in 1963. Hot liquids, hot air and electric resistance cable have been used. The resistance cable is preferred since it offers greater convenience in installation and maintenance.

Heating cable providing resistance of 5 watts per foot or 16 watts per meter has been adequate when placed 6 inches (15 cm) deep and one foot (3 cm) apart in the center of an athletic field. Spacings of 18-24 inches are used in the outer portions of the field where the turf wear is less, and a normal turfgrass cover is easier to maintain.

The fields at the Air Force Academy, Colorado, and Lambeau Field at Green Bay, Wisconsin, are two of the earlier installations of soil heating in the United States. More recently heating systems have been installed at Foreman Field, Goshen Indiana; Ross Ade Stadium, Purdue University; Mile High Stadium, Denver, Colorado; Kennedy Stadium, Washington, D.C.; and University of Wisconsin at Milwaukee, Wisconsin. Three Michigan fields also have installed soil heating equipment.

Since some athletic events are scheduled in spite of weather conditions, anything that helps counteract the weather extremes and provides improved playing conditions is beneficial.

In fields that have soil warming equipment, frost action is minimized, playing surfaces remain firmer, snow melts from below and creates less wetness. Roots and crowns of cool season grasses grow when temperatures are above 40°F (50°C), so replacement or growth of plant parts is favored. Seed germination and new sod rooting is also favored.

The increased demand for sports facilities will create a greater need for soil warming. The increasing costs of energy could restrict this.

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Vented Field Covers

Raising the temperature of the interface between the cold air above and the warm soil below may greatly improve the rate of turfgrass growth under marginal weather conditions. Vented field covers made of clear plastic sheeting (¼ inch perforations spaced 6 inches apart) have proven useful in increasing the temperature below the interface. These covers are easy to apply, can be left on the turf for long periods of time, and allow rain to enter the rootzone. The covers can increase the growing season by 30-60 days in late fall and early spring.

Numerous "raincoat" coverings have been used to protect soil from excess rainfall prior to game time. However, moisture tends to condense under the surface of the solid plastic sheets which results in a wet playing surface, and any holes or loose edges that allow the entry of rain water tend to cause excessively wet spots. Further, the heavy covers require considerable manpower and time to spread.

At least 16 of the major stadia in Sweden have powered rollers by which the plastic field covers are removed. These are stored within one section of the soccer fence during the games and throughout the summer months. A plastic covering used for this purpose may last three to six years, depending on the ultraviolet light inhibitors incorporated. Plastic sheeting, without perforations, must be removed during bright warm days to prevent killing of the turfgrass.

Covers reinforced with nylon or of other woven fibers provide increased strength and resistance to tearing. Experience with plastic sheets perforated at 2, 6, and 8 inch intervals indicates that the 6 inch spacing is most satisfactory. The 6 inch perforations allow some venting, permit water to enter and reduce the adverse effects of wind on the large sheets.

Colorants

Latex based colorants are widely used on athletic fields. The white spray paint has largely replaced the lime dusts for official line markings. The logos of teams and stadia are emblazoned in colors in the endzones. The sidelines are color coded for player information. Entire fields (especially those of dormant bermudagrass) have been sprayed green. Green sawdust has been added to bare areas for color effect. Entire fairways have been sprayed prior to television coverage of winter golf. Home lawns of zyosia or bermuda are sprayed in the fall following the first frost, then retouched in early spring for added color.

Trade names of turfgrass colorants on the market include Everbright, Greenstuf, Greenzit, Sta-Green, Stayz-Green, Vichem Green, Vitalon dark—zoysia, Vitalon light—bermuda, and Winterlawn. **WTT**