

SEED PRIMING AND PREGERMINATION: MAKING TIME

By Matthew Trulio

Of all the shortages you can face as a sports turf manager, from staff, to budget, to equipment, perhaps the greatest one is *time*. There never seems to be enough of it.

That's particularly true for high-use facilities. By the time one event begins, you're looking to the next, which could be a week or so away, or even the next morning. Your goal is to provide the best natural surface possible within the constraints of time and resources. And while neither is a cure-all, or even worth pursuing in all situations, seed priming or seed pregermination can help you reach that goal.

Although the terms priming and pregermination are often used interchangeably, they're decidedly different. According to Dr. Doug Brede of Jacklin Seed, seed priming is a pre-plant process that gets seed ready to grow before it "hits the ground." The process involves partially wetting the seed, allowing it to progress through several steps of germination, and then drying it back for planting. Priming takes the seed past the innate dormancy mechanisms that prevent or slow it from germinating when conditions are less than ideal.

Pregermination is process of germinating seed in a tank of water before sowing, Brede explains. After pregermination, roots have already broken the seed coat and an occasional leaf blade may be seen. Pregerminated seed demands immediate planting or the seed withers and dies.

In seed priming, the quantity of water fed to the seed during treatment is more limited than in pregermination. The seed doesn't receive enough water to fully germinate, so roots and shoots do not emerge. However, enough water is provided to get the seed started through the initial physiological steps of germination.



For the Tifway 419 bermuda turf at Sun Devil Stadium, Don Follette and his crew pregerminate 450 to 500 pounds of a ryegrass blend for each game. Photo courtesy: Don Follette.



Primed bluegrass seed (bottom), unprimed bluegrass seed (top right) and unprimed ryegrass seed (top left). Photo courtesy: Jacklin Seed Company.

more commonly used technique for speeding turf establishment. In its most simple form, the basic process involves soaking the seed in water, oxygenating the water, changing the water and, once the cotyledon has emerged, "drying" the seed (although allowing it to dry completely would kill it). The pregerminated seed is then applied to the field.

"There are a lot misconceptions regarding seed priming, and everyone has their own ideas," says Spardy, who did his senior project on the subject under the guidance of Dr. Kent Kurtz at Cal Poly Pomona. "One thing we found to be a constant in both germination speed and rate, was keeping the water between 75 and 80 degrees F. Changing the water every three hours, which is optimum, to eight hours is important, because

"There are a lot of different techniques people use for pregermination, but they all begin with soaking the seed in water," explains Nick Spardy, a turf consultant for Wilbur-Ellis based in San Diego, CA. "The goal is to create an ideal environment with adequate moisture, temperature, and oxygen where the seed is ready to germinate. Either the seed has started to swell or the cotyledon has actually emerged.

"In priming, the same concept is applied, but the process is stopped well prior to germination," he continues. "The seed may be swollen, but the cotyledon is far from emerging."

Most priming efforts, Spardy explains, are performed in the laboratory. The "tricky" part of the priming, he notes, is not just stopping the process, which requires precise timing, but storing primed seed. However, a number of companies are working on releasing primed seed varieties. (Check with individual seed companies or distributors for availability.)

In the field, seed pregermination tends to be a

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as the seed sits in water it releases exudate, a natural chemical which actually works as an inhibitor to germination."

The other key to success, Spardy asserts, is oxygen and oxygen circulation. It's critical to ensure oxygen reaches all levels of seed in the tank — without it, the only oxygen seed at the middle and bottom levels will receive is that from the water. In his work at Cal Poly, an aquarium pump was used to circulate oxygen in the seed as it sat in its water-filled containers. If you don't have oxygen pumping through the pregermination tank, it's important to at least try to move the seed around by stirring in the hope of moving seed at the bottom to the top.

What kind of "speed" advantage can pregerminated seed offer? Under optimum conditions at Cal Poly, Spardy maintains, they were able to reduce the normal germination of perennial ryegrass, with adequate conditions, from four to seven days to 36 hours. Keep in mind, however, results can vary widely with con-

ditions and your familiarity with pregermination techniques.

