ENH1103

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Establishment of Laneleaf Tickseed (*Coreopsis lanceolata)* in Roadside Right-of-Ways[1]

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Introduction

The Florida Department of Transportation's (FDOT) roadside right-of-way (ROW) wildflower program began in 1963 (3). In addition to the aesthetic attributes of wildflower plantings, FDOT noted that the plantings would increase driver alertness and would also lower maintenance costs. The economic benefit is even more relevant today because maintenance expenses are driven by higher fuel, labor and equipment costs.

The economic value of using native wildflowers in ROWs, especially native wildflowers adapted to Florida's environment (often referred to as Florida ecotypes) began to be recognized in the 1980s (3). Today, the ecological value and sustainability of using native wildflowers adapted to specific regions of the country is widely acknowledged (5). And when plantings of these types of wildflowers are established and managed appropriately, maintenance costs are minimized, as is the need to replant.

Figure 1. A roadside right-of-way planting of lanceleaf tickseed.

Lanceleaf Tickseed

Lanceleaf tickseed occurs throughout most of the United States, the main exception being the Rocky Mountain states (12). In Florida, the documented range of this upland species extends southward into

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Lake County (14). Lanceleaf tickseed frequently occurs in sandhills and disturbed habitats, including roadside ROWs.

The northern Florida lanceleaf tickseed ecotype is a low-growing (6 - 8 inches tall), short-lived perennial that is usually evergreen (Fig. 2). Leaves of this ecotype are smooth and nearly hairless. However, a naturally occurring variant in Florida has leaves and stems densely covered with long, soft hairs. The main blooming season is early to mid-spring. Flowering stems extend about 6 - 8 inches above the foliage. Individual flowers are about 1/2 - 1 inch in diameter. The petals (ray flowers) and disc flowers are yellow, unlike most of the other native tickseeds in Florida, which have brown or dark-red disc flowers (13).

Ecotypes When native wildflowers are used in ROWs, we strongly encourage the use of seeds of ecotypes that 1) originate from and are adapted to Florida's ecoregions, and 2) that have been produced in a manner that maximizes genetic diversity of the harvested seeds. Based on research with Leavenworth's tickseed, genetically diverse, commercially produced crops of lanceleaf tickseed are likely to be those that have been harvested throughout the season by vacuuming seed off landscape fabric (1,7) or by hand harvesting from each plant. Using genetically diverse Florida ecotypes facilitates establishment and survival. The origin of these ecotypes makes them well suited for Florida's environment, and the genetic diversity of these ecotypes enhances the likelihood of long-term survival of the planting. Also, by using Florida ecotypes, the risk of genetically contaminating wild populations of lanceleaf tickseed is minimized. For more information about ecotypes and issues regarding the use of native plants, see *Native Plants: An Overview* (6).

Establishing a sustainable population of lanceleaf tickseed requires the following:

- an appropriate site,
- site preparation practices that minimize weed interference,
- timely sowing of seeds at an appropriate rate, and
- cultural practices that favor population sustainability.

Recommendations in this publication are based on a northern-Florida ecotype of lanceleaf tickseed, including research and anecdotal evidence about establishment, maintenance, and performance of Florida ecotypes of native wildflowers under roadside or simulated roadside conditions in North Florida and Central Florida (4, 10, 11).

Figure 2. Lanceleaf tickseed.

Site Selection

Location

The Florida ecotype of lanceleaf tickseed is well suited for roadsides in North Florida and Central Florida as far south as Lake and Orange counties. However, unlike plantings in North Florida, plantings in Central Florida might not flower the first year after seeding. This lack of flowering the first year after seeding suggests that the northern Florida ecotype of lanceleaf tickseed needs to be exposed to cold temperatures for a minimum length of time before this ecotype will flower (a process termed vernalization).

Based on aesthetic appeal to the public, as well as maintenance practices, safety considerations, and economic issues, the areas identified below are appropriate locations for lanceleaf tickseed plantings.

- Rural ROWs requiring mowing by a small to medium-sized mower or string trimmer
- Steep slopes
- Interchanges
- Welcome Centers / Rest Areas

Site Characteristics

The greatest likelihood of establishing a sustainable population of lanceleaf tickseed is in well drained soils that have a slightly moderate to moderate capacity for holding moisture. Avoid highly compacted soils. For wetter sites, consider establishing Leavenworth's tickseed. (See EDIS publication EP368, *Establishment of Leavenworth s Tickseed (Coreopsis leavenworthii) on Roadside Right-of-Ways)*, http://edis.ifas.ufl.edu/EP368.

