TURFGRASS TRENDS Golfdom
SOLUTIONS, IDEAS & OPINIONS

From Something Old, Something New

Coated-sand topdressing improves core hole recovery

By Max Schlossberg, Robert Kerr and Karl Danneberger

Sand topdressing improves turf quality in a variety of ways. The most obvious is in remediation of soils having suboptimal physical properties. Compared to silt or clay loams, a macroporous sand layer accepts surface water rapidly.

Furthermore, a dry, water-repellent thatch layer is more easily wetted once topdressed with sand. Many superintendents question whether sand topdressing actually accelerates thatch decomposition or just dilutes thatch (and subsequently organic matter). It likely does both. Sand is hard enough to remove paint and has an abrasive-scouring action on thatch. Further, increased water-holding capacity from sand additions make the thatch environment more suitable for microbes to dwell and eat.

After four years of treatments and monitoring, R.N. Carrow and colleagues (1987) found that sand topdressing of Tifway bermudagrass reduced thatch more rapidly than coring or vertical mowing.

Another approach to amend soil or minimize surface organic matter accumulation is coring (a.k.a. core aerification) and backfilling with coarse-textured sand. Many a compacted push-up green have been steadily converted to macroporous media through annual (or biannual) hollow-tine aerification practices, followed by sand backfilling.

In theory, a fine-textured native soil could be completely renovated to a predominantly sand upper profile by aerifying and sand-backfilling only 12 times. Of course, luck would be a prerequisite, as the tines must

FIGURE 1

There was a systematic introduction of divots to plots at Penn State University for the study.

strike only native soil (no repeat core evacuations) for the complete conversion to take place so quickly.

Unbeknownst to many, the researchers that first reported the benefits of topdressing putting greens had envisioned the topdressing process to include more than just sand (Madison et al., 1974). This original topdressing research showed sand topdressing to be a uniform and reliable mechanism of delivering seed, fertilizer, lime and pesticides to greens; all in one pass of the spreader.

Over time, superintendents likely found mixing all of these materials to be problematic and tedious and resorted to simple straight–sand topdressing for the benefits mentioned above.

A common thread known to weave through these common cultural practices is the need for rapid turf recovery. Lingering core aerification holes are the scourge of the putting public. Unincorporated topdressing wreaks havoc on meticulously maintained reels, and makes more work for your overworked mechanic. Hence, vigorous shoot growth facilitates rapid recovery and blissful sentiment, having conducted these disruptive cultural practices.

FIGURE 2

Number of core holes visible 11 days after aerification at Ohio State University.

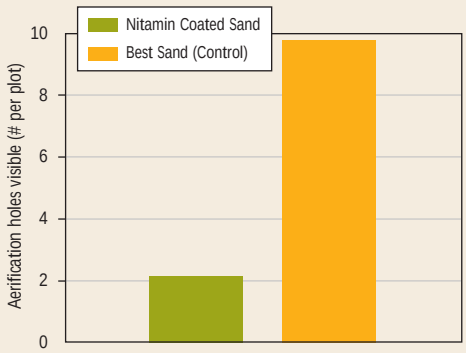

FIGURE 3

Recovery of aerified plots at Ohio State University 14 days following treatments with coated sand (left) and control sand.

Recovery practices

As mentioned above, rapid recovery is an important part of keeping disruptive cultural practices temporary. Coordinating optimal shoot growth with aerifying and/or topdressing is a practice successfully used by superintendents. Managers using growth regulators often time post-growth regulation surge to coincide with these practices. Others fertilize with nitrogen just prior to or immediately following these practices.

D.C. Bowman (2003) recently showed nitrogen fertilization at a uniform daily rate significantly benefits turf health when compared to less-frequent fertilization (at equal total rates). Scientists at Georgia-Pacific asked, "Can we help managers achieve faster turfgrass recovery by developing a product that will simultaneously amend soil and fertilize turf?" Soon after, the patent-pending Nitamin Coated Sand was born.

The coated sand contains 1 percent nitrogen by weight (1-0-0). The term "low-analysis fertilizer" may conjure images of natural organics or nutrient-impregnated degradable carriers. It is unique in this respect. Best Sand, available in various particle-size distributions, is coated with Nitamin nitrogen fertilizer and stabilized, providing a homogenous, steady-release fertilizer with the following characteristics:

- very low burn potential (low salt index);
- low size guide number (SGN ~ 50); and
- high particle density (facilitating rapid canopy penetration).

