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Seed Production of a Florida Ecotype of Black-Eyed Susan[1]

Jeffrey G. Norcini, David J. Zimet, Clarence Maura, Sharon Pfaff, Mary Anne Gonter[2]

Species Description

Black-eyed susan, *Rudbeckia hirta*, is a wildflower native to Florida as well as most of the eastern U.S. (Figure 1). It occurs in 54 of Florida's 67 counties (Wunderlein et al., 1998) and is an annual, or at best a short-lived perennial (2-3 years). It has a basal rosette of leaves from which arise the flowering stems. Leaves and stems are dark green with short, coarse hairs. Overall height of black-eyed susan while blooming is from 1 1/2 to 2 feet.

Black-eyed susan is a long day plant that flowers from mid-spring into fall. The most obvious sign that the flowering process has begun is an "arching of the foliar canopy upward and away from the soil surface" (Harkess and Lyons, 1994). The flowers, which are about 1 1/2 to 2 1/2 inches in diameter, are composed of showy, buttery yellow ray flowers that surround the dark purple disk flowers in the conical center (Figure 1). As the daylength shortens in the fall, flowering is reduced and malformed flowers become increasingly more common.

Origin

The Florida ecotype of black-eyed susan originated from seed collected during 1997 from native populations located primarily in the Red Hills region of the Florida panhandle and extreme southern Georgia (USDA Hardiness Zone 8b). A small percentage of the seed was collected in the Wakulla District of the Apalachicola National Forest south of Tallahassee. All collection sites were in upland habitats. Most of the populations from which seed were collected were growing under a high canopy of slash, loblolly, or longleaf pine that may have been subjected to periodic prescribed burns.

Seed was increased and cleaned at the USDA NRCS Plant Materials Center in Brooksville, Florida. Additional seed increasing will be conducted at the North Florida Research and Education Center (Monticello and Quincy locations).

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2. Jeffrey G. Norcini, David J. Zimet, North Florida Research and Education Center, Clarence Maura, Sharon Pfaff, and Mary Anne Gonter, U.S. Department of Agriculture, Natural Resources Conservation Service Plant Materials Center, Brooksville, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611. Research funded by Federal Highway Administration in cooperation with the Florida Department of Transportation Environmental Management office.

Establishment and Maintenance

Site Preparation

Black-eyed susan should be grown on well-drained soils. Seedbeds should be prepared several months before planting. Potential weed infestations during production can be minimized by reducing the weed seed bank in the soil. There are several methods of achieving this:

1. Mow, shallow till, wait 2-3 weeks (or until weeds are 1-3 inches tall) and apply a nonselective herbicide such as glyphosate3 or glufosinate; repeat the till/herbicide portion of method as often as you feel necessary (optional).
2. Deep till several (2 or more) times, allowing a new "crop" of weeds to emerge before retilling.
3. Mow, till, soil solarization.

Soil solarization is a cultural method of pest control in which clear polyethylene is laid over moist, tilled soil for 6 to 12 weeks to trap incoming solar radiation thereby heating the soil to temperatures lethal to many weed species and soilborne pests. Several points to keep in mind are as follows:

- Use this method only in summer or early fall.
- This method will only control/suppress soil pests 6-8 inches down in soil.
- Soil must be kept moist.
- Some crabgrass species may not be controlled.

Additional information about this technique can be found in Extension Publication ENY 625, "Nematodes" (Noling, 1999).

Since all three of the above methods involve tilling the soil, make sure the seed bed is firm before planting.

Minimum till, especially where bahiagrass predominates4, is another planting method to consider. Existing vegetation in the field can be killed with a nonselective translocated herbicide. Once the weeds are dead, eliminate the residue either by burning, or by mowing close to the soil and bagging the clippings. Then lightly scarify the field with a disk or harrow so that the soil surface is barely scratched. You may want to disk or harrow at least one time in a perpendicular direction to increase the amount of soil surface that is scarified.

Germination of the black-eyed susan seed will probably be greater in the scarified soil. Remember too, that the deeper the cultivation, the greater the number of weed seed that will be exposed and could germinate. After the field is prepared, plant the seed as described below, or you can use a no-till drill seeder like those used by the Florida DOT.