Another important site consideration is the existing vegetation that may compete with lanceleaf tickseed. A good site to establish lanceleaf tickseed is one dominated by a long-established population of bahiagrass, with the density of bahiagrass being sparse to moderate; weeds should also be sparse. The main advantage of establishing laceleaf tickseed in sites dominated by bahiagrass is that the weed-seed bank in such sites should be less than in areas where broadleaf weeds and/or sedges have more of a presence.

Avoid sites with *Rubus* species (blackberry and dewberry), *Smilax* species (greenbrier or catbrier), and *Cyperus* species (nutsedges or nutgrasses) as those species are very difficult to control in a wildflower planting. Sites with a moderate density of broadleaf herbaceous species should also be avoided since these species may have built up a substantial seed bank and could outcompete lanceleaf tickseed after site preparation. Also avoid highly compacted soils as lanceleaf tickseed establishment in such soils will be poor.

Site Preparation

When establishing lanceleaf tickseed in areas dominated by bahiagrass, use a “no till” method. Bahiagrass is extremely competitive and outcompetes many broadleaf weeds and sedges, but tilling will promote germination of weeds and sedges in the seed bank. A “no till” approach facilitates successful lanceleaf tickseed establishment.

Herbicide Method

Competition is one of the primary reasons that wildflower plantings fail. Since bahiagrass is extremely competitive, lanceleaf tickseed establishment can be greatly increased by eradicating bahiagrass with an herbicide. This method should work well for sites dominated by bahiagrass provided that other recommendations in this publication are followed. About four weeks before sowing seeds of lanceleaf tickseed, apply a nonselective, translocated herbicide that contains only glyphosate (marketed under many trade names) as an active ingredient. Make a second application about two weeks later. Anecdotal evidence suggests that glufosinate (Finale®) should be as effective as glyphosate.

About two weeks after the second application, mow the dead vegetation close to the soil. Removing or minimizing clippings and thatch will facilitate successful lanceleaf tickseed establishment (4). Clippings and thatch may need to be removed because they could prevent wildflower seeds from reaching the soil.

Non-herbicide Method

In situations when herbicide cannot be used, lanceleaf tickseed may be established by simply mowing turf (as previously described) prior to seeding. However, because bahiagrass will strongly suppress growth of lanceleaf tickseed seedlings (4), only use this method at sites dominated by a sparse density of bahiagrass, where soil is neither too compacted nor too loose, where the thatch is minimal to nil, and where weed interference will be minimal based on the criteria described previously.

Lanceleaf tickseed can become established in sites where bahiagrass density is moderate, but the lanceleaf tickseed population probably will not be as dense (or competitive) as when using the herbicide method. Additionally, lanceleaf tickseed will produce fewer flowers when planted in areas with bahiagrass.

Sowing Seeds

Seed Source

Seeds of the northern Florida ecotype of lanceleaf tickseed are available from the Wildflower Seed and Plant Growers Association, Inc., which is also known as the Florida Wildflowers Growers Cooperative. Check their Web site for seed availability: http://www.floridawildflowers.com.

If seeds of lanceleaf tickseed are not listed as available on that Web site, contact the Growers Cooperative to learn when seeds will be available or to learn whether one of the growers has retained some seeds to sell directly. (Send e-mail to businessmanager@floridawildflowers.com.) Currently, co-op members can keep 20 percent of their seeds to sell on their own.

Sowing Dates

In North Florida -- the region including Escambia County to the west, on the Gulf Coast, and extending east to include Duval County on the Atlantic Coast -- sow seeds in late September to mid October. In parts of Florida south of this region, sow seeds from mid-October to mid-November. However, sowing seeds can be delayed until late November in Central Florida -- an area including Pasco County to the west, on the Gulf Coast, and extending east to include Orange County. If sowing seeds into living bahiagrass turf in any region of Florida, regardless of whether the bahiagrass is mowed, wait until at least the last week of September, when bahiagrass is beginning to go dormant.

Timing is especially important in North Florida. Seeds planted in late fall or winter may not germinate for many weeks because of colder soil and/or a lack of rain. In addition, nongerminated seeds of lanceleaf tickseed might enter secondary dormancy in cold, moist soils, possibly delaying germination for several months.

