

NORTH  
CAROLINA

*wild flower*

PRESERVATION  
SOCIETY, INC.



Schweinitz's Sunflower  
*Helianthus schweinitzii*

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NORTH CAROLINA WILD FLOWER  
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1994-96

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**NEWSLETTER**  
of  
**North Carolina Wild Flower Preservation Society**

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COVER DRAWING: *Helianthus schweinitzii* Torrey & Gray reproduced by permission of the artist, Julia Larke, Louisiana Natural Heritage Program.

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*The Perfect Gift for Any Occasion —  
Membership in the Society  
and an Invitation to Our Outings*

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## MESSAGE FROM THE PRESIDENT

What are the differences between a yard and a lawn? One difference is the amount of fertilizers, weed killers, time and money needed to maintain a single specimen of plant over a large area of lawn. Another difference is the uninterrupted view of an expanse of a single specimen of plant provided by a lawn. However, a yard yields a richness: white, yellow and red clovers, broad-leaved, narrow-leaved and English plantains, prostrate spurge, crabgrass, panic grass, oxeye daisy, daisy fleabane, sourgrass and sheep sorrel. The edges of a yard can provide Queen Anne's lace, yarrow, goldenrods, asters, joe pye, bonesets, blueberries, blackberries and a plethora of other treats. While mowing the yard this afternoon, I noticed a spike coming up in the yard and then another. Finally, after mowing around five of the spikes, I found one in bloom. Spiral ladies tresses orchids have invaded my yard.

Driving down the interstates through North Carolina one cannot help but notice NCDOT's exercises in developing roadside lawns. Acres of land being stripped by herbicides in order to plant single specimen plantings. Day lilies, canna lilies, cosmos, California poppies are very attractive plants and provide a pleasant view as we are driving. But, if left alone or perhaps managed by occasional burning or seasonal mowing, what would happen to the same spaces? Could these broad expanses of open areas become prairies or savannahs and provide habitats for the wide variety of plants that once graced this state before farming and development destroyed the original expanses of natural gardens?

With the constant shift to political intolerance, the small voice coming from the conservationist seems to diminish. How can we effect change? Support for the appropriate political lobbies, like Friends of the State Parks, the Sierra Club, the Environmental Defense Fund always help some. But the most effective way is to talk. Talk to everybody: your friends, people at the hairdressers or barbers, people at social events, business meetings or classrooms.

Plant your ideas like seeds. Scatter them over a broad area. The more you scatter the more likely one seed/idea will take root. When one takes root it then begins to spread on its own. Perhaps your seed will be the one that spreads to the point that some legislator notices its merit.

As a preservation society we are trying to develop ways to speed up the germination process of some of our ideas. Craig Moretz has agreed to serve as the Society's Conservation and Preservation Chair. If you have concerns or ideas about a plant or habitat that may be in danger in your area let Craig know.

Bob Tuggle

NCWFPS  
FALL GENERAL MEETING 1993  
September 11-12  
Reported by Bob Tuggle

The Wild Flower Society has over the years developed a reputation for attracting inclement weather. This trip was a narrow miss. Hurricane Emily visited the Outer Banks area one week before we did. The program/meetings committee anxiously waited to see if the trip would need to be cancelled. All traffic to the island was halted. Water and electricity were a problem. It was questionable whether accommodations would survive.

However, with some modification to the plans we were able to make the trip. Hatteras Island, south of Oregon Inlet, was closed until Saturday morning, September 11. One of our hikes was to be at Buxton Woods, adjacent to the Hatteras Lighthouse and south of the inlet. The Charlotte Observer, September 5, 1993, had carried this line regarding the hurricane damage: "Early reports indicated considerable devastation of mature trees in the highly-prized Buxton Woods maritime forest on Hatteras Island." Perhaps at a later date we can plan another trip into the area and see how a maritime forest heals.

The weather for our weekend was wonderful. Lodging was at a Comfort Inn near Whalebone Junction. Saturday morning, we visited Nags Head Woods. This tract of land, which is partially owned by the Nature Conservancy, consists of a series of relic dunes nestled between the famous Jockey's Ridge Dune and another active dune called Run Hill. The trek started near the visitor's center, were led by Jeannie Kraus, we hiked into the sunlight dappled corridors of the maritime forest.

American holly, black gum, wax myrtle, red bay, loblolly pine, dogwood, beech, hop hornbeam and southern red oak were among the species that provided the upper and lower canopy. Dwarf palmetto, saltmeadow cordgrass, little bluestem grass, three species of cattails, and bamboo were all found along the wetter areas. Also, found in the wetter areas were signs warning hikers of cotton-mouth moccasins. Most of us were happy to see only the signs.

Coming out of the forest and into the dune area we found ourselves in a blowout. This is an unprotected area where the prevailing winds prevent the larger plants from establishing themselves. Some plants did meet the wind's challenge, such as the cactus, *Opuntia drummondii*. The trail led back into the woods and passed by several shallow ponds. Ed Swab was able to point out three of the four genera of duckweed that grow in the area: *Wolffia*, *Wolffiella* and *Lemna*. *Spirodela* was the one we missed. Mosquito fern (*Azolla*) was also present, as were mosquitoes. We broke for lunch which was spent relaxing around picnic tables at Jockey's Ridge State Park, taking the time to visit with other members from around the state.

