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Until our recent discoveries, *Helianthus occidentalis* Riddell subsp. *plantagineus* (Torr. & Gray) Heiser (Asteraceae) was known in Arkansas only from a single specimen (Palmer 23254, UARK) collected in 1923 from the banks of the Ouachita River in Garland County (Smith, 1988, 1994). On August 3, 1994, we serendipitously discovered a population (Site 1) during a plant survey in the Ouachita National Forest in Perry County. We made intensive searches for additional occurrences during the 1995 flowering period from early July until early September. On July 21 a second population (Site 2) was found about 0.7 km from our first stand, and on August 10 a third population was discovered on the Ouachita River in Montgomery County (Site 3).

Extensive searches were made in Garland, Hot Spring, Montgomery, Perry, and parts of Saline County. Our failure to find the plant on the Ouachita River in Garland County led us to conclude that Palmer's 1923 site was probably inundated by the later construction of lakes. We believe that the low yield of new sites resulting from our searches and the fact that other botanists have not reported occurrences are good indicators of the rarity of this sunflower in the state. This subspecies probably should be considered endangered or threatened in Arkansas.

We found that the key characters given by Heiser (1969) reliably separate the subspecies of *H. occidentalis*. Subsp. *plantagineus* is distinguished by the strigose pubescence (making the leaves smooth to the touch) and the usually serrate leaf margins, in contrast to the scabrous to hispid, usually entire leaves of subsp. *occidentalis* which occurs in the northwestern corner of Arkansas. Smith (1994) indicated a difference in petiole length based on the Arkansas specimens that were available at the time. After he examined material from our study sites, Dr. Smith (personal communication) concluded that petiole length seems to be variable and of less importance than pubescence as an identifying character.

We have made the following observations at our study sites. Flowering stems are seldom over 1.5 m tall, often less than 1.0 m. Flower heads are mostly 2-3 cm wide. Aerial stems die in the fall, but subterranean stolons give rise at their tips to new rosettes which appear above ground by the end of March. During the flowering period there are many more rosettes than flowering stems in a stand. Flowering stems are usually connected by stolons to several small rosettes surrounding the parent plant. The rays begin to emerge in early July and flowering peaks in August. The plants become quite inconspicuous under drought conditions during which the leaves fold or curl, and the flower heads may dry or produce depauperate or aborted fruits.

Site 1 is on Forest Road Y08 in Compartment 1408 of the Winona Ranger District of the Ouachita National Forest (Sec 11 T3N R19W). There are two roadside patches on opposite sides of a depression over a culvert which provides passage for a small intermittent stream. Each patch is roughly rectangular in shape, a little under 2 meters long and about half as wide. Each colony is quite dense as a result of the stoloniferous habit of the plants.

Site 2 is about 0.7 km from Site 1, separated by a steep ridge that reaches an elevation about 30 meters higher than the sites. Most of the plants are in colonies on both sides of Forest Road 207 at the junction of Road 849 and 866. A few plants are scattered westward along Road 849. This is the largest population we have found. The densest colony is on a wing ditch bank, where the rosettes nearly cover the ground.

Site 3, in Montgomery County, is on a shale outcrop bluff on the Ouachita River, downstream from Oden, east of the Hog Jaw community. It may be similar to the site originally found by Palmer which was also on shale. There is a dense colony at the edge of the woodland on the bluff top, and other plants extending out along cracks and troughs on the open outcrop. A few clumps occur on ledges below the bluff top.

All three sites occur within associations of shortleaf pine, oaks, and hickories. Eastern red cedar and winged elm are common elements in all the sites. Winged sumac and sericea lespedeza occur in each area and are especially abundant at Site 1, immediately adjacent to the sunflower colonies. Brambles and greenbrier are also common. The soils of Site 1 and 2 are deeper than the shallow soil over shale in Site 3. An abundance of ruperstrine cryptogams at Site 3 further distinguishes Site 3 from the other sites. An interesting vernal associate found growing on the ledges and vertical rock faces only at Site 3 is Palmer's saxifrage (*Saxifraga palmeri* Bush).

The densest colonies are in full sunlight, and none of them become established under the canopy of adjacent

woodlands. Many roadsides and rock outcrops offer such exposure, but the rarity of occurrence suggests that this species is not often successful in invading new areas. Nevertheless, few other plant species seem to invade dense colonies of *H. occidentalis*. In our sites even brambles have made only slight invasions. The report of allelopathic effects of *H. occidentalis* by Curtis and Cottam (1950) was disputed by Anderson and Liberta (1987) who found no evidence that this species produced allelochemicals which would inhibit seed germination or vesicular-arbuscular mycorrhizal formation of other species in their study area. They suggested that once the sunflowers invade suitable sites and establish dense colonies by their perennial rhizomatous growth, the intense competition of such colonies limits the establishment of seedlings of other species. Stipanovic et al. (1979) found evidence that toxins in *H. occidentalis plantagineus* from Texas may play a role in its resistance to aphids and sunflower beetles; Hertz et al. (1983) reported that diterpenoids in this species inhibited larval growth of the sunflower moth. A report that *H. occidentalis plantagineus* produces significant amounts of natural rubber (Stipanovic et al., 1980) indicates the complexity of the chemistry of this sunflower. Evidently *H. occidentalis* does produce chemicals with protective roles. In light of these studies we will not presume to explain why the sunflower stands we found have not succumbed to invasion by such aggressive species as sericea lespedeza; it seems likely that both colony structure and secondary chemicals play important roles. Obviously, the intriguing ecology of this plant offers opportunity for further investigation.

One nomenclatural irregularity should be noted. Kartesz (1994) cited Shinners as the authority for subspecies *plantagineus*, but it was Heiser (1969) who elevated Torrey and Gray's variety to subspecies status based on its geographical distribution. Smith (1988, 1994) and other authors cite Heiser as the subspecific authority.

Vouchers for the populations reported are deposited in the herbaria of Henderson State University and the University of Arkansas at Fayetteville. We thank Dr. E.B. Smith of the University of Arkansas for confirmation of the identification. We appreciate Mr. Don Crank for making a photographic record and for good company in the field.

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