Seeding Rate

Ideally, seeding rates should be determined for each species based on the number of viable seeds per acre or 1000 ft2 that will result in a sustainable stand of wildflowers and then converting that rate to pounds. (See discussion below, under the heading, Viable vs. Nonviable Seeds / Bulk Seed vs. 'Pure Live Seed'). However, because information about the optimal number of viable seeds to sow per unit area is lacking or limited, bulk seeding rates are commonly used. Use of the bulk seeding rate can result in substantially more seeds being sown than necessary. While over-seeding might not be an issue for relatively inexpensive seeds, ecotype seeds are expensive.

The next-best alternative is to sow seeds on a “pounds of Pure Live Seed (PLS) per acre” basis. (See discussion under the heading, Viable vs. Nonviable Seeds / Bulk Seed vs.'Pure Live Seed'). Based on research conducted in North Florida and North Central Florida (4), lanceleaf tickseed sown at about 5.5 - 7 lb PLS per acre will produce a good stand of wildflowers provided that this publication's guidelines for site preparation are followed.

Substantially increasing seeding rates of lanceleaf tickseed to improve establishment is not warranted when seeding into dead/mowed bahiagrass or living bahiagrass. In both cases, increasing the seeding rate to nearly 13 lb PLS slightly improved stand density, but did not greatly increase the showiness of the stand when it flowered (4). Living bahiagrass -- when dormant -- does not substantially inhibit emergence of lanceleaf tickseed seedling. However, actively growing bahiagrass outcompetes many of the seedlings, resulting in less coverage of lanceleaf tickseed (4).

Viable vs. Nonviable Seeds / 'Bulk Seed' vs. 'Pure Live Seed'

Viable vs. Nonviable Seeds For seed producers and end users, seeds are classified as either viable or nonviable. A seed is deemed viable only if it is capable of germinating and producing normal plants under field conditions. To determine the percentage of viable seeds within a seed lot, a seed technologist conducts two tests. First, a germination test is conducted to determine the percentage of seeds that develop into normal seedlings within the allotted time of the germination test. A normal seedling possesses all of the structures necessary for the seedling to develop normally. If any of the essential structures are lacking or underdeveloped, or if the seedling is obviously infested with a bacteria or fungus, the seedling is deemed nonviable. Hence, a 'live' seed is not necessarily viable. At the conclusion of the germination test, all nongerminated, nondiseased seeds are subjected to a viability test, which typically is a tetrazolium (TZ) test. Tetrazolium is a colorless chemical that stains living tissue pink to red. Seeds subjected to the TZ test are deemed viable if the structures essential for germination and normal seedling development are stained pink to red. Seeds that test positive in a postgermination TZ test are classified as dormant; some labs refer to these seeds as 'hard.' Accurate TZ testing and interpretation of TZ test results requires considerable skill and experience.

Bulk Seed vs. Pure Live Seed A bag of seeds contains viable wildflower seeds, inert matter (nonviable seeds and pieces of leaves, stems, flowers) and possibly even some viable weed seeds. The total contents of the bag are referred to as bulk seed. The number of pounds of Pure Live Seed(s) in a bag is a function of viability and purity and is based on weight. However, since the percentage of viable seeds is determined under lab conditions, it is unlikely that all viable seeds will germinate and develop into mature plants under field conditions.

$$\text{PLS (lb)} = \frac{\textit{Total weight of seeds in bag} \text{ (lb)} \times \textit{\% purity} \times \textit{\% viable seeds}}{10{,}000}$$

where the % viable seeds = % germination + % dormant (often called hard) seeds

For example, there are 81 lb PLS in a 100 lb bag of bulk seed that has 90% pure seed, with the pure seed being 90% viable (81 = [100 x 90 x 90]/10,000).

The bulk seed weight in the bag, % purity, % germination, and % dormant (or hard) seeds should always be on the seed label per Florida seed law specifications. The total percent viable seeds might also be listed on the label; if listed, simply use the total percent viable seeds in the equation above.

Figure 3. How to calculate seeding rate.

Equipment

Sow seeds with a seed drill or mechanical planter at a depth of 1/8 of an inch or less. If broadcasting seeds with a hand-operated spreader, increase seed-to-soil contact with a rubber-tired roller, turf roller, or similar equipment.

Establishment and Maintenance

Irrigation

Moisture is essential for good establishment. If rainfall is limited and irrigation is available, apply 1/4 - 1 inch per day for two to six weeks after sowing seeds, with the higher amounts and frequency in sandier soils (4). However, applying supplemental irrigation is probably not practical for large plantings.

