ERNST SEEDS

EXPECTATIONS OF NATIVE SPECIES

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GERMINATION AND GROWTH (all the following assume adequate light, adequate soil temperature, appropriate moisture, and good seed-to-soil contact):

In general, annual species have less seed dormancy than biennials and biennials have less than perennials. Seed dormancy is nature's hedge against unfavorable conditions during a plant's life cycle. Unfavorable conditions can be, but are not limited to, late spring frost or drought. Dormant seeds germinate when favorable conditions are present.

ANNUALS

Most species 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 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 that of an annual due to seed dormancy.

PERENNIALS

1. Warm Season Grasses: Germination will occur in the spring when moisture conditions are appropriate and soil temperatures exceed 55°F (12°C) at a 3" depth. Best germination occurs when soil temperatures are much higher.

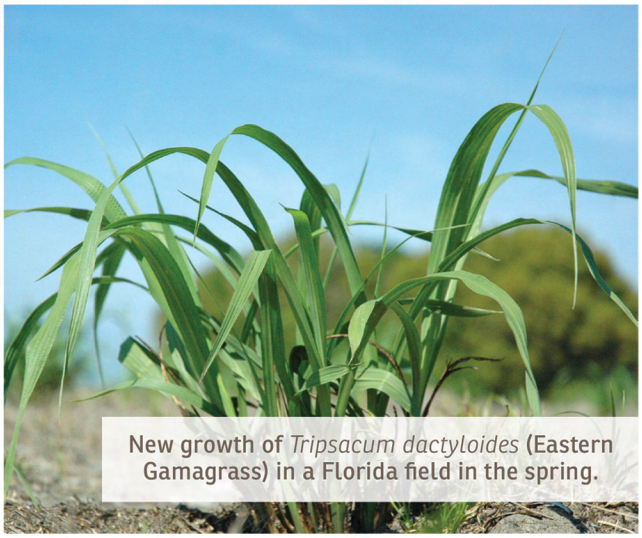
Most of these species do not require cold, wet stratification to produce an adequate stand. Two exceptions are *Tripsacum dactyloides* (Eastern Gamagrass), which requires 14-60 days of stratification, and *Chasmanthium latifolium* (River Oats), which requires 60 days of stratification for northern genotypes. Stratification is the process by which seed is exposed to cool, moist conditions.

While cold, wet stratification is not necessary in most cases to produce an adequate stand, 20%-50% of the seed may be dormant. Most 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 (24°C-35°C). Most of the growth is in root development the first season. Very few (<5%) plants within a species may flower and set seed in the first growing season. Maximum plant development may take two years or longer.

2. Cool Season Grasses: Some species will germinate when temperatures are a little higher than 40°F (4°C) while others will require warmer temperatures. They may germinate in the fall or spring. Adequate stands of most species do not require stratification; however, 50% of the seed may remain dormant without stratification. Most 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 (18°C-29°C). With adequate moisture and nutrients, some flowering and seed set may occur in the first growing season.



New growth of *Tripsacum dactyloides* (Eastern Gamagrass) in a Florida field in the spring.

Tripsacum dactyloides (Eastern Gamagrass).

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Elymus virginicus **(Virginia Wildrye).**

3. Some sedges (*Carex albolutescens*, *scoparia*, *vulpinoidea*), **rushes** (*Juncus effusus*, *tenuis*) and **bulrushes** (*Scirpus atrovirens*, *cyperinus*, *expansus*, *polyphyllus*) have a very high seed count per pound of seed. When planted in the spring, a substantial number of seedlings may be produced by these species in the first growing season. These seedlings may represent 5% or less 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 two years due to seed dormancy. Sedges and bulrushes are 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 comosa, crinita, folliculata, frankii, glaucescens, grayi, granularis, intumescens, lupulina, lurida, squarrosa, stipata, stricta)* and **bulrushes** *(Scirpus acutus, americanus, robustus, validus)* have a high level of seed dormancy and may not have consequential germination without stratification.

Most seedlings will emerge in the first and second growing seasons after stratification (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 for other *Carex spp. Scirpus spp.* in this group have round or triangular stems arising from a point often below the soil surface. The stems are typically larger than those of *Juncus spp.*

Carex crinita **(Nodding Sedge).**

5. For most **broadleaf species,** some germination will occur in the first year without stratification (artificial or natural). A high percentage of species and seeds within the species are likely to germinate in the first growing season following the first winter *in situ* (on-site). Most of the seeds that 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* (Oxeye Sunflower); second growing season: *Rudbeckia triloba* (Browneyed Susan), *Aster spp.*, *Monarda spp.*, *Penstemon spp.*, *Solidago spp.*; after three to five growing seasons: *Liatris spp.*; or, not until the seventh growing season: *Baptisia tinctoria* (Yellow False Indigo). The number of blooming years depends on soil fertility, available moisture, and growing season temperatures. It may be shorter for a given species the further south one is located.

