

MOST DON'T JUST USE ONE TYPE. Golf course superintendents use a combination of granular and liquid fertilizers to achieve desired results.

Liquid and granular fertilizers are taken up into the plant the same way under normal conditions — through stolons, rhizomes and roots. But a better understanding of the nutrients applied can help superintendents improve their fertility programs.

For instance, many superintendents confuse foliar fertilization with liquid fertilization, says Jeff Higgins, Ph.D., chief agronomist for ValleyCrest Golf Course Maintenance in Calabasas, Calif.

“Liquid fertilizer and foliar fertilizer are totally different, yet many superintendents think they’re the same,” Higgins says.

Foliar fertilization is the application of liquid fertilizer at low water volumes, so it adheres to the foliage and enters the plant that way, Higgins says. Ideally, the water volume for foliar fertilization would be 15 gallons of water per acre or less. With foliar fertilization, there’s also a risk for burn.

“If you apply liquid-soluble fertilizer at the water volumes for true foliar fertilization, the fertilizer more than likely will dry on the leaf surface, and the salt properties will attract water out of the plant and desiccate it,” Higgins says. “You need to apply the fertilizer in sufficient water volume to ‘wash’ it off the foliage down to the stolons, rhizomes and roots, where it’ll be absorbed.”

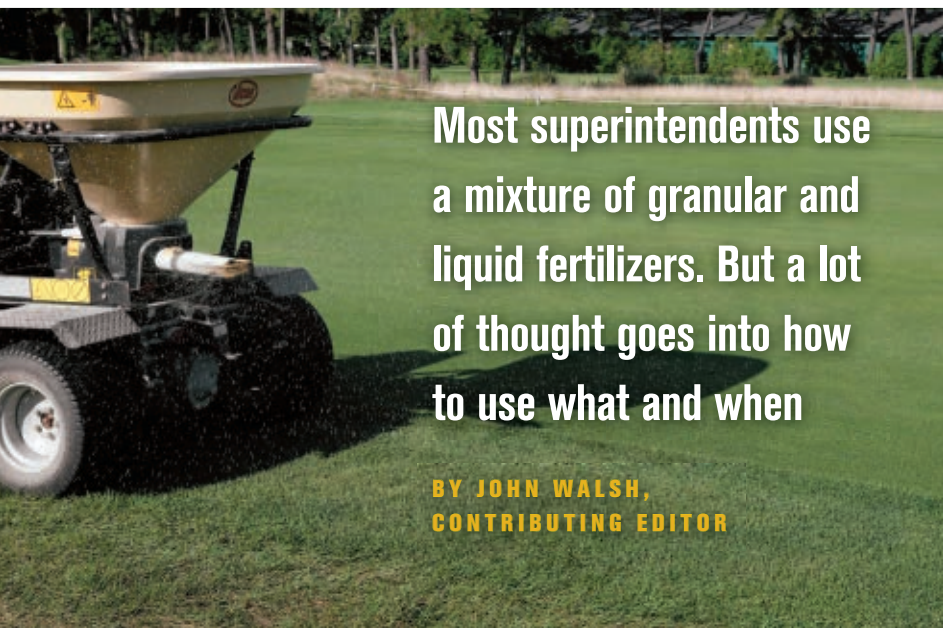
Most superintendents use liquid and granular fertilizer, and a minority use

strictly liquids, Higgins says. Those with *Poa annual*/bentgrass greens are more likely to use more liquid; and those with bermudagrass greens are more likely to use more granular because there’s more growth on bermudagrass greens and more fertilizer is needed. However, with the ultradwarf bermudagrasses, superintendents need to use liquid fertilizer to get down into the canopy and avoid the mower pickup that sometimes comes with granular usage, Higgins adds.

Superintendents can achieve more growth with a granular product because of the ability to apply higher nitrogen rates, which is one advantage over a liquid fertilizer. There’s a time and place for granular fertilizer on greens, but superintendents need to watch for particle size, Higgins says, adding they

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The Combo-Meal



Most superintendents use a mixture of granular and liquid fertilizers. But a lot of thought goes into how to use what and when

BY JOHN WALSH,
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need to know how the product work, whether mower baskets will be removed and determine if the product will alter the greens' performance.

"It goes back to the objective," he says. "If you're aerifying and trying to heal the turf quickly, you can apply granular fertilizer to get the plant moving."