Weed Control

Competition -- including that from bahiagrass -- is one of the primary reasons that wildflower plantings fail to establish or deteriorate a year or two after establishment. To help suppress interference from broadleaf weeds, consider applying imazapic (Plateau®, BASF; Panoramic 2SL, Alligare; Impose™, Makhteshim Agan of North America) at 4 oz product/acre within one day of seeding (11) at sites where bahiagrass has been killed or strongly suppressed with glyphosate or glufosinate. However, imazapic at 4 oz/acre has little to no beneficial effect on lanceleaf tickseed establishment if applied to living bahiagrass in the fall (4). Suppression of bahiagrass growth by imazapic does not carry over until spring, so bahiagrass outcompetes most of the lanceleaf tickseed seedlings in the spring.

Once seedlings of lanceleaf tickseed are established, many grasses can be controlled with postemergent, broadcast applications of Acclaim® Extra (fenoxaprop; Bayer Environmental Science). It is a grass herbicide (graminicide) and will not harm established plants of lanceleaf tickseed. Poast® Herbicide (sethoxydim, Micro Flo Company), a grass herbicide labeled for control of grasses in lanceleaf tickseed, was relatively ineffective at suppressing bahiagrass (4). Another herbicide to consider for limiting growth of bahiagrass is imazapic, applied at 4 oz/acre. However, imazapic might suppress flowering of lanceleaf tickseed for about a month (8). Regardless of the herbicide, ALWAYS USE A NONIONIC SURFACTANT; crop oils might injure lanceleaf tickseed (4).

Imazapic at higher rates can be applied to established plantings of lanceleaf tickseed to control yellow and purple nutsedge (*Cyperus esculentu*s L. and *C. rotundus* L., respectively). However, when deciding whether to apply a higher rate of imazapic, consider the severity of the nutsedge infestation, the level of tolerable injury to the lanceleaf tickseed and the long-term benefits to the lanceleaf tickseed planting that can result from the use of the high imazapic rates needed to control nutsedge. In addition to delayed flowering of lanceleaf tickseed, some minor stunting and chlorosis of the lanceleaf tickseed could occur. Such injury is usually temporary, however, and lanceleaf tickseed should grow normally within a couple of months after application of imazapic.

Mowing

General Guidelines

Time mowing cycles to the flowering and seed set of lanceleaf tickseed. Avoid mowing when lanceleaf tickseed flowering stems extend above the vegetative growth. In North Florida, this stage will occur in early to mid-March. In Central Florida, this stage could occur in late February. Peak flowering is in late March through April, but flowering often continues into May. Allowing sufficient time for seeds to mature, at least three to four weeks, is critical to sustain lanceleaf tickseed populations. Wait until June to resume mowing, and then mow only if needed for weed control as dead flowering stems will drop off on their own. The final mowing cycle of the year should be a "clean up mowing" after Thanksgiving.

Plantings of lanceleaf tickseed can be mowed as few as two times per year, but no more than six mowing cycles should be necessary (4). Vegetative growth of the Florida ecotype of lanceleaf tickseed under ROW conditions is about 6 inches tall and rarely exceeds 8 inches. A mowing height of 8 inches, which is within FDOT guidelines for rural areas (2), will minimize disturbance to lanceleaf

tickseed, thereby facilitating its spread and sustainability.

During Establishment

For newly planted sites in which bahiagrass was eradicated prior to lanceleaf tickseed seeding, one or two mowing cycles might be all that is needed through February to suppress growth and flowering of cool-season broadleaf weeds. If seeds of lanceleaf tickseed were sown into living bahiagrass, an additional mowing cycle might be necessary, especially in Central Florida.

Fertilization

Supplemental fertilization is NOT recommended. Since plantings will be mowed, nutrients will be recycled as the clippings decompose. Consider, too, that lanceleaf tickseed -- like many of Florida's native wildflowers -- is adapted to soils with low fertility and performs well under those conditions. Supplemental fertilization will promote weed growth and could cause lanceleaf tickseed to become more susceptible to drought stress, as well as to insect and disease pests.

Lanceleaf Tickseed as a 'Nurse Crop'

Consider using lanceleaf tickseed as a "nurse crop". After lanceleaf tickseed has become established, introduce Florida ecotypes of other native species into the planting. The potential of lanceleaf tickseed to protect tender seedlings of the introduced natives while minimizing weed competition should be investigated. When lanceleaf tickseed plantings are used in such a manner, the population of lanceleaf tickseed may eventually decline as the other native wildflowers and grasses take over.

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