"Seed pregermination is something you have to play with," says Spardy. "But it's a viable tool for the sports turf industry. The biggest problem can be trying to apply the pregerminated seed out in the field, so most people use a carrier like sand, topdressing, or an organic fertilizer. Another potential problem is that if the cotyledon is too long, it can be damaged, so it's very important to watch it as it matures."

Applied Technique

Any pregermination strategy must be adjusted or "customized" to the situation at-hand. Don Follette, superintendent of grounds at Sun Devil Stadium in Tempe, AZ, home of Arizona State University and the NFL Arizona Cardinals (the team name has been formally changed), uses a process he learned from NFL turf consultant George Toma. (Follette has worked with Toma on the last four Super Bowls.)

The natural surface at Sun Devil Stadium is Tifway 419 bermuda. Follette describes it as a flat, sand-based field with

excellent drainage and above- and below-ground irrigation. The field hosts 20 to 22 games a season, as well as the occasional rock concert.

"We pregerminate 450 to 500 pounds of a ryegrass blend for each game," he explains. "We use 55-gallon drums that hold about 150 pounds of seed apiece, fill it with water and PBI/Gordon Bov-A-Mura 5-0-0 liquid fertilizer, using about one-quart per drum. We fill it in the morning and add a wetting agent, and let it sit in a warm place indoors, with a temperature of 72 to 75 degrees. You don't want the seed to get too cold. At the end of the day we drain the liquid, aerify the seed with an air hose, and then refill the drum with water. We drain, aerify, and refill it the next morning, and then drain, refill, and aerify it a third time. Then we leave it overnight again. The next morning we drain it and spread it out on the clean floor to dry."

To provide a carrier for the pregerminated seed so it can be spread, Follette mixes it with Milorganite at a rate of 50 pounds of seed to 80 pounds of the fertilizer, turning the mixture over with a shovel to blend it.

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"Mixing the seed with Milorganite is a good 'trick' to making it spreadable," says Follette. "The combination gives it body; otherwise, the seed would just stick to the spreader."

Using a broadcast spreader, pregerminated seed is applied to the field at Sun Devil Stadium after every game. (In "problem areas," the seed is hand-spread.) Following seeding, the field is lightly topdressed with a very thin bead of sand, says Follette, "just to knock the seed down past the grass blades." In two days, he says, they see green shoots and have healthy grass within two weeks.

Typically, Follette applies pregerminated seed from September through January, when the field's bermudagrass starts to go dormant. "The pregerminated seed gives me a quicker start, so I have some semblance of a plant growing by the time I get to the next game. The only thing we have to watch out for is fungus, because the seed is so wet. We treat the field with Scotts fungicide, typically six to eight applications in the winter and fall."

Reasonable Expectations

It's not hard to find competent sports turf managers who tried pregermination and were less than pleased with the results. The shortcomings of the procedure in a given instance may have as much to do with field use frequency as they do with any particular pregermination technique. In a high-use situation, where the turf has little chance for recovery, explains Steve Wightman, stadium turf manager at San Diego Jack Murphy Stadium, you may be better off investing time and money into aeration and fertilization than in pregerminating seed. For his part, Wightman pregerminates seed approximately once a year.

"My philosophy has always been to have seed on the playing field," he explains. "When conditions are right, it will germinate. That has worked best for me, rather than pregerminating. The bottom line is that you always have a very fragile, immature plant trying to grow under the most adverse conditions. Your success with pregermination, then, might be very limited down the center of a high-use football field. In high-use conditions, the results of pregermina-

tion can be rather limited, so it may behoove you to put that money into a good fertility program. I've always been a big proponent of overseeding in general, but there are times when it can be difficult to reap its benefits."

Pregermination and priming are no substitute for giving a field a chance to recover, and unrealistic expectations will lead to certain disappointment. If you're trying it for the first time, contact other professionals in your area or your local turfgrass specialist to find out if your situation is a good candidate for the process. No doubt, pregermination will take some tinkering before you get it right, and you may find the effort outweighs the results. Yet in the right situation, seed pregermination is useful in maximizing *time*, a commodity that is always in short supply for sports turf managers. □

Editor's Note: For more information on seed priming and pregermination techniques, see sportsTURF February, 1994: "Speed Seed Outpaces Pregermination And Limited Priming" and sportsTURF September, 1992: "Limited Water Seed Priming."

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