Many superintendents use slow-release or organic granular fertilizers as a base once or twice a year, supplementing them with liquid, Higgins says, adding that most superintendents use granular fertilizer in the fairways because it's easier and quicker to apply.

Tissue and soil testing help determine the timing of fertilizer applications based on the needs of the turfgrass.

"I'm a fan of doing tissue testing (primarily on greens) to quantify how effec-

tive your fertilizer program is," Higgins says, adding that most superintendents don't tissue test enough.

From a physiological standpoint, fall is the most important time to fertilize because all turf — cool season and warm season — builds up carbohydrate resources, Higgins says.

Granular only

Steve Spears isn't applying fertilizer like most superintendents because he doesn't use any liquid products. Spears, the golf course superintendent at the 18-hole St. Germain (Wis.) Municipal Golf Course, manages Pennncross greens, bluegrass/fescue fairways and bluegrass/bentgrass tees without phosphorus.

The state legislature passed a law last year that disallows Spears from applying

or fourth week in April and continuing through the third or fourth week in October. He applies it once every three or four weeks at one-half to three-quarters of a pound per application. He uses two products — a 17-0-17 and a 19-0-15. The products, which are water-dispersible granules, are applied right behind the mowers early in the morning. After the application, he runs the sprinklers three to five minutes.

Spears also uses a 0-0-25 product, which has magnesium and manganese, to help build chlorophyll and helps the plants physiologically. It also helps with drought tolerance and compaction and helps maintain the plants' water balance.

In fairways, Spears uses a 24-0-10 fertilizer. He makes four applications, each at one-half pound of nitrogen per 1,000 square feet, in the spring and fall. In the middle of the summer, he makes two applications of 20-0-20 at three-quarters of a pound of nitrogen that lasts six to eight weeks. Spears makes the fairway applications based on the color and quality of the turf. After six weeks, he starts to see the bluegrass turn yellow. In all, he's applying fertilizer in the fairways every seven weeks from mid-May to mid-September.

Tees are fertilized once a month using a 23-0-10 product, which provides three-quarters of a pound of nitrogen per 1,000 square feet.

"I want to achieve the same turf quality with different products at a less expensive cost," says Spears, citing the 15 to 20 percent increase in the cost of fertilizer last year.

Improving deficiencies

Unlike Spears, Travis Livingston doesn't have to work around a phosphorus ban. Rather, he's worried about phosphorus and potassium deficiencies.

The golf course superintendent at the private, 18-hole Sewickley Heights (Pa.) Golf Club uses liquid and granu-

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Approach



phosphorus anywhere unless a soil test determines it's needed. (He can apply phosphorus if he's seeding.)

"The grass doesn't look as good, but golfers don't know," he says. "Actually, we've had some purpling of the plant, which indicates a lack of phosphorus."

Spears, whose maintenance budget is \$330,000, re-evaluated his entire fertilizer program, and is using different products in different rotations. He begins in the spring with one application of a 18-9-18 on greens when interseeding with Pennncross. He interseeds as a result of winter damage and to increase bentgrass population.

Spears, whose fertilizer budget is \$23,000, applies 4 pounds of nitrogen a year on greens, starting in the third

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lar fertilizer on *Poa annua*/bentgrass fairways, greens and tees. Livingston, whose overall maintenance budget is \$980,000, makes granular applications in late spring and early fall mainly for nitrogen. He uses a 10-20-20 product because the soil has been deficient of phosphorus and potassium. In between those applications, he applies potash two or three times a year.

Livingston's granular applications occur around the time he aerifies, which is twice in the spring and twice in the fall. After aerification, he waters in the fertilizer and waits one to three days before mowing.

Livingston, whose fertilizer budget is \$65,000, foliar feeds the greens once a week, using 2 gallons of water per 1,000 square feet. The amount of fertilizer changes based on conditions and what's needed. Part of his program is based on a schedule, and part is based on turf conditions.

Livingston applies a wide range of fertilizer on greens. Some weeks he applies nitrogen, others weeks he doesn't. Some weeks it's a bit of potassium. Typically, he applies twice as much phosphorus and potassium as nitrogen.

