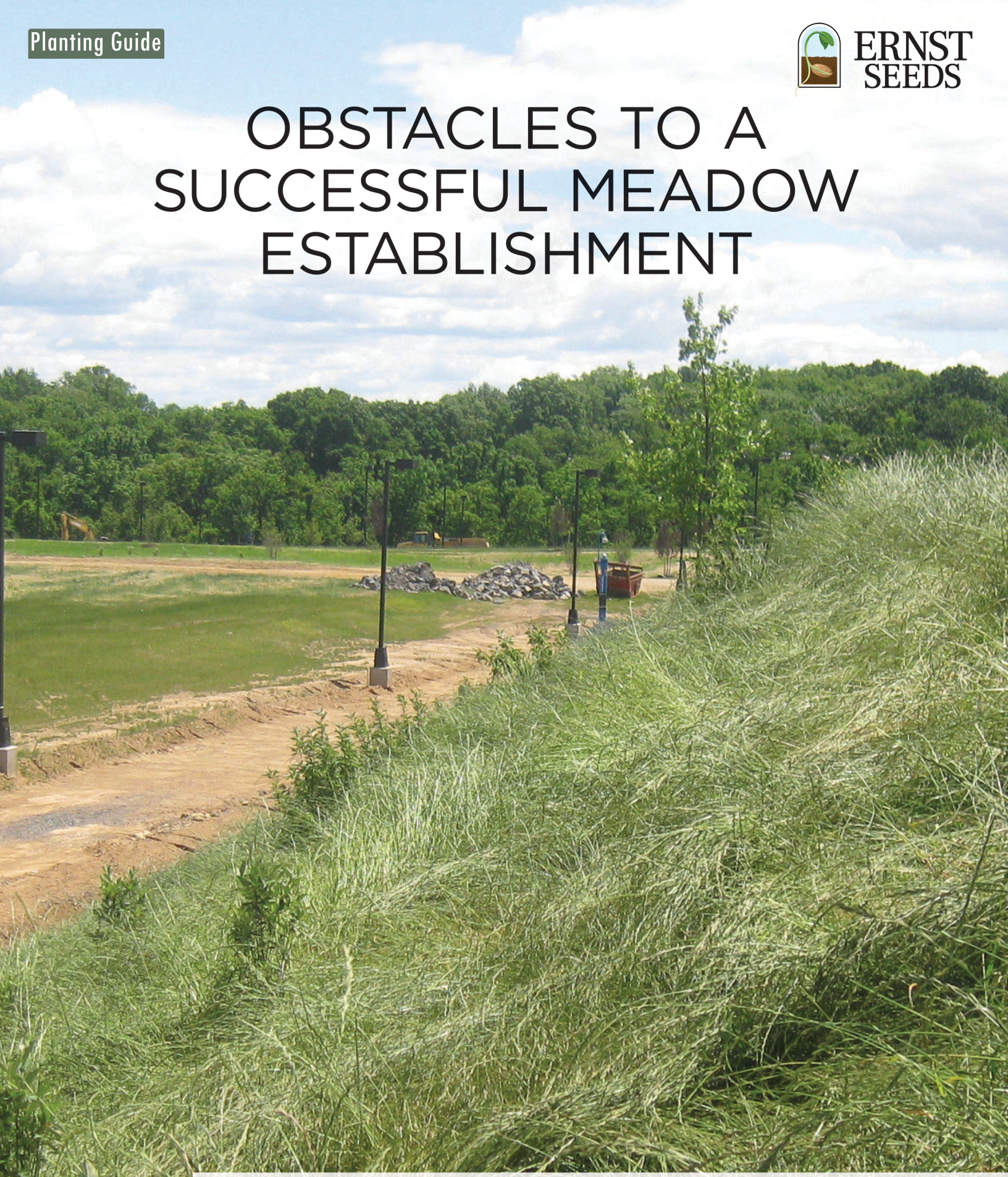
ERNST SEEDS

OBSTACLES TO A SUCCESSFUL MEADOW ESTABLISHMENT



Stand failure in central Pennsylvania caused by excess application of *Lolium multiflorum* (Annual Ryegrass).



Stand failure caused by soil compaction at a landfill in northwestern Pennsylvania.

OBSTACLES TO A SUCCESSFUL MEADOW ESTABLISHMENT

Over the past 20 years, we have had the opportunity to visit sites or see photographic evidence of many native meadows that failed to establish successfully. As a result, we have found some repetitive themes relating to these failures - site conditions, weeds, excessive cover crop seeding rates, or use of an inappropriate cover or companion crop.