After noon, we went exploring. Since we couldn't visit Buxton Woods as planned we opted to go, at Henry LeGrand's suggestion, to the Bodie Island Lighthouse. Wandering around the periphery of the lighthouse grounds, over patches of lippia and Indian blanket, everyone noticed the almost impenetrable

barrier made by the plants at the edge of the salt marsh. This barrier provides wonderful protection for those birds and small creatures that can negotiate it. Bamboo vine, grapes, yaupon, goldenrods, grasses, myrtle, bayberry, beauty berry are only a few of the species providing the tangle.

Lucky for us, the park service has built a raised boardwalk through the barrier and several hundred yards into the salt marsh. Several observation platforms occur along the way to assist in viewing wildlife without damaging the ecosystem. New York fern, Virginia chain fern, rushes, cord grass and blue stem were abundant along the border.

The group scattered for dinner at various seafood restaurants. Later that evening we gathered again for a short slide presentation given by the author. The slides featured wildflowers from throughout the year. Afterwards a slightly bruised cake was shared in celebration of an unnamed member's birthday.

Walking along the beach that night, if you dragged your feet just after the wave receded you may have been able to see a purplish phosphorescence. The best guess I could get from several sources is that the glow came from a microscopic creature known as a dinoflagellate.

Sunday we went back to Jockey's Ridge again. This time we went into the back of the dunes to an area that is little travelled by the public. The dynamics of the constantly shifting dune is very evident. Trees which in any other location may be sixty feet tall are covered with sand. Only the large crown gives evidence that a mature tree exists on the spot. The diversity of communities occurring on the barrier islands continues with this hike. Now we see plants that have adapted to the harsh wind, sun and temperature extremes occurring on a sand dune. Occurring along the way were yaupon, butterfly pea, flat-topped goldenrod, yucca, sand spur, marsh pink, panic grass, knotweed, yellow-eyed grass, rattlebox, St. Johnswort and the sundew, *Drosera rotundifolia*. A special treat was the presence of wooly beach heather and maritime pinweed. The first documented collection of maritime pinweed in the state came from this site by Benson Kirkman. Benson was along to point out the plant and located several more specimens while we were there.

About noon, everyone left in various directions towards home. All in all another wonderful weekend.

*Contact your legislator immediately and  
ask them to vote for full funding for the  
STATE PARKS FUND/STATE PARKS AUTHORITY.*

The fund was created in the last seconds of the 1994 session,  
but was not fully funded.

## CLUB MOSSES FROM CUTTINGS

By Dr. Florence L. Barrows

*Boyce Thompson Institute*

The seasonal demand for Christmas decorations causes an annual depletion of the native Club Mosses or Ground Pines (*Lycopodium*), which in many places are in danger of extinction. Because of the need of conservation of these choice native evergreens, various organizations and individuals have urged the use of substitute materials which make attractive Christmas wreaths. Instead of destroying these valuable plants, why not grow them? It is possible to grow Club Mosses from cuttings.

The species most often seen on the market are *Lycopodium complanatum* L. and *L. obscurum* L., especially the latter. These species, as well as *L. clavatum* L., can be propagated by cuttings or growing tips of creeping stems or rhizomes. Only young growth is capable of rooting readily, as older woody tissue dries out and dies. Figure 1 shows the best age to use for cuttings. The stems of *L. complanatum* and *L. clavatum* are creeping, and young tips root readily where they come in contact with the soil, or by layering. *L. obscurum* has a subterranean rhizome which branches near the tip, and sends up new leafy branches.

Cuttings made in spring—about the middle of April, or whenever new growth starts—root better than fall cuttings. Cuttings may be rooted in a mixture of peat and sand, and later transplanted to a soil mixture; or they can be started directly in a mixture of equal parts of peat moss, sand, sod soil, and leaf mold. If this soil mixture is used, plants can be left undisturbed over a much longer period. They should be kept moist and well shaded until well rooted. Those in Figure 1 were grown in a slat-shaded cold frame. The wild plants seem to do especially well on a north slope in moist woods where there is plenty of leaf mold.