"When I got here three years ago, I didn't put nitrogen in the tank for a while," he says. "We're not seeing the flush of microbial activity because we're introducing sand into the profile through aerification. The N-P-K balance has taken years to achieve. We'll start backing off the phosphorus because we're not deficient anymore."

Fairway fertilization is the same spring and fall routine as with greens. In between that, it's every two weeks with a foliar feed because it coincides with Livingston's Primo applications. He likes the foliar feed in the fairways because it allows more flexibility and allows him to be more consistent with water use. It also avoids the mower pick-up issue with

granular fertilizer. The labor cost to apply the liquid fertilizer is offset because it's timed with the Primo applications.

Tee fertilization mimics the fairways, but Livingston will add granular fertilizer because of different soil structures.

"You still have to feed the soil," he says. "I'm not 100 percent foliar. You need both. It's about how it fits, when it fits and where it fits."

Most bang for the buck

Like Livingston, Adam Schultz uses liquid and granular fertilizer. However, Schultz spends one-sixth — \$10,000 — what Livingston spends annually on fertilizers. Schultz receives a discount on fertilizer because a club member works for a fertilizer company. The superintendent at the semiprivate Oakview Golf Club in Slippery Rock, Pa., maintains *Poa annua*/bentgrass fairways, tees and greens with a \$400,000 budget.

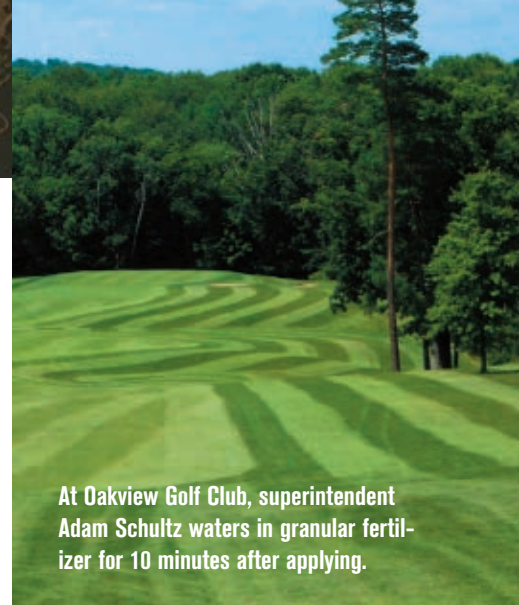
On greens, he applies a granular product as a base in early spring to thicken them up. From late spring to late fall, he uses liquid fertilizer.

"You can take the amount down low — 0.10 to 0.20 of a pound of nitrogen per 1,000 square feet every 10 days," he says. "It's hard to get down to 0.10 with granular. The liquid gives you what you need so there's no flush of growth. I can add or scale back as needed."

The liquid fertilizer (8-0-0, 10-0-10 and 18-2-5) is mixed with fungicides and usually applied at two-week intervals — sometimes earlier. Schultz uses a 150-gallon tank — 15 gallons is product, the rest is water.

"When there's a lot of play, I don't want a flush of growth, so I like the liquid applications," he says. "I've stuck with liquids on the greens for several years."

Schultz seldom applies liquid fertilizer in fairways because of cost. He uses a lot of slow-release product (24-5-10), so he can put down one application, lasting three or four months. For the



At Oakview Golf Club, superintendent Adam Schultz waters in granular fertilizer for 10 minutes after applying.

most part, he makes one application in the spring and one in the fall, using a 25-0-12 product.

"I'll do some of the approaches and pars more than twice a year to dress them up," he says. "There are times fairways can use more fertilizer. If I had a bigger budget, I'd go out earlier in the year with an application. I don't screw around with the greens but have tweaked the timing of the fairway applications because I need to get the best bang for the buck."

Schultz makes sure to water in the granular fertilizer for 10 minutes after applying because tip burn can occur if the product isn't watered in properly.

Schultz hits the tees more often — about once a month — than fairways because they get abused. He applies a granular (34-0-0) first then adds a liquid (the same one he uses on greens).

In the know

Overall, Higgins says superintendents need to understand more about the nutrients they're applying. They should ask themselves these questions:

- What's the percentage of slow release in the fertilizer blend?
- In what forms can the plant take up the nutrients?
- How long does it take?
- Does the source of nutrients, whether liquid or granular, have to be converted to a form the plant can uptake?

"To truly use fertilizer effectively, you need to know the release characteristics," Higgins says. ■