

Pregermination vs Seed Priming

Pregermination of grass seed and grass seed priming are not synonymous terms. Pregermination of seed involves the soaking of the seed until the physical process of germination - the actual penetration of the root through the seed coat has occurred, followed by planting the wet seed. Priming grass seed, on the other hand refers to soaking the seed in a limited amount of water until the physiological process of germination has commenced, drying the seed and planting in the conventional manner.

The basic difference, therefore, is the control of the amount of water that is fed to the seed. Limiting the amount of water during priming allows the germinating juices to course through the seed but does not allow for full germination. As a result the primed seed can be stored for a period of time without harm. In contrast pregerminated seed must be planted within three to five days because if the seed is dried it is killed and the seed is wasted. Thus delay in seeding pregerminated seed due to weather can result in the loss of a seed lot. On the other hand primed seed can be stored for a period of time without harm. Unplanted seed merely reverts to its unprimed state and may be stored for several months.

Pregermination of turfgrass seed is accomplished by adding 50 pounds of seed to a 45 gallon drum and covering the seed with enough water to thoroughly wet the seed. The mix is stirred on and off until tiny roots are visible on the seeds, then is drip dried in a burlap bag suspended in the air. The seed must not be allowed

to dry before seeding or after placing on the soil surface because the little seedling will be killed as the germination process has progressed too far.

The hazards associated with pregerminated seed, therefore, are the method of seeding and the influence of weather on the timing of the operation. The wet pregerminated seed with its small roots - probably only a few millimetres in length - will not flow easily in a conventional seeder. Physical damage to the emerging root tips is an additional hazard. Thus hydro seeding is the most satisfactory seeding method.

Pregermination generally cuts one day off the germination period for every day of soaking. For example, if a species that would normally germinate in 7 days is soaked for two days, it will germinate in the field in 5 days. Emergence of the root tip on the majority of the seed is the test of when to drain the seed and plant.

Freshly primed seed is quite dramatic in the early stages of field germination. As a rule of thumb, priming — at best — cuts the germination period in half. Thus if a crop normally germinates in 14 days, i.e., bluegrass, it will germinate in 7 days if primed. As the priming effect wears off, however, through degradation during storage, such that the 7 days become 8 days, and so on. In a study at Oklahoma State prime seed of Kentucky bluegrass emerged three days sooner than untreated seed and has as much as 27% greater field survival.

After 6 weeks under optimal growing conditions in the field, it is nearly impossible to tell a primed bluegrass field from an unprimed one. The benefits of priming come when temperatures are adverse or when the bluegrass is mixed with a fast growing species such as ryegrass that normally tends to overwhelm the slow germinating bluegrass. Another priming benefit is under athletic field conditions, where only a short period is allocated between games for reseeding.

Certain conditions are required for a successful priming operation. The first is the control of the amount of water added. Control may be accomplished by adding a salt-water [225 g table salt per 19 litres of water] or a water-polyethylene glycol mix which limits the water penetration of the seed by osmotic effects. Some water passes into the seed, but not enough to complete germination.

A more simplified approach is to dampen the seed with a limited amount of water. Add 8 pounds of water to 10 pounds of seed with stirring, followed by periodic mixing to redistributed any

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surface water. The process may be carried out in woven poly bags that the seed is shipped in. Air flow may be achieved by a short piece of plastic hose inserted to the centre of the bag and attached to a small squirrel-cage fan. The air flow helps to cool the seed which tends to heat when wetted. Perennial regress will be primed at room temperature in 2 days whereas bluegrass will require 5 days. An "eyeball" method of gauging the priming time is to stop priming when the very first root tips can be seen on a few seeds.

Temperature in the priming process is of major importance. The ideal temperature for priming is 15 C. Ideally the seed should remain at 15 C during the drying process. Use of higher temperature during drying will effectively remove the priming effect. The seed should be dried to 15% moisture if seeding is to occur in five days. Dropping the moisture content to 12% will drastically reduced the priming effect.

Light may also be beneficial in the priming process. Bluegrass will prime without light, however, the germination index of bluegrass seed primed with light will be higher than seed primed without light. Only a brief exposure of one hour or less per day is require and red light is most beneficial. Fluorescent light is least beneficial.

Oxygen during the priming process is perhaps the key ingredient for bluegrass. Priming while submerged in water totally inhibits the priming process. There seems to be a natural dormancy mechanism in the bluegrass seed that prevents it from germinating in wet conditions.

As bluegrass seed germinates it gives off inhibitors. In nature, the inhibitors probably aid the plant by reducing competition around the young seedling. However, when priming in bulk the inhibitors can build up, actually inhibiting the priming process.

The shelf life of primed seed decreases with time and temperature. When stored at 15 C the priming effect can be detected for up to one year but the amount of the priming effect would be insignificant in the field. As a rule of thumb the priming effect can be expected to remain at a beneficial level for one to two months when the seed is stored under cool conditions.

Priming for too long a period - until the root tip breaks the seed coat will effectively ruin a lot of seed. On the other hand priming for too short a period will provide little or no priming advantage. If time is important or if germination conditions are less than optimal, pregermination or priming of the seed might be considered by a turf manager. Be aware it is a tricky process and can be expensive if your seed supply is destroyed in the process. Remember the seed companies have not adopted the priming process, partly due to the logistics of the operation and partly due to the limited shelf life of the prime seed.

(This article was compiled from a series of articles written by Dr. Douglas Bede of the Jacklin Seed Company)




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