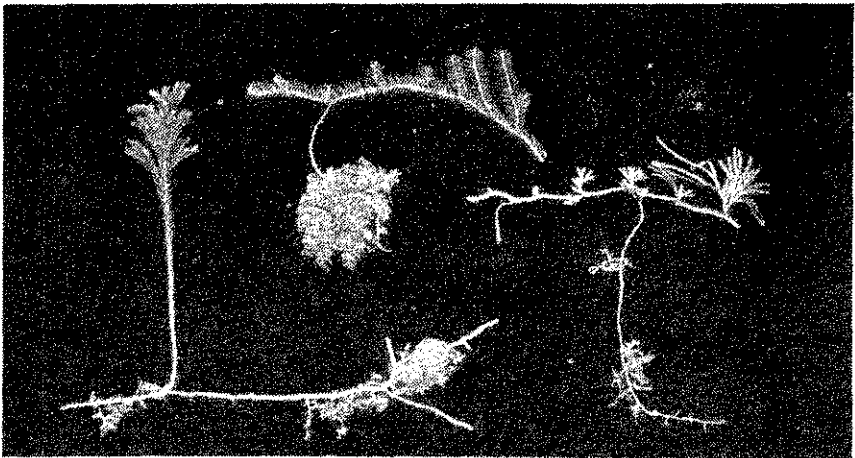


Fig. 1. Club Mosses propagated by young tip cuttings taken in spring. (*Lycopodium obscurum* L., *L. clavatum* L., and *L. complanatum* L. var. *flabelliforme* Fernald.) x 1/3.

The native species of *Lycopodium* reproduce by means of spores, runners, and bulbils. One species, *L. lucidulum* Michx., the Shining Club Moss, produces bulbils; and in the greenhouse can be made to develop two crops of bulbils a year. In nature the bulbils normally mature from late August through September. Figure 2 shows a heavy crop of bulbils produced in the greenhouse in September, after the same plants had produced an earlier crop in April. These bulbils are produced near the tip of the stem, in axils of the leaves like the Tiger Lilly. Figure 3 shows a series of bulbils. These grow readily into young plants if they are scattered over a suitable soil, such as the mixture already described. Keep moist to start root formation. Figure 4 shows a young plant about a year old, which was grown in a shaded frame. The Shining Club Moss can also be propagated by stem tip cuttings 3 or 4 inches in length. The stem roots very easily, but the cutting must have an apical bud to produce a new plant. This species roots readily in the fall as well as in the spring, and is the easiest to grow, but it has limited commercial value.

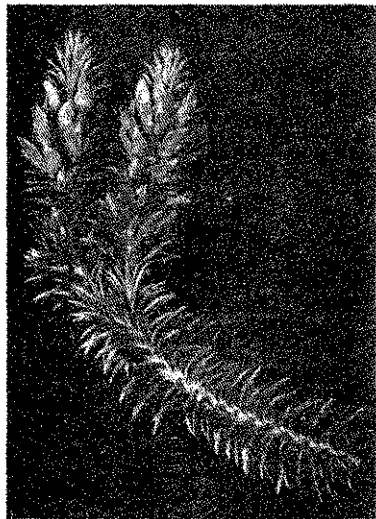


Fig. 2. The Shining Club Moss, *L. lucidulum* Michx., propagated in spring or fall by tip cuttings or by bulbils. x 1.

All four of these native species of *Lycopodium* can be grown in cold frames under slat shade in the soil mixture already mentioned. The roots of these plants contain a micorrhizal fungus which seems to be necessary for their well-being. If some soil is brought in from the woods with the roots of the plants, it will be almost certain to contain the necessary fungus. A little leaf mold collected from the beds of *Lycopodium* and mixed into the soil for the cuttings will usually insure the presence of the right fungus. Both shade and moisture are essential to maintain a healthy condition. The slat-shaded cold frames are valuable for maintaining



Fig. 3. Bulbs of the Shining Club Moss, *L. lucidulum* Michx. x 2.

the necessary environment. *L. obscurum* which is most in demand for Christmas wreaths can be grown very well in cold frames.

Spores are produced in large numbers by

some species, but sporelings are small and hard to find in the woods. The first report of the discovery of wild sporelings in America was made in 1917 by E. A. Spessard of Marquette, Michigan. Since then a few more stations have been



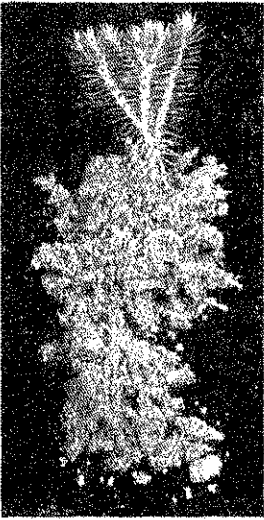


Fig. 4. Young plant of the Shining Club Moss, *L. lucidulum* Michx., about a year old. Grown from a bulbil. x 1/2.

found in New York, New Jersey, Massachusetts, and Connecticut.

The spores are very slow and difficult to germinate. In tests, only 16 to 20 per cent were germinated over a period of two or two and a half years. These were kept on damp sphagnum or peat moss. Development was slow and the plants reached only a 10-cell stage. Fresh ripe spores when treated for 5 minutes with 95 per cent alcohol, gave some germinations in a few days, but the plants developed only a few cells. Perhaps some day the method of propagation by spores may be worked out satisfactorily enough to make it commercially practical, but it still is in the experimental stage.

However, with a little care and patience, Club Mosses can be grown from cuttings. Lovers of our native evergreens should encourage this method of providing an annual supply of these attractive plants for Christmas decorations. Some might also be grown for use in glass globe gardens and Wardian cases so popular at present. Both *L. lucidulum* and *L. obscurum* would be suitable for this use. All of the native species appear from time to time in the various flower shows

in conservation and roadside plantings, and are worthy of a place in shady naturalistic fern and wild flower gardens.

