Native wildflower seed production techniques in

MISSISSIPPI

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ABSTRACT

Techniques using little hand labor to plant, manage, harvest, and clean seeds of 5 native wildflower species in Mississippi are presented.

KEY WORDS

Chamaecrista fasciculata, Coreopsis tinctoria, Dracopis amplexicaulis, Rudbeckia hirta, Salvia lyrata, seed establishment, harvesting, seed cleaning

NOMENCLATURE

USDA NRCS (2004)

We produce seed of local ecotypes of native wildflowers (Table 1) at the USDA Natural Resources Conservation Service, Jamie L Whitten Plant Materials Center (PMC) near Coffeeville, Mississippi, for the Mississippi Soil and Water Conservation Commission for use by its conservation districts within the state. The PMC is located in the East Gulf Coastal Plain and has silt loam soils with low levels of organic matter. The wildflowers are grown in small fields (< 1.2 ha [3 ac]) that, because of topographic or soil properties, are not suitable for research activities. We plant more fields of partridge pea than the other wildflowers because we also maintain foundation seed blocks of Lark, a selected germplasm that we released for its wildlife and aesthetic uses. Staffing limitations severely restrict the amount of hand labor used in wildflower seed production operations.

PLANTING PROTOCOLS

We plant all species except partridge pea in August and September. Seeds will germinate during fall and overwinter as either a true rosette or a small plant. Partridge pea is a legume with a hard seed coat and, if planted in the fall, non-dormant seeds germinate immediately and are killed by the first hard frost. We typically scarify partridge pea seeds to abrade the seed coats, inoculate with cowpea type (EL strain) of *Rhizobium* (Nitragin, Brookfield, Wisconsin), and drill the seeds 13 mm (0.5 in) deep in 102-cm (40-in) rows in May. The planting rate we use is 6 kg pure live seeds (PLS)/ha (5 lb PLS/ac). In the past, we have broadcast-sown seeds of the other wildflower species onto a clean seed bed. In the future, we plan to plant more of these wildflowers using a no-till drill to reduce soil disturbance that favors weed growth.

We cultipack the soil to create a firm seedbed, broadcast the seeds, and recultipack the soil to ensure good seed-to-soil contact. Planting rates used for broadcast seeding are 3.4 kg PLS/ha (3 lb PLS/ac) for blackeyed Susan and plains coreopsis, 4.5 kg PLS/ha (4 lb PLS/ac) for clasping coneflower, and 9 kg PLS/ha (8 lb PLS/ac) for lyreleaf sage. The

Patridge pea, *Chamaecrista fasciculata* (Michx.) Greene. Photo by BB Billingsley Jr

TABLE 1

Information on wildflower species.

Common name	Scientific name	Family	Life cycle
Blackeyed Susan	*Rudbeckia hirta* L.	Asteraceae	Annual; biennial; perennial
Clasping coneflower	*Dracopis amplexicaulis* (Vahl) Cass.	Asteraceae	Annual
Lyreleaf sage	*Salvia lyrata* L.	Lamiaceae	Perennial
Partridge pea	*Chamaecrista fasciculata* (Michx.) Greene	Fabaceae	Annual
Plains coreopsis	*Coreopsis tinctoria* Nutt.	Asteraceae	Annual

planting rates we use for seed production are higher than those recommended for conservation or prairie plantings to ensure a good stand. Rates for no-till drilling will be reduced by 25% to 30%.

In 2003 we experimented with using a no-till drill for planting a field of blackeyed Susan. The seeds germinated well. We were unable to evaluate the effect on weed growth fully because the site had a fairly dense stand of other plants already. After drilling, however, we only noticed a few, scattered plants of species that typically invade disturbed areas, such as ragweed (*Ambrosia* L. [Asteraceae]) and morning-glory (*Ipomoea* L. species and *Jacquemontia tamnifolia* (L.) Griseb. [Convolvulaceae]). No-till was chosen for this field because it was sloped and would have eroded if tilled conventionally.

FERTILIZER

We use fairly low rates of fertilizer on these species; generally 38 kg/ha (34 lb/ac) actual nitrogen (N) on the nonlegumes. Clasping coneflower requires a higher N rate for optimum plant growth, so we use 57 to 76 kg/ac (51 to 68 lb/ac). Phosphorus and potassium are applied when needed at a rate of 34 to 67 kg/ac (30 to 60 lb/ac) of both P_2O_5 and K_2O.

WEED CONTROL

Chemical weed control options for these species are limited because no herbicides are labeled specifically for seed production. Partridge pea has shown good tolerance to metolachlor and some other soybean herbicides. Imazapic is labeled for both pre- and postemergence applications to establish and maintain plantings of blackeyed Susan, plains coreopsis, and partridge pea. Selective graminicides, such as sethoxydim or clethodim, are also safe for use on wildflowers. Because partridge pea is planted in rows, weeds can be mechanically controlled with cultivation before the plant canopy closes. Cultivation is not an option for the wildflowers that are broadcast, and we have had poor success with cultivating these species when they were planted in wide rows because we lost many plants to root disturbance and crown deterioration when soil clods were deposited onto the plants.