Planting

Plant black-eyed susan in November to early December. Direct seed 0.75 to 1.5 lb Pure Live Seed5 per acre into weed-free fields. Seeds can be broadcast by a whirly-bird type spreader (especially if planting one acre or less) or planted in rows using a seed drill (Figure 2, Figure 3). This seeding rate should yield a stand dense enough to help reduce weed competition. If planting in rows, use the lower seeding rate, and space rows far enough apart so that you can use a cultivator to control weeds in the aisles. If seed was not planted with a seed drill, cover with a thin layer of soil (1/8 to 1/4 inch at the most), either by a cultipacker, roller, or by simply scratching it into the soil with a rake (Figure 4). It is critical for germination that there be good soil-to-seed contact.

Planting seed in November to early December will minimize the need for supplemental irrigation. Supplemental irrigation should only be necessary during very dry winters. Another reason to plant in the fall is that you may be able to harvest seed earlier. Research suggests that flowering of black-eyed susan does not begin until the plant has reached a certain stage of maturity (as measured by the number of leaves) (Harkess and Lyons, 1993; Orvos and Lyons, 1989). Planting in late fall will help to insure that plants will be mature enough once environmental conditions are favorable for flowering.

During the growing season, no fertilization should be required unless the soil is extremely infertile. Irrigation might be necessary during extended periods without rain.

Black-eyed susan is an annual, or at best a short-lived perennial (2-3 years) that reseeds itself. Thus, replanting new seed should only be necessary infrequently.

Weed Control

Weeds are probably going to be the main pest problem. They could reduce seed yield because they will compete with the crop for water and nutrients. Secondly--and just as important-- is that marketing of the seed will be difficult or not possible should there be weed seed mixed in with the black-eyed susan seed. Seed cleaning methods that eliminate weed seed will increase costs and lower yield.

If chemical weed control is to be part of a weed management program, use a pre-emergent herbicide. Weed control costs are usually lower if you prevent weed growth rather than eliminating an infestation. Apply a pre-emergent herbicide labelled for use on black-eyed susan, such as oryzalin or trifluralin, before weeds germinate. Either of these herbicides can be applied once black-eyed susan reaches the 5- to 6-leaf stage. Both of these herbicides require 1/2 inch water for activation-- within 3 days for trifluralin and within 21 days for oryzalin.

Existing annual or perennial weeds in aisles (if seed was planted in rows) can be controlled with cultivation or with directed applications of nonselective herbicides such as glyphosate or glufosinate. Eliminate small and immature annual or perennial weeds that are growing in aisles with a directed application of a contact herbicide that contains diquat or herbicidal soaps. Use a shielded spray nozzle whenever applying nonselective herbicides in the aisles to reduce the likelihood of spray drift damaging the crop. Many grass weed species anywhere in the crop can be controlled with postemergence applications of fenoxaprop or sethoxydim. Broadleaf weeds, growing in the row or in a crop that was planted by broadcast seeding, need to be pulled by hand unless the black-eyed susan spacing is wide enough to safely allow use of a sprayer with a shielded nozzle to apply a nonselective translocated or contact herbicide. **Whenever using an herbicide, read and follow all label directions, including those for protective safety equipment and re-entry intervals.**

Other Pests

Spittlebugs and evidence of foliar thrips have been observed on plants growing in northern Florida; however, these pests did not seriously harm black-eyed susan. Powdery mildew (*Erysiphe* sp.) could pose a potential problem. Powdery mildew is a dry-weather disease, and in Florida can be a problem generally in late spring and early fall.

Although it can infest all above-ground parts of black-eyed susan, including the flowers, it shouldn't pose a major problem unless the infestation becomes severe. Ensuring good air circulation around the plants can reduce the likelihood of serious infestations and make sure the planting is not too dense. The fungicides thiophanate methyl (such as Cleary 3336, Fungo FL or Systech 1998) and propiconazole (Banner Maxx) can be used to treat this disease. Before applying a broadcast treatment to the whole field, spray a small portion of the field and check for phytotoxicity 5 to 7 days after application. Also be aware that propiconazole has some growth regulator activity so you may want to rotate its use with thiophanate methyl. Another treatment option is to use sulfur labelled for "flowers" in homeowner products available at retail outlets.