*This article appeared in the October 1938 issue of "WILD FLOWER", published quarterly by The Wild Flower Preservation Society of Washington, D. C.*

*Reproduction of this historical article marks the first time we have included photographs in our newsletter.*

*Thank you . . .*

*Jane Welshmer, Jean & Pearson Stewart*

*from the new staff and the Society.*

**THE WHITE HOUSE**  
**Office of the Press Secretary**

**For Immediate Release**

**April 26, 1994**

**MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES**

**SUBJECT: Environmentally and Economically Beneficial Practices on Federally Landscaped Grounds**

The Report of the National Performance Review contains recommendations for a series of environmental actions, including one to increase environmentally and economically beneficial landscaping practices at Federal facilities and federally funded projects. Environmentally beneficial landscaping entails utilizing techniques that complement and enhance the local environment and seek to minimize the adverse effects that the landscaping will have on it. In particular, this means using regionally native plants and employing landscaping practices and technologies that conserve water and prevent pollution.

These landscaping practices should benefit the environment, as well as generate long-term cost savings for the Federal Government. For example, the use of native plants not only protects our natural heritage and provides wildlife habitat, but also can reduce fertilizer, pesticide, and irrigation demands and their associated costs because native plants are suited to the local environment and climate.

Because the Federal Government owns and landscapes large areas of land, our stewardship presents a unique opportunity to provide leadership in this area and to develop practical and cost-effective methods to preserve and protect that which has been entrusted to us. Therefore, for Federal grounds, Federal projects, and federally funded projects, I direct that agencies shall, where cost-effective and to the extent practicable:

- (a) use regionally native plants for landscaping;
- (b) design, use, or promote construction practices that minimize adverse effects on the natural habitat;
- (c) seek to prevent pollution by, among other things, reducing fertilizer and pesticide use, using integrated pest management techniques, recycling green waste, and minimizing runoff. Landscaping practices that reduce the use of toxic chemicals provide one approach for agencies to reduction goals established in Executive Order No.12856, "Federal Compliance with Right-To-Know Laws and Pollution Prevention Requirements;"

- (d) implement water-efficient practices, such as the use of mulches, efficient irrigation systems, audits to determine exact landscaping water-use needs, and recycled or reclaimed water and the selecting and siting of plants in a manner that conserves water and controls soil erosion. Landscaping practices, such as planting regionally native shade trees around buildings to reduce air conditioning demands, can also provide innovative measures to meet the energy consumption reduction goal established in Executive Order No. 12902, "Energy Efficiency and Water Conservation at Federal Facilities;" and
- (e) create outdoor demonstrations incorporating native plants, as well as pollution prevention and water conservation techniques, to promote awareness of the environmental and economic benefits of implementing this directive. Agencies are encouraged to develop other methods for sharing information on landscaping advances with interested nonfederal parties.

In order to assist agencies in implementing this directive, the Federal Environmental Executive shall:

- (a) establish an interagency working group to develop recommendations for guidance, including compliance with the requirements of the National Environmental Policy Act, 42 U.S.C. 4321, 4331-4335, and 4341-4347, and training needs to implement this directive. The recommendations are to be developed by November 1994; and
- (b) issue the guidance by April 1995. To the extent practicable, agencies shall incorporate this guidance into their landscaping programs by February 1996.

In addition, the Federal Environmental Executive shall establish annual awards to recognize outstanding landscaping efforts of agencies and individual employees. Agencies are encouraged to recognize exceptional performance in the implementation of this directive through their awards programs.

Agencies shall advise the Federal Environmental Executive by April 1996 on their progress in implementing this directive.

To enhance landscaping options and awareness, the Department of Agriculture shall conduct research on the suitability, propagation, and use of native plants for landscaping. The Department shall make available to agencies and the public the results of this research.

WILLIAM J. CLINTON

## FROM THE ENDANGERED SPECIES COALITION

### The Problem:

Over 500 plants and animals in this country alone have gone extinct since the signing of the Declaration of Independence. Our ecosystems are being so rapidly degraded that over 3,000 species are now candidates for placement on the endangered list. Unchecked logging, mining, and development will continue to spur the loss of life.

### The Facts:

- ✓ Because up to **100 species will be going extinct each day**, we must act now to halt the dramatic loss in diversity of life.
- ✓ Thousands of jobs in businesses like the salmon fishing industry depend on strong protection for endangered species.
- ✓ Like the canary in a coal mine, endangered species warn us of threats to human existence like DDT and other toxic chemicals.
- ✓ Wetlands and forests, ecosystems that purify our drinking water and filter our air, are protected when we protect the habitat of endangered species.
- ✓ Today, human-caused extinctions are occurring at up to **10,000 times the natural rate**.
- ✓ Over **40% of all pharmaceuticals** used today are derived or synthesized from natural substances.