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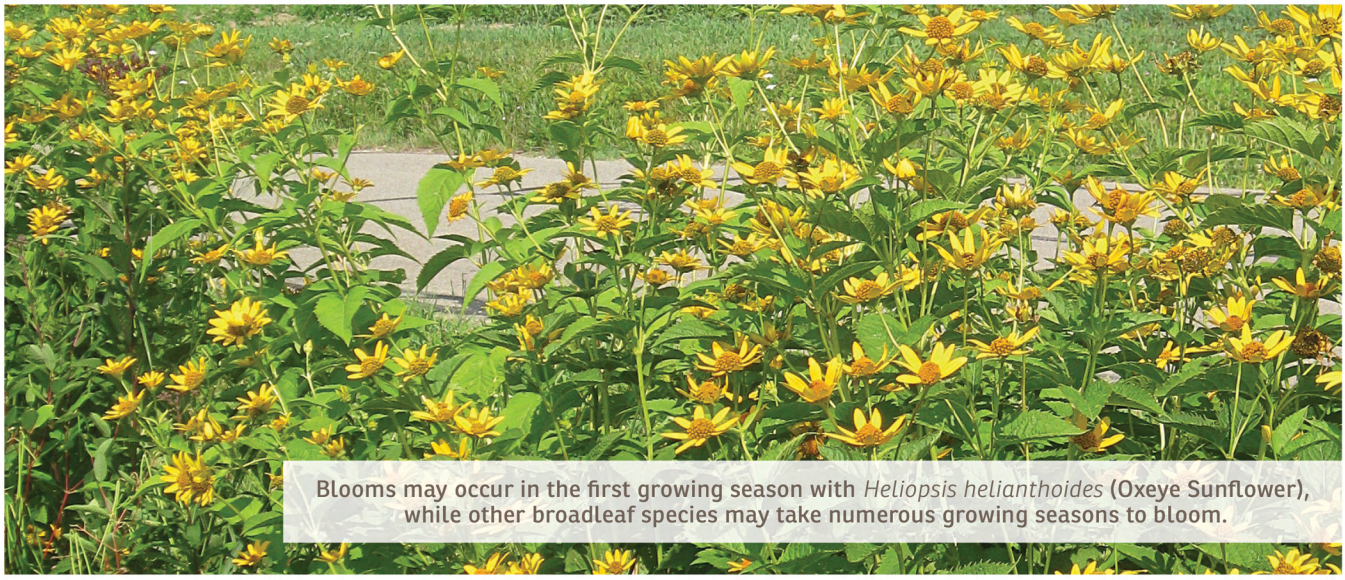

Blooms may occur in the first growing season with *Heliopsis helianthoides* (Oxeye Sunflower), while other broadleaf species may take numerous growing seasons to bloom.

6. Seed dormancy in perennial species is affected by latitude of ecotype origin. 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.

Most of our native seed mixes are composed of perennial species. Mixes dominated by perennial species have the potential to last more than a decade if properly maintained. For all mixes, a site must be kept free from invasive species or aggressive weeds. Mixes of herbaceous species with no tree, shrub, or vine components in the formula must be kept free from the encroachment of woody or vine species with controlled burning, mowing, or spot spraying.

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 three growing seasons, but non-existent or present in small pockets by the fifth growing season. Over time, colonies of some long-lived perennials will grow larger in area and species composition will change in response to annual rainfall variations.

It is not unusual for those new to planting meadows to be nervous about a mix's performance during its establishment year. Typically, customers need confirmation that the desirable species are growing. Fortunately, our ability to assess a situation is assisted by a small set of species that generally germinate very well.

For wetland meadows, some common early emerging species include: *Asclepias incarnata* (Swamp Milkweed), *Eupatorium perfoliatum* (Boneset) and *Carex spp*. For upland meadows, some common early emerging species include: *Chamaecrista fasciculata* (Partridge Pea), *Elymus virginicus* (Virginia Wildrye), *Helianthus angustifolius* (Narrowleaf Sunflower), *Heliopsis helianthoides* (Oxeye Sunflower), *Monarda fistulosa* (Wild Bergamot), *Penstemon digitalis* (Tall White Beardtongue), and *Rudbeckia hirta* (Blackeyed Susan). Seedling images of many of these species are available at the download center on our website.

DISCLAIMER

The information in this review of practices is the result of over 50 years' experience in seed production. Ernst Conservation Seeds has been supplying seeds and consulting in the reseeding of tens of thousands of acres of roadsides, surface-mined lands, conservation, and restoration sites in eastern North America, as well as growing and supplying seed and consulting in the planting of hundreds of thousands of acres of CRP/CREP-related areas for erosion control and wildlife habitat.

All these practices are opinion only and our best advice as a result of these experiences. These recommendations are for individual consideration and do not cover all the conditions that will be encountered in the field.

Ernst Conservation Seeds is not responsible for conditions that will be encountered in individual situations. The use of brand names does not represent our endorsement of a specific product; rather, it represents our experience only and has not necessarily been replicated in peer-reviewed research. The use of chemical pest control agents is subject to manufacturers' instructions and labeling, as well as federal, state, and local regulations.