SEED HARVEST

We harvest our wildflowers using a standard combine equipped with a slow-speed fan apparatus. All these species have an indeterminate ripening pattern, which means that harvests must be timed carefully to maximize potential yields. Harvest dates often vary between production years because climatic conditions influence the rate of growth and ripening.

Lyreleaf sage is the first species that we harvest, usually in mid-May. The seeds are naked, held loosely within a tubular calyx, so they are easily lost if the flower stalk is disturbed. They ripen from the bottom of the stalk toward the top, so we wait until most plants have ripe seeds in the center of the stalk before harvesting.

Blackeyed Susan, clasping coneflower, and plains coreopsis all ripen in midsummer within weeks of each other. Clasping coneflower will mature in late June to early July. The plants are ready to harvest when the receptacle changes from a dark, grayish color with a smooth surface to a wooly brown. The brownish structures are the disk flowers that have been shed to allow the achenes to fall freely from the receptacle. Fields must be harvested soon after most of the heads have reached this stage to avoid losses. Blackeyed Susan is usually harvested in early to mid-July. Timing is not as critical because the achenes are retained in the receptacle longer than those of clasping coneflower. Plains coreopsis is harvested in late July to early August. Plains coreopsis achenes also do not shed readily from the receptacle. We wait until most seed heads are fully mature before we harvest because immature achenes have persistent wings that interfere with seed cleaning. Mature achenes are wingless.

Partridge pea is ready to harvest in late September to early October. Partridge pea pods disperse their seeds by explosive dehiscence. Fields must be harvested before a large percentage of the seeds have popped out; if harvested too early, however, many seeds will be immature, reducing yields and seed quality.

SEED DRYING

We do not have a seed dryer, so we spread the load from the combine on the floor of our warehouse to dry, turning it daily to prevent mold growth and to keep it from heating as the seeds dry and green plant material decomposes. Careful setting of the combine limits the amount of green material included in the load, which decreases the heating problem and expedites cleaning.

SEED CLEANING

When the seedlot is dry, we process it using an air-screen cleaner. Seeds should pass through the top screen and be retained on the bottom screen. Seed sizes, and therefore screens used to clean seeds, can vary from year-to-year; however, the sizes listed in Table 2 are good starting points for the initial cleaning operation, often referred to as scalping. When scalping, always pick a top screen with openings well larger than the size of the seeds, because if you try to make too close a separation at this stage, many seeds will run over the screen with larger pieces of trash. The seedlot will generally require from 1 to 4 additional cleaning operations, depending on the number and type of contaminants that are present.

Lyreleaf sage is somewhat difficult to clean because the rounded seeds vary in size, making it difficult to remove the contaminants without losing seeds in the process. Achenes of blackeyed Susan and clasping coneflower are similar in appearance, but clasping coneflower is easier to clean. Achenes of blackeyed Susan taper to a pointed end, but those of clasping coneflower are wider in the middle. This slight difference in shape affects sifting of achenes through holes in screens. Plains coreopsis achenes are flattened and curved on either end, forming a crescent. These curves impede flow of seeds through screen openings, but as long as most achenes are mature and wingless, the seedlot can be cleaned fairly thoroughly. Partridge pea seeds are rhombic in outline and flattened laterally, which allows use of screens with oblong holes, after scalping, to remove rounded or unflattened contaminants such as morning-glory seeds.

YIELDS

Annual species always have larger seed yields than perennial species. Clasping coneflower, plains coreopsis, and partridge pea are capable of producing 90 to 134 kg/ha (80 to 120 lb/ac) of clean seeds in a good year. Blackeyed Susan can produce 22 to 34 kg/ha (20 to 30 lb/ac) and lyreleaf sage 17 to 22 kg/ha (15 to 20 lb/ac). All our seedlots undergo quality testing; however, the germination and purity requirements for common-type seeds are less rigorous than for foundation seedlots. As is true for many states, there are no written field standards for wildflower production in Mississippi. Most of our seedlots equal or exceed 60% germination, the level accepted for agricultural seeds in the state. Testing methods recognized by the Association of Official Seed Analysts have not been developed for many of the wildflowers we grow, so methods used in the testing lab may not always provide maximum germination values. We also rarely request specialized testing that would determine dormant or hard seed percentages. In the seeds sent out from this program, purity is of more concern than germination because disseminating noxious or problem weed seeds along with the wildflowers seeds must be avoided.

TABLE 2

Screen sizes used for the initial cleaning of wildflower seeds.

Species	Top screen	Bottom screen
Blackeyed Susan	1/16 round hole 1/18 round hole	36 x 36 wire mesh 6 x 36 wire mesh
Clasping coneflower	1/16 round hole 1/18 round hole	6 x 36 wire mesh
Lyreleaf sage	6 round hole	1/18 round hole
Partridge pea	10 round hole	6 round hole
Plains coreopsis	1/14 round hole 1/16 round hole	36 x 36 wire mesh 6 x 36 wire mesh

CONCLUSIONS

The wildflower seed production program has succeeded in increasing the visibility of the PMC in Mississippi as well as providing the public with seeds of locally adapted wildflower species.

REFERENCE

[USDA NRCS] USDA Natural Resources Conservation Service. 2004. The PLANTS database. URL: http://plants.usda.gov (accessed 15 Dec 2004). Baton Rouge (LA): National Plant Data Center.

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