### Our Solution:

The Endangered Species Coalition, an alliance of over 130 environmental, scientific, business, religious, and animal welfare organizations, is working to renew and strengthen the Endangered Species Act. We recognize the Act must be reauthorized to include the following:

- ✓ **Getting ahead of the extinction curve:** Provide greater protection for species when they are considered candidates and have not yet become endangered.
- ✓ **Enforcing the Law:** Ensure that sufficient funds are available to enforce the law.
- ✓ **Saving species from the brink of extinction:** Set deadlines for both producing and putting in action the plans to recover a species.

- ✓ **Saving endangered habitats and ecosystems:** Shift away from the current species-by-species focus towards a more ecologically and financially sound ecosystem approach.
- ✓ **Building partnerships with private landowners:** By providing financial incentives and technical assistance, involve private landowners and volunteers in the recovery of endangered species.

### **Opposition:**

The Endangered Species Act is being attacked by extractive industries like timber and mining interests. They are lobbying Congress to pass a watered-down version of the Act which will create loopholes for developers and add new hurdles for endangered species. Their proposals are nothing short of a loaded gun pointed at the heart of the Endangered Species Act.

### **You Can Help:**

We need your help. Call or write your *Senator/Representative* and urge them to support S. 921/H.R. 2043 and the conservation amendments. You can reach them by dialing (202) 224-3121.

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### **For more information, write:**

Endangered Species Coalition  
666 Pennsylvania Ave, SE  
Washington DC 20003  
(202) 547-9009

### **WHY WILD FLOWERS ARE DISAPPEARING**

The disappearance of 99.99% of all wild flowers has been and will continue to be due, not to picking, but to overgrazing, fires and deforestation with the resulting erosion and siltage; also to agricultural, commercial and real estate developments. This Society therefore does not favor laws to prevent picking, as they are difficult or impossible to enforce and apply only on public property. A property owner can not be prevented by law from picking, digging, or destroying native plants, or from delegating that right to another.

*The above paragraph appeared in the October 1938 issue of WILD FLOWER, a Quarterly publication of The Wild Flower Preservation Society, Washington, D.C.*

## SCHWEINITZ'S SUNFLOWER (*Helianthus schweinitzii*)

\*\*\**Editor's Note:* On our Fall 1994 outing, participants saw Schweinitz's sunflower in bloom at the Daniel Stowe Botanical Garden. Following up on the excitement generated by seeing this rare and beautiful native species, even in cultivation, the editorial staff decided to use it for our first of a continuing series of articles on the "Good Guys — Our Special Native Flora."

\*\*\*The following material was excerpted by Benson Kirkman from: US Fish & Wildlife Service. 1994. Schweinitz's Sunflower Recovery Plan. Atlanta, GA. 28 pp. [Prepared by Alan S. Weakley, NC Natural Heritage Program, Div. of Parks & Recreation, Raleigh, NC, and Richard D. Houk, Winthrop University, Rock Hill, SC. Original artwork by Julia Larke, Louisiana Natural Heritage Program.]

A full copy of the original document may be purchased from: US Fish & Wildlife Service, 5430 Grosvenor Lane, Suite 110, Bethesda, MD 20814 Telephone: 301/492-6403 or 1-800/582-3421

Current Species Status: *Helianthus schweinitzii* is [federally] listed as endangered. Thirty-five populations are known – 19 from North Carolina [NC] and 16 from South Carolina [SC]. All occurrences are centered around Charlotte, NC, and Rock Hill, SC. The objective of the Recovery Plan is reclassification to threatened, followed by delisting.

### DETAILED BIOLOGY OF THE SPECIES

Description Schweinitz's sunflower (*Helianthus schweinitzii* Torrey & Gray) was federally listed as endangered on May 7, 1991 (US Fish & Wildlife Service [Service] 1991). This species, endemic to the Piedmont of NC and SC, is endangered by the loss of historic levels of natural disturbance from fire and grazing by native herbivores, increasing residential and industrial development, mining, encroachment by exotic species, highway construction and improvement, and roadside and utility right-of-way maintenance.

Schweinitz's sunflower is a perennial species of the sunflower genus (*Helianthus* Linnaeus), a large genus of the aster family (Asteraceae), which is one of the largest and most familiar families of flowering plants. Like some other members of the genus, Schweinitz's sunflower has thickened tuberous rhizomes (resembling sweet potatoes), which store starch and are the perennating structure for the species. Generally, the species is about 2 meters in height but can be substantially shorter if young, stressed, or injured (mowed plants can flower at less than 0.5 meters) or substantially taller (plants in full sun and with little competition frequently reach 3 meters and, exceptionally, 5 meters). The stem is usually unbranched in its lower portion (unless the stem apex is injured or removed, as by mowing), but the terminal one-third of the stem (in the inflorescence) is freely branched, with the branches departing from the stem at about a 45-degree angle.

The stem is usually pubescent but can be nearly glabrous; it is often purple (Kral 1983, Radford 1968).