Deer and rabbit predation, especially of tender new shoots, may also be a problem.

Harvesting Seed

Seed is ripe when it turns black. However, since seedheads do not readily shatter, harvesting can be delayed until the seed on many plants has matured. Keep in mind, however, that severe storms can cause lodging or shatter seedheads that would normally shatter later.

Seed can be harvested mechanically, or harvested manually with pruning shears. Black-eyed susan can be mechanically harvested with a seed stripper (Prairie Habitats, Inc., Manitoba, Canada) a hand-held model (Figure 5) or one that attaches to the front of an ATV or by combine. The USDA NRCS Big Flats PMC in Corning, New York used a combine with a high cylinder speed, 7/64 screen size, and no air (U. S. Dept. Agric., 1985). They also noted that the side air intakes might need to be sealed off, depending on the machine.

A combine is most effectively used for crops of an acre or more. A combine will harvest the whole crop, whether the seed is mature or not. Using a handheld seed stripper allows for more selective harvesting (Figure 5). Manually harvesting with pruning shears has the advantage of selecting for only ripe seedheads.

Multiple harvests are possible because black-eyed susan will flower throughout the summer and into fall, especially if the first harvest is in July. However, keep in mind that after August, flower initiation may be reduced and flower development may be abnormal (Beckwith, 1991), which will reduce the amount of harvestable seed. For fields of one acre or less, manual harvesting may be cost-efficient.

Harvested seed will contain some leaves, stems, and immature seed. Therefore, it is imperative that seed be dried before it is cleaned--and just as important--dried relatively quickly. If the plant material remains moist too long it will start to decay. Spread harvested seed on a clean, hard surface and allow to dry for a few days before cleaning.

Use a floor fan to facilitate drying if the harvest is large. Laying the harvested seed on brown packing paper or newspaper (visit your local newspaper and ask for the ends of newsprint rolls) in a shed or barn should be adequate. If drying seeds outdoors, you need to be concerned about winds, dew that will slow the drying process, and rain.

Cleaning Seed

A two-screen air-screen cleaner can be used to clean black-eyed susan seed (Figure 6). If further cleaning is necessary, try using different screens (about $30-35 each) in the air cleaner. Additional cleaning can also be accomplished with a gravity table; however, this piece of equipment is relatively expensive. If you don't want to invest in mechanized seed cleaning equipment, purchase screens used in the air-screen cleaner and clean the seed manually.

Seed Storage

After cleaning, seed should be stored in a cool, dry environment such as a large refrigerator or walk-in cooler for maximum shelf life. The current rule-of-thumb is that temperature (oF) + relative humidity (% RH) in the storage facility should total 100 or less. For example, storing seed at 35oF and 40% RH (35+40=75) would be adequate.

If seed is going to be stored in a shed or barn, it needs to be protected against insects and rodents. No matter where the seed is stored, each bag should be labelled with the species name, date of harvest, date of storage, percent purity, and germination rate.

Seed Certification

This ecotype of black-eyed susan needs to be certified by the *Southern Seed Certification Association, Inc*. (a joint Florida/Alabama agency), P.O. Box 2619, Auburn, AL 36831 (334-844-4995).

Availability of Seed

Limited amounts of seed will be made available to individuals or businesses with an expressed interest in seed increasing, and eventual production of a seed crop for sale to the Florida DOT and any other interested parties. Potential growers should contact the University of Florida/IFAS North Florida Research and Education Center.

Footnotes

Note: Footnotes 1 and 2 are printed on page one.

3. If using glyphosate, you may want to wait 2 weeks after the last application before planting seed.

4. Consider using this method in the northern part of Florida where a November/December frost could kill the bahiagrass topgrowth thereby eliminating the need for herbicides.

Bahiagrass will not provide much competition until seedlings have germinated. A grass herbicide can be used to control bahiagrass when necessary.

5. The number of pounds of **P**ure **L**ive **S**eed = (pounds of bulk seed X percent purity of the seed X percent germination rate)/10,000; ex: 10.8 lb PLS = (20 lb bulk seed X 90% pure X 60% germination rate)/10,000).

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**University of South Florida Institute for Systematic Botany, Tampa, FL; **Botanical and Ecological Consultant, Bremerton, WA.*