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# Topdressing Athletic Fields

One of the first questions to consider when creating a topdressing program is particle size distribution. It is crucial to occasionally measure sand size and quality within a topdressing program as source quality can change over time. The article will discuss whether a topdressing program is the right path to take, how to incorporate a program through cultivation, general costs of topdressing, the importance of sand particle size, and how much sand is needed when applied on the surface following aerification.

## Implementing a topdressing program

Before determining the proper topdressing material to be used, one must consider the overall purpose of the program. A well-defined and consistent program can:

- Modify and dilute thatch
- Increase long-term water infiltration and percolation through gradual soil modification
- Increase seed germination
- Smooth and level the playing surface

The essential first step is selecting the right material. Soils across Iowa vary depending on location, ranging from very fine, heavy-textured clay and loam soil to very coarse, sandy soil. As a result, it is highly recommended to first test the underlying soil texture for sand, silt, and clay content. After determining soil texture, locate a product that fulfills the particle size criteria required. How the material selected pairs with the original soil needs should be carefully considered to meet the goals of the overall program. The success of a topdressing program is reliant on the ability to find equivalent materials that are slightly coarser than the soil's original composition.

A common mistake when topdressing a field is adding fine texture material over a course-textured soil. This can occur when sod is laid over an existing root zone and through improper topdressing. In addition, placing a fine-textured material over course material creates distinct layers that clog internal drainage. Always place coarse textured material over finer textured material to increase percolation, provided there is adequate pore space between particles.

## Modification through cultivation:

When modifying an existing root zone, adequate cultivation is necessary to insure proper incorporation of the material. The more a topdressing material texture varies from the existing root zone, the more cultivation is required. Without sufficient cultivation, there remains a high potential for layering to occur. Anytime a layer is created in the soil, its interface can negatively affect hydraulic conductivity, and root penetration, along with air and gas exchange characteristics.

The objective of all topdressing programs is to reach 75 percent sand by weight in the root zone. At 75 percent sand by weight, macropores are created, allowing the sand particles to bind and reduce particle density. The large pore spaces reduce the probability that a field becomes severely compacted. Additionally, aerification holes backfilled with sand can create deep channels that allow water to move rapidly through the soil. Lapses or inconsistent programs can cause major infiltration and layering issues in the future. Topdressing is a multi-year process and once started needs to continue for the life of the field.

Frequent topdressing is also used to dilute thatch – intermingled layers of living and dead crowns, stems, roots, and rhizomes – that develops over time. A small thatch layer under an athletic field between 0.25-0.5 inches can provide stability and padding for users, however an excessive thatch layer (>0.5 inches) can prevent water infiltration, as well as create a favorable environment for pests. Disease and insects thrive in saturated environments caused by excessive thatch. In addition, the consistently wet surface and concentrated thatch layer can discourage roots from developing deep into the soil profile. Fields with poor rooting reduce field stability and negatively influence an athlete's traction, potentially resulting in more injuries.

Fine sands range from 0.5 to 0.25 millimeters, while granular particles greater than two millimeters in diameter are considered fine gravel. As a general rule, uniform rounded medium coarse sands (0.25-1mm) should be used on Iowa's native soil fields. The United States Golf Association (USGA) recommends sands with 60 percent by volume in the medium to coarse range. Rounded sands are also preferred for modifying native fields due their large pores and higher macro-porosity. Finer sands will ensure surface stability in sand-based fields. In general, increasing the coarseness of the sand reduces the field's overall stability.

A majority of the topdressed fields in Iowa receive 25-50 tons (1-2 truckloads) of sand each year. The timing of application is dependent on the total number of events that take place on the field and the sport turf manager's maintenance program. Some fields are topdressed several times with light topdressing, while others focus on heavy applications after aerification. Regardless of the method used and timing, topdressing should only happen during periods of active growth, unless used late in the season as a desiccation prevention technique.

## Topdressing costs:

The biggest cost associated with topdressing is the fees required to transport material to a given location. The current cost of freight is determined by adding the base rate ($3.40/mile) and fuel surcharge ($0.70 cents/mile), which is usually approximately 20 percent of the base rate. Total freight cost may be listed as two separate line items, or combined as a total transportation cost. The fuel surcharge will fluctuate during a given year as the base rate changes. Commonly, overall freight costs around $4.00 per mile. Therefore, transporting a truckload of sand 100 miles would cost about $400 dollars. The freight cost often exceeds the price of sand.

Current estimate of sand costs
- USGA Sports Turf Sand 90/10: $31.40 per ton
- Class 2 USGA Sports Turf Sand: $13.50 per ton
- Mason sand: $12.00 per ton

Generally, the cost of topdressing material increases with increased particle size. Additionally, vibrated reflux classifications and a screening processes to distinguish varying particle sizes increases the overall cost as well. As a result, increased costs typically means higher consistency within a given material. With the expense of transportation and difficulty in finding high-quality sand, it is important to consider site-specific management, transportation, and sand costs, as well as the overall goal of the application prior to purchase.