Heiser et al. (1969), in the most recent monograph of the genus *Helianthus*, placed *H. schweinitzii* in Section *Divaricati*, Series *Gigantei*. Its closest relatives include other members of the *Gigantei* series, such as *H. giganteus* Linnaeus, *H. maximiliani* Schrader, *H. resinosus* Small, and *H. grosseserratus* Martins. The small heads, however, make *H. schweinitzii* anomalous in the *Gigantei*. Partly as an explanation of its small heads, Heiser et al. (1969) mentioned the possibility that *H. schweinitzii* is an allohexaploid, involving *H. giganteus* and a small-headed species, such as *H. microcephalus* Torrey & Gray, a member of Section *Divaricati*, Series *Microcephali*. Anashchenko (1979) also suggested the allohexaploid nature of *H. schweinitzii*, considering it to reflect allopolyploidization between two rather

distantly related protogenomes, the "angustifolius" protogenome (two gene complements) and the "mollis" protogenome (one gene complement), but this hypothesis has not been tested. In any case, the placement of *H. schweinitzii* in established series in *Helianthus* is problematic, owing to its probable allohexaploid evolution. Based on data currently available, it would appear that the closest relatives of *H. schweinitzii* are *H. giganteus*, *H. microcephalus*, *H. smithii* Heiser, and *H. laevigatus* Torrey & Gray. Characteristics that distinguish *H. schweinitzii* from these species are given below.

The leaves [of *H. schweinitzii*] are opposite on the lower stem, changing to alternate above. Characteristically, they are borne at a right angle to the stem, with the tip often drooping. In shape, they are lanceolate, wider near their bases, but variable in size, being generally larger on the lower stem, and gradually reduced upward. Lower stem leaves average 10 to 20 centimeters (cm) long and 1.5 to 2.5 cm wide, about 5 to 10 times as long as wide. Upper stem leaves (subtending branches of the inflorescence) average about 5 cm long and 1 cm wide. Leaf margins are entire or with a few obscure serrations and are generally also somewhat revolute. The leaves are rather thick and are stiff in texture. The pubescence of the leaves is distinctive and is one of the best characters to distinguish Schweinitz's sunflower from its relatives [emphasis added]. The upper surface of the leaf is scabrous (rough), with the broad-based spinose hairs directed toward the tip of the leaf. The lower surface is more or less densely pubescent, with soft white hairs nearly obscuring the leaf surface.

Compared to most sunflowers in eastern North America, Schweinitz's sunflower has relatively small heads (as the apparent "flowers", which are actually aggregates of many small, specialized flowers, are called). The disk is 6 to 15 millimeters (mm) (0.6 to 1.5 cm) across and the disk flowers are yellow. [The ray flowers are also yellow, as expected in the genus.] The involucre bracts are narrow and acute, with their tips spreading to some degree. Toward the tip, the bracts have ciliate margins, and they are pubescent on the exposed surface. The nutlets are 3.3 to 3.5 mm long and are glabrous, with rounded tips. The pappus consists of two awns, 1 to 1.7 mm long (shorter than in most other species of the genus in the area), which usually drop from the nutlet before its maturity.

The following combination of characters separates *H. schweinitzii* from all other species of *Helianthus* in eastern North America [emphasis added]: heads small (the involucre less than 1.5 cm across), stems at least sparsely strigose or hirsute below the inflorescence, leaves sessile to short-petiolate (petiole less than 1.5 cm long, very rarely to 3 cm long), scabrous above, with dense soft white hairs below, lanceolate, broadest near base, 5 to 10 times as long as wide. *H. schweinitzii* is a distinctive species, with a unique combination of characteristics, and its taxonomic validity is unquestionable. *Helianthus* is a fairly difficult genus, however, and misidentifications or confusion involving *H. schweinitzii* and some other members of the genus have occurred. [Table I. (see page 14) is derived from the original text and summarizes key characters for *H. schweinitzii* versus the most similar species.]

In surveying for *H. schweinitzii* during its blooming period (September through October), one will encounter other genera in the aster family with yellow flowers superficially resembling a sunflower. In addition to technical characters, they may be distinguished in the following ways (useful even at a distance and from a moving car): (1) Species of *Bidens* and *Coreopsis* occurring in the range of *H. schweinitzii* all have lobed or divided leaves; (2) *Bidens aristosa* (Michaux) Britton is frequently seen, but occupies wetter sites (occurring in roadside ditches or wet pastures than *H. schweinitzii* and has a shorter and bushier habit (rarely more than a meter tall); (3) *Coreopsis major* Walter occurs in similar sites but is a smaller plant, less than a meter tall, and has the leaves opposite, with each leaf divided into three leaflets (looking like a whorl of six leaves); (4) Yellow-flowered *Verbesina* are of similar height but occur in denser stands in more mesic sites, lack the open branching in the inflorescences, have flowers of a richer yellow (the color of egg yolks), and winged stems.

#### Distribution and Recovery Criteria

Schweinitz's sunflower is presently believed to occur only in the lower Piedmont of south-central NC and north-central SC. The currently recognized range centers around Charlotte, NC; all extant populations are within a radius of about 100 kilometers (60 miles) of that city. Excluding erroneous or dubious records, the known county distribution is Montgomery, Rowan, Stanly, Cabarrus, Mecklenburg, Davidson, and Union counties, NC, and York County, SC.