POOR SITE CONDITIONS

- Poor pre-plant weed control: Native species require bare ground to germinate and grow and will not establish well in a site already vegetated with weeds or lawn.
- Presence of excessive organic matter used as mulch: Mulch prevents good seed-to-soil contact. A seed may germinate but its radicle (first root) may be unable to find moisture and the seedling dies. Microorganisms that decompose mulch or compost consume nitrogen, a nutrient essential to plant growth. This results in a nitrogen-deficient environment in which a seedling will grow poorly or not at all. If using compost, be certain it has decomposed to where the parent material is unrecognizable.
- Soil compaction: If the tip of a crowbar or piece of rebar cannot be pressed 3" deep into the soil, there is compaction which will result in a very poor or non-existent stand. For highly compacted soils, consider broadcasting 1"-2" of well-decomposed compost across the site followed by rototilling the compost in 6" deep.
- Herbicide residues, including pre-emergent herbicides, from the previous year: Generally occurs on sites that were previously lawns with a lawn service contract for weed control within 12 months of planting. Also problematic is when the site was a crop field to which herbicides, such as Atrazine (atrazine), Princep® (simazine), Milestone® (aminopyralid), Stinger® (clopyralid), Resolve® Q (rimsulfuron), Cimarron® (metsulfuron methyl), or Synchrony® XP (chlorimuron ethyl), were applied within 12 months of planting.
- Excessively high or low soil pH: For many plant species native to eastern North America, availability of many nutrients essential to plant growth is limited in soils with pH less than 4.5 or greater than 7.5. Ideal pH is 5.5-7.0. When pH is outside this range, species tolerant of the site's pH should be chosen (pH can be raised with lime or lowered with sulfur).



Canada thistle in a wetland restoration site.

- Drought within two to six weeks after planting: Seeds cannot germinate without water and seedlings do not grow/survive without water. In drought-prone areas, we recommend planting between late October or when soil temperatures are less than 55°F (13°C) at 3" deep and in spring when forsythia or redbud blooms.
- Erosion (on steep slopes): Failure to use erosion control blankets or toe them in at the top of the slope. Erosion is also a problem on slopes where final tracking of the soil was not perpendicular to the slope, resulting in the seed being washed down to the bottom of the slope.
- Presence of crownvetch, sericea lespedeza, trefoil, tall fescue, bahiagrass, bermudagrass, white Dutch clover, alsike clover, bindweed, mile-a-minute, Japanese hops, kudzu, or invasive shrub species not controlled prior to planting or volunteered from dormant seed when the soil was prepared for planting. These species can smother desirable but slower growing perennial natives.
- Use of borrowed topsoil infested with seeds of invasive species.
- Wildlife: Geese can eat seeds, seedlings, and mature plants while deer can be devastating to some wildflowers. If up to five deer are regularly observed in the area, it may be wise to plant a deer-resistant mix. If the deer population is sufficient to make growing a garden or fruit trees difficult, it may be impossible to grow wildflowers on the site. The same is true if a deer population of 20 or more is regularly observed in the area.
- Lack of proper maintenance: Letting annual ryegrass cover crop or weeds, such as foxtail or ragweed, smother native seedlings during the first full growing season. Avoid this by trimming the meadow to 8" whenever growth exceeds 18"-24".
- Failure to control invasive or problem species prior to planting or after germination: If there are vines or spiny plants in the landscape that were not planted, be vigilant in controlling them.

APPLICATION OF A COVER CROP AT AN EXCESSIVE RATE

Issues with an excessive rate of cover crop have generally been confined to the use of annual ryegrass. Excessive annual ryegrass applied to sites planted with native species smothers growth of the native meadow. We have not had complaints when annual ryegrass was used at 10-12 lb per acre.