Conceptually, the coated sand seemed like an innovative product, but its field performance required testing. Thus, replicated experimentation by two independent universities was contracted to make a determination, and the results are in.

Field experiments

Field experiments were conducted at a number of locations, including The Ohio State University and the Pennsylvania State University.

The Ohio State University: This study was conducted at the Ohio Turfgrass Foundation Research and Education Facility in Columbus. The objective was to determine if backfilling coring holes with the coated sand vs. traditional sand would enhance core hole recovery.

The study was initiated on a 3-year-old L93 bentgrass fairway established on native soil and mowed at one-half inch. Plots 3 x 6 feet in

area were set up in a complete randomized block design (RCBD) and aerified with five-eighth-inch tines on Aug. 13, 2004.

Three days previous, plant growth regulator treatments had been applied at the following rates: 0.125 ounce Primo per 1,000 square feet, 0.38 ounce Trimmit per 1,000 square feet, or 5 ounce Proxy per 1,000 square feet (both alone and in combination with Primo). Following aerification, cores were removed and the plot area was allowed to settle and dry. On Aug. 16 the core holes were filled with either the coated sand or dry Best Sand. Eleven days following treatment, the number of visible core holes in the L93 was recorded.

The Pennsylvania State University: This study was conducted at the Valentine Turfgrass Research Facility in University Park. The objective was to determine any advantages in topdressing typical divot damage with the coated sand compared to ordinary sand, ordinary sand blended with isobutylidene diurea fertilizer or ordinary sand blended with ammonium sulfate at equivalent nitrogen rates. Twelve blocks of four 2x4-foot plots, established on a PennEagle bentgrass fairway (native soil, half-inch mowing height) received divot-inducing attention on four separate dates (June 20, July 9, 29 and 30; three blocks per date).

The following day plots were hand-topdressed with the above-mentioned treatments to provide nitrogen at a rate equivalent to 3 pounds of nitrogen per 1,000 square feet (control plots received no nitrogen). All plots in the randomized block design possessed ideal soil nutrient levels and were foliarly fertilized with 0.5 pounds of magnesium sulphate per 1,000 square feet to standardize sulphate sufficiency.

TABLE 1

Divot area per plot (initially ~2800 cm²) over experimental period:

Treatment	Mean divot size (cm²)	
Control (sand topdressing only)	1073	B*
IBDU (blended with sand topdressing)	931	AB
$(NH_4)_2SO_4$ (blended with sand topdressing)	1002	AB
Nitamin Coated Sand (1% N topdressing)	853	A

* — Different letters following means signify statistical differences (a = 0.05).

FIGURE 4

Plot topdressed with coated sand 25 days after treatment (top) and 49 days after treatment at Penn State University.

Digital images of the plots were taken periodically over the seven weeks following divot topdressing. Images were analyzed and square centimeters of recovery were calculated using SigmaScan Pro 5 (Richardson et al., 2001). Mixed models and regression analysis were conducted to determine significant differences between treatments.

Results

The Ohio State experiments showed coring and filling the holes with the coated sand enhanced core hole recovery based on number of holes visibly present 11 days after treatment (Figures 2 and 3). The use of a plant growth regulator had little or no effect on core hole recovery.

The Penn State experiments showed average divot size over the seven-week period was smallest in the coated sand treated plots (Table 1). Divot recovery (percentage) was accelerated by all fertilizer treatments when compared to the control. However, among fertilizer treatments, plots topdressed with the coated sand had significantly greater recovery over the experimental period.

This observation was most stark in the period three to seven weeks following topdressing, and affirmed by orthogonal contrast statements. Images illustrating stolons extending from adjacent bentgrass into divots show rapid growth with no signs of phytotoxic injury (Fig. 4).

Summary

During the summer of 2004, the coated sand showed good performance as both sand topdressing and steady-release nitrogen fertilizer in two independent studies.

Recovery of a treated L93 fairway was four to five times more rapid than ordinary sand in the two weeks following aerification. Likewise, divot recovery on a PennEagle fairway was significantly enhanced when the coated sand was used in the topdressing compared to both ammonium sulfate and isobutylidene diurea spiked sand in the seven weeks following treatment.

Moreover, advantages demonstrated in the latter study do not account for costs associated with in-house sand-fertilizer blending; burn risk or non-uniform application of improperly homogenized sand-fertilizer blends.

Neither the Ohio State nor Penn State universities make any endorsement, promise, or warranty (expressed or implied) of commercial products and/or their performance mentioned herein.

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