*Helianthus schweinitzii* will be considered for reclassification from endangered to threatened when 10 geographically distinct, self-sustaining populations are protected in at least 4 counties in NC and one county in SC; managers have been designated for each population; management plans have been developed and implemented; and the populations have been maintained for 5 years. Furthermore, at least 7 of these populations must be in natural habitats, in permanent conservation ownership and management. Delisting the species will be considered when at least 15 geographically distinct, self-sustaining populations are protected in at least four counties in NC and one county in SC; management plans have been implemented; populations (as measured by number of adult plants) have been stable or increasing for 10 years; and permanent conservation ownership and management



**TABLE 1. Key Characters for Distinguishing *H. schweinitzii* from Similar Species**

Species	Head Size	Leaf Size	Leaf Shape	Leaf Surface	Stems	Roots	Petiole	Disk/Flower Color
<i>H. schweinitzii</i> Torrey and Gray	Small involucre <1.5cm wide	1.0-2.5 cm wide 5 to 10 times as long as wide	Lanceolate	Strongly scabrous above; densely pubescent beneath, w/soft white hairs	Strigose	Rhizome w/ cluster of tuberous roots	Sessile to short petiolate 1.5 cm long	Always yellow
<i>H. laevigatus</i> Torrey and Gray	Similar	Similar	Similar	Slightly scabrous above; nearly glabrous beneath	Smooth	Short rhizome		
<i>H. microcephalus</i> Torrey and Gray		2-6 cm wide	Broadly lanceolate		Smooth & glaucous	Long rhizome	1-3 cm long	
<i>H. smithii</i> Heiser	Similar	Similar	Similar	Glabrous or sparsely pubescent beneath	Glabrous & glaucous	No tuberous - thickened roots	Similar	
<i>H. angustifolius</i> Linnaeus	1.5 to 2 cm wide	Narrow 1 cm wide 10 to 30 times as long as wide						Normally red; rarely yellow
<i>H. glaucophyllus</i> D.M. Smith				Glabrous & glaucous beneath; lack resin dots				
<i>H. divaricatus</i> Linnaeus		1-8 cm wide; 3 to 6 times as long as wide	Broadly lanceolate	Scabrous above & sparsely pubescent beneath	Smooth			
Other <i>Helianthus</i>	Larger >1.5 wide							

of at least 10 populations is assured by legally binding instruments.

#### Habitat

Schweinitz's sunflower is documented to occur only in a relatively small area approximately centered around Charlotte, NC. The geology and soils of this area appear to be an important determining factor in the occurrence of Schweinitz's sunflower.

Two main geologic belts cross the area of occurrence of *H. schweinitzii* – the Charlotte Belt and the Carolina Slate Belt. The Charlotte Belt, the more western of the two belts, consists largely of intrusive igneous rocks, ranging widely in age and composition (from granite to gabbro). Most of the occurrences of Schweinitz's sunflower in the Charlotte Belt are on mafic plutons. The Carolina Slate Belt consists of sedimentary and volcanic rocks to Cambrian age that have been mildly deformed and metamorphosed. This belt is also geologically complex, containing a variety of ages and compositions of rocks. Although *H. schweinitzii* substrates in the Carolina Slate Belt are primarily mafic rocks (of either volcanic, plutonic or sedimentary origin), the species also appears to occur on intermediate and even felsic rocks.

A unifying characteristic of all these rock types is that they are highly weatherable, generally contain low amounts of resistant minerals such as quartz, and generally weather to fine-textured soils occurring in a landscape of subdued topography. Schweinitz's sunflower appears to be notably absent from granite, metamorphosed granite, metamorphosed quartz diorite, quartzite, and other granitic rocks present in some abundance in parts of most of the counties in the species' range.

Though it is found primarily on soils derived from mafic rocks, *H. schweinitzii* apparently also occurs on soils derived from intermediate or felsic rocks. The main unifying factors in all the soils appears to be that they are thin, occur on upland interstream flats or gentle slopes, are clayey in texture (and often also with substantial rock fragments), and (because of their topographic position and texture) vary over the course of the year from very wet to very dry.

This set of conditions makes these soils (and sites) poor for agricultural use. Schweinitz's sunflower's preference for these poor soils has probably helped it, over the past two centuries, to survive the general conversion of the landscape of the Carolina Piedmont to agricultural uses and subsequently to urban and suburban uses. Thus, Schweinitz's sunflower has not been as severely affected as it might have been.

This same set of soil conditions also has a bearing on the likely natural habitat of *H. schweinitzii*. Many early accounts of the Charlotte area described open prairies and blackjack oak-post oak savannas and woodlands (Service 1991, Nelson 1992). Following the settling of the area by Europeans, historical accounts referred to the increasing amount of dense forest and brush. It is almost certain that fire was the primary force that maintained the openness of the prairies and oak savannas found in the Charlotte area in the eighteenth century and earlier. The primary ignition source for the fires was probably lightning, striking upland areas during summer and fall droughts. In much of the Charlotte Belt and parts of the Carolina Slate Belt, the nature of the underlying rock has resulted in the weather-

ing of a landscape consisting of very broad upland flats. In other words, the "natural fire compartments" would have been relatively large, in some cases up to 20 to 30 square kilometers uninterrupted by stream valleys that would serve as "fire-breaks." Under conditions in which fires could have been ignited by lightning strikes, fires would likely have burned over these fairly extensive areas, and could also have jumped to other "fire compartments."