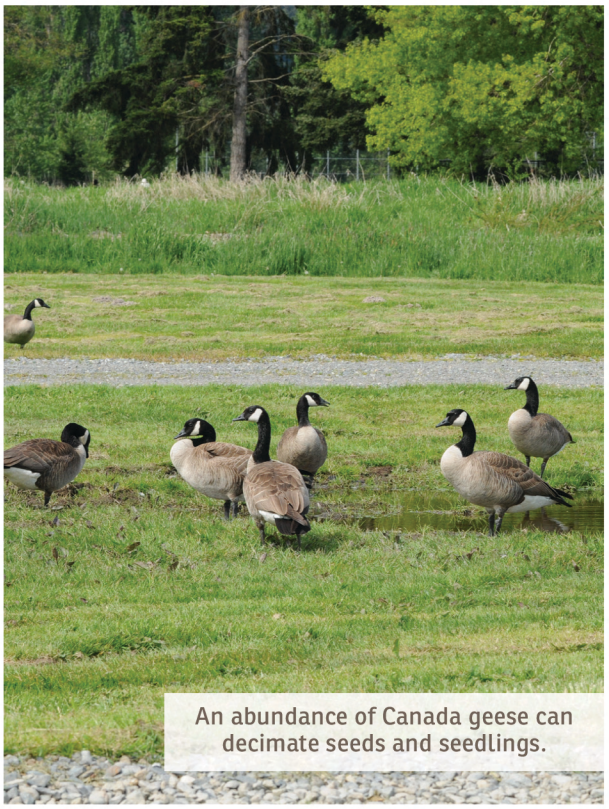
Green foxtail smothered native seedlings during the first full growing season of this planting.

USE OF AN INAPPROPRIATE COVER OR COMPANION CROP

We do not recommend the use of bahiagrass, bermudagrass, or tall fescue as cover or companion crops in our native meadow mixes. Bahiagrass or bermudagrass as a cover crop will be impossible to control prior to new growth of perennial native species and will likely smother out the native species when used as a companion crop.

We do not recommend the addition of the following legumes to native meadows as they also tend to take over and smother out native species: *Lespedeza cuneata* (Sericea Lespedeza), *Coronilla varia* (Crownvetch), *Lotus corniculatus* (Bird's Foot Trefoil), *Trifolium pratense* (Red Clover), or *Trifolium repens* (Ladino Clover). If already present on the site, control these species by spot spraying with Roundup® (glyphosate).

If a legume is desired in a meadow mix, we recommend such native legumes as *Baptisia alba* (White Wild Indigo), *Baptisia albescens* (Spiked Wild Indigo), *Baptisia australis* (Blue False Indigo), *Baptisia tinctoria* (Yellow False Indigo), *Chamaecrista fasciculata* (Partridge Pea), *Chamaecrista nictitans* (Sensitive Pea), *Desmodium canadense* (Showy Ticktrefoil), *Desmodium paniculatum* (Panicled Ticktrefoil), *Lespedeza capitata* (Roundhead Lespedeza), *Lespedeza frutescens* (Shrubby Bushclover), *Lespedeza virginica* (Slender Bushclover), *Senna hebecarpa* (Wild Senna), and *Senna marilandica* (Maryland Senna).



An abundance of Canada geese can decimate seeds and seedlings.



Japanese hops can quickly overtake a native planting if not controlled early.

WHAT IS THE APPROPRIATE COVER CROP FOR A MEADOW?

We recommend the following cover crops and seeding rates:

- Grain Oats: 30 lb per acre; planted January through July (areas north of the Mason-Dixon Line), January through April (areas south of the Mason-Dixon Line).
- Grain Rye: 30 lb per acre; planted August through December (areas north of the Mason-Dixon Line), September through December (areas south of the Mason-Dixon Line), and September through April (moist sites).
- Annual Rye: 10-12 lb per acre; planted year-round (dry sites).
- Brown Top Millet: 10 lb per acre; planted May through August (dry sites south of the Mason-Dixon Line).
- Japanese Millet: 10 lb per acre; planted May through August (wet sites).

These seeding rates are based on our experience with native meadows as well as our desire to establish strong, individual native plants. Planting cover crops that are too aggressive or thick diminishes the long-term viability of the perennial meadow plants. We have concluded that annual small grains, such as oats and rye, are the best cover crops or companion crops to plant with native seedings when there is a need. Grain cover crops can reduce competition from aggressive weeds because they grow quickly and reduce the potential for erosion by providing quick cover. We generally do not recommend annual ryegrass as it is too aggressive and volunteer seedlings can be persistent. When using annual ryegrass with native species, do not exceed 12 lb per acre.

PROBLEM WEEDS FOR UPLAND MEADOWS

In much of our market area, crabgrass, giant foxtail, green foxtail, and ragweed can smother a meadow in the establishment year. If overtaken by these weeds, use a brush hog mower or string trimmer to trim the meadow to 8". Trimming below 4" will kill seedlings of many native species. A lawn mower is not recommended.