## Quality assurance:


While the cost often equates to the overall quality of the sand, the most vital factor in relation to the initial root zone mix or previous material used is sand size. Just because a USGA 90/10 Sports Turf Mix has the highest cost in the list above, does not mean it is the best selection for all situations. In some situations, cheaper mason sand may be required to prevent layering. Mason sand can be coarser and less consistent than the USGA 90/10, but it may also be optimal based on original soil texture, past topdressing material, and current or future maintenance strategies.

A semi-annual testing through universities or independent labs is recommended to insure quality. Additional testing is required whenever changing sand sources. A simple test for a nominal fee can prevent one bad topdressing event from compromising several years of work. Inquiring about the underlying soil prior to purchasing and installing sod is also recommended. Confirming establishment and growth on comparable soils will help prevent layering and summer patch in the future.

## How much sand is really needed?

Table 1 can help determine surface topdressing requirements to specified depths. For example, an entire football field and surrounding area at 1/8 inches would need 0.56 tons/1,000 square feet or 33 tons/60,000 square feet.

**Table 1. Surface topdressing requirements**

| Sand needed for Surface Application (ton/1,000 square feet) | | |
|---|---|---|
| +1/8" | +1/4" | +1/2" |
| **0.56** | **1.12** | **2.24** |

Aerification can be beneficial in combination with a sand topdressing program to improve internal drainage, reduce thatch and increase fertilizer uptake efficiency while also

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**Table 2. Sand Required and Areas Impacted for various Coring and Topdressing Programs. Modified from a table originally created by Dave Minner, Iowa State University professor of horticulture.**

| Core Spacing (inches) | Holes per square foot | Tine diameter (inches) | Tine depth (inches) | Sand needed to fill holes + surface (ton/1,000 square feet) | | | % area removed each pass | Number of passes with aerifier to impact a given area of field | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | +1/8" | +1/4" | +1/2" | | 50% removed | 25% removed | 10% removed |
| 2 | 36 | 0.5 | 3 | 1.22 | 1.78 | 2.89 | 5.0 | 10 | 5 | 2 |
| | | | 8 | 1.76 | 2.87 | 4.00 | | | | |
| | | 0.75 | 3 | 2.04 | 2.60 | 3.72 | 11 | 5 | 2 | 1 |
| | | | 8 | 4.51 | 5.08 | 6.19 | | | | |
| 3 | 16 | 0.5 | 3 | 0.85 | 1.41 | 2.53 | 2.2 | 22 | 11 | 5 |
| | | | 8 | 1.34 | 1.9 | 2.93 | | | | |
| | | 0.75 | 3 | 1.22 | 1.78 | 2.89 | 5 | 10 | 5 | 2 |
| | | | 8 | 2.32 | 2.87 | 4.00 | | | | |
| 4 | 9 | 0.5 | 3 | 0.72 | 1.28 | 2.40 | 1.3 | 40 | 20 | 8 |
| | | | 8 | 0.99 | 1.55 | 2.68 | | | | |
| | | 0.75 | 3 | 0.93 | 1.49 | 2.61 | 3 | 18 | 9 | 4 |
| | | | 8 | 1.55 | 2.10 | 3.22 | | | | |
| 6 | 4 | 0.5 | 3 | 0.63 | 1.19 | 2.31 | 0.5 | 90 | 45 | 18 |
| | | | 8 | 0.75 | 1.31 | 2.42 | | | | |
| | | 0.75 | 3 | 0.72 | 1.28 | 2.40 | 1.3 | 40 | 20 | 8 |
| | | | 8 | 0.99 | 1.55 | 2.68 | | | | |
| 8 | 2.25 | 0.5 | 3 | 0.60 | 1.16 | 2.28 | 0.31 | 161 | 81 | 32 |
| | | | 8 | 0.68 | 1.22 | 2.35 | | | | |
| | | 0.75 | 3 | 0.65 | 1.21 | 2.33 | .69 | 72 | 36 | 15 |
| | | | 8 | 0.81 | 1.36 | 2.48 | | | | |

providing a uniform playing surface. To determine the material needs for backfilling aerification holes and surface application depth, the size and frequency of aerification holes must be taken into consideration. Table 2 provides specific requirements and areas impacted for various core aerification and topdressing depths. The general assumption is that sand weighs 1.45 ton/cubic yard and that 100 percent aerifier efficiency is used.

Topdressing is a valuable tool for all sports turf managers, and when used correctly it can improve field quality and safety. It is vital to select the right material when implementing a topdressing program. Selecting the correct material can lead to increased longevity of the field and provide a better playing surface for athletes.

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