Native Americans living in the area probably used fire as a land management and hunting tool, and they may have significantly augmented the natural fire frequency in the area. Grazing by native herbivores may also have played a role in maintaining the open structure of the plant communities. Historical accounts refer to bison and elk grazing in the Charlotte area (Service 1991).

Because the soils [associated with the species] also present difficulties for the rapid and dense growth of vegetation, they have tended to remain somewhat sparsely vegetated, even in the absence of forces which naturally operated to keep them open, such as fire and grazing. Probably the single most important habitat characteristic of Schweinitz's sunflower is its need for protection from shade and excessive competition from other vegetation. With fire operating in the landscape to maintain open and semi-open habitats, it is possible that Schweinitz's sunflower had a wider ecological amplitude than is apparent to us in the modern landscape. In other words, the remnant sites in which the species now occurs may not be representative of the full range of situations in which it would have occurred 200 years ago. In addition to the difficult sites in which it has been able to persist in the absence of fire, Schweinitz's sunflower may formerly have occupied sites with moister, more fertile, and loamier soils that are more hospitable to plant growth.

Schweinitz's sunflower is associated with a variety of plants, some also rare or uncommon, some with affinities to glade and prairie habitats of the Midwest, some associated with fire-maintained sandhills and savannas of the Coastal Plain, and other generalist species also found in wooded situations of the Piedmont. The habitat of *H. schweinitzii* tends to be dominated by members of the families Asteraceae, Fabaceae, and Poaceae, an association emphasizing affinities of the habitat to both longleaf pine-dominated sandhills and savannas of the Southeastern Coastal Plain and to glades, barrens and prairies of the Midwest and Plains. In the few sites where Schweinitz's sunflower occurs in relatively natural vegetation, the natural community would be considered a Xeric Hardpan Forest [as described by] Schafale and Weakley (1990).

### Life History/Ecology

Limited information is currently available on the life history or species biology of Schweinitz's sunflower. It is a long-lived perennial, with individuals probably living for decades. The species blooms from late August to frost. The relative importance of sexual (by seed) and asexual (by rhizome) reproduction is not known in this species. From observations, it seems that populations are generally fairly stable in numbers and area, as would be expected of a species with a conservative strategy.

The fact that most extant populations are on road rights-of-way might lead one

to conclude that the species is weedy; i.e., able to colonize new sites through mobile seeds. Nearly 10 years of careful observations of populations by staff of the NC Natural Heritage Program (many populations visited yearly for that period) indicate, however, that populations do not spread under the generally prevailing conditions. Most newly discovered populations appear to be well-established and are old; they were simply unknown. There is some recent information that suggests that Schweinitz's sunflower can colonize recently disturbed ground immediately adjacent to an existing population, but this requires confirmation.

Schweinitz's sunflower produces viable seeds, which germinate readily in a greenhouse. There appears to be no dormancy requirement, and stratification is not necessary. Under greenhouse or nursery conditions, a flowering plant of 1 to 2 meters in height can be raised from seed within a year. Plants do best in full sun and, where shaded to a significant degree, seem to lose vigor, though they can persist for many years in partial shade. They also appear to be detrimentally affected by growing in dense competing vegetation, even if the other vegetation does not shade them. The mechanism [involved here] would presumably be root competition for scarce and limiting resources, such as water and nutrients. The largest plants of this species seen (about 5 meters tall) were in full sun on a south-facing railroad embankment with bare clay soil and essentially no competing vegetation.

Seedling establishment has not yet been studied under field conditions. While it is difficult to determine how significant the results of [ongoing] experiments are, it appears that reintroduction efforts involving transplantation may not be easy and may require more than ordinary efforts to assure their success. Seedlings appear to grow very slowly under at least some natural field conditions.

Schweinitz's sunflower can also be propagated from pieces of the tubers. New plants readily sprout from entire or partial tubers.

### Threats and Conservation Measures

The reasons for listing Schweinitz's sunflower [as endangered] were carefully enumerated by the Service (1991). They include habitat destruction, curtailment of range, loss of known populations, fire suppression and alteration of native habitat, highway right-of-way maintenance, urbanization and suburbanization of the area of occurrence of the species, inadequacy of existing protection afforded by State laws, small population size, and lack of formal protection for all but a few of the known populations.

Schweinitz's sunflower has been afforded endangered status by both the Service and the NC Department of Agriculture's Plant Conservation Program (Sutter 1990, Weakley 1991). However, such listing, in and of itself, provides only limited protection to the species. For instance, neither Federal nor NC law protects the species from destruction by the landowner himself. Moreover, Schweinitz's sunflower does not occur in a static habitat that can be left alone; it requires active management to maintain optimal habitat.

Despite its listing, *H. schweinitzii* continues to be detