

Expectations of Your Native Species

Following are some general parameters for germination of native species created by Ernst Conservation Seeds' crop specialists. These parameters are applicable to restoration seedings.

A definite protocol of germination could be carried out for the fastest germination of each species, which could involve as much as one year's pretreatment prior to planting. It is the opinion of Ernst Conservation Seeds that the application of the seed to the site and the natural conditioning of the seeds for germination (which occurs when conditions are right) are appropriate for restoration.

This description of germination of several species in a mix is an aid in understanding these principles.

Expectations

Germination and Growth (all of these assume adequate light, appropriate moisture, and good seed-to-soil contact.)

As a generalization, annual species have less dormancy than biennials, and biennials have less than perennials. This dormancy is nature's hedge against unfavorable conditions during the life cycle of a plant. Unfavorable conditions could be, but are not limited to, late spring frost or drought. Dormant seeds are in reserve to germinate when nature calls them "off the bench."

Annuals: Most species will germinate, flower, and set seed by the end of the first full growing season. Germination of an individual species is likely to be high.

Biennials: Most species will germinate, with some plants within a species population flowering and setting seed in the first full growing season. The bulk of the plants will flower and set seed in the second growing season. Germination of an individual species is likely to be lower than for annuals due to presence of seed dormancy.

Perennials:

1. **Warm Season Grasses:** Germination will occur in spring when moisture conditions are appropriate and soil temperatures at a 3" depth exceed 55°F (12°C). Best germination occurs when soil temperatures are much higher. Most of these species do not need cold/wet stratification to produce an adequate stand. Two exceptions are *Tripsacum dactyloides* (Eastern Gamagrass), which needs 14-60 days of stratification, and *Chasmanthium latifolium* (River Oats), which needs 60 days of stratification for northern genotypes.

While cold/wet stratification is not necessary in most cases to produce an adequate stand, 20%-50% of the seed may be dormant. The vast majority of seedlings that emerge will be growing by the end of the second full growing season.

Greatest growth of these species occurs when air temperatures are 75°F-95°F. A very few (<5%) plants within a species may flower and set seed in the first growing season. The majority of growth is put into root development the first season. Maximum plant development may take five to seven years.

2. **Cool Season Grasses:** Some species will germinate when temperatures are a little higher than 40°F. Others will require warmer temperatures. They may germinate in fall or spring. Adequate stands of most species will not require stratification; however, 50% of the seed may remain dormant without stratification. The vast majority of seedlings that emerge will be growing by the end of the second full growing season.

Greatest growth occurs when temperatures are 65°F-85°F. With adequate moisture and nutrients, some flowering and seed set may occur in the first growing season.

3. Some sedges (*Carex alata*, *annectans*, *scoparia*, *tribuloides*, *vulpinoidea*), Rushes (*Juncus canadensis*, *effusus*, *marginatus*, *tenuis*, *torreyi*), and bulrushes (*Scirpus atrovirens*, *cyperinus*, *expansus*, *polyphyllus*) have a very high seed count per pound of seed. If planted in the spring, a substantial number of seedlings may be produced by these species in their first growing season. These seedlings may represent 5% of fewer of the total seeds present.

Flowering and seed production will occur one to two growing seasons after an individual seedling has germinated. Maximum germination will take at least one year due to seed dormancy. Sedges and bulrushes will be recognizable by the arrangement of any three successive leaves in a pattern resembling the spokes in the Mercedes™ symbol. *Juncus* spp will have round stems that originate at a common point near or on top of the soil.

4. Some sedges (*Carex baileyi*, *buxbaumii*, *comosa*, *conoidea*, *crinita*, *Folliculata*, *frankii*, *gynandra*, *intumescens*, *lacustris*, *lupulina*, *lurida*, *squarrosa*, *stipata*, *stricta*, *vesicaria*) and bulrushes (*Scirpus acutus*, *americanus*, *fluvialis*, *maritimus*, *pungens*, *tabernaemontani*) have a high level of seed dormancy and are unlikely to have any consequential germination without stratification. A majority of seedlings will emerge in the first and second growing seasons after they have been stratified (artificially or naturally). Plants will flower and set seed one to three years after they germinate. *Carex* spp in this group may be recognized as described above. *Scirpus* spp have round or triangular stems that arise from a point that is often below the soil surface. Stems are typically larger than those of *Juncus* spp.
5. Broadleaves: Some germination (typically inconsequential) may occur in the first year for the most broadleaf species without stratification (artificial or natural). A high percentage of the species and seeds within the species are likely to germinate in the first growing season following the first winter in situ (on site). A majority of the seeds that will germinate will have done so by the end of the growing season following stratification. Following germination, blooms may occur in the first growing season (*Heliopsis helianthoides*); the second (*Monarda* spp, *Rudbeckia triloba*); after three to five growing seasons (*Liatris* spp); or, not until the seventh growing seasons (*Baptisia tinctoria*).
6. Seed dormancy in perennial species is affected by latitude of origination for the ecotype. In greenhouse studies, we have found that northern ecotypes (PA, OH, NY, NJ) typically require more weeks of cold/wet stratification than southern ecotypes (FL, GA, NC, SC) of the same species.

Life Span of a Mix: The majority of our native seed mixes are composed of perennial species. Mixes dominated by perennial species have the potential to persist for more than a decade if properly maintained. For all mixes, the site must be maintained to keep them free from invasive species or aggressive weeds. Mixes of herbaceous species that have no tree or shrub components in their formula must be kept free from encroachment by woody species by controlled burning or mowing.

Appearance of a Mix: The natural communities we create with native seed mixes are dynamic. Annuals, biennials, and short-lived perennials may be widely present in the landscape in the first one to three growing seasons, but non-existent or present in small pockets by the fifth growing season. Colonies of some long-lived perennials will grow larger in diameter. Species composition will change in response to annual variations of drought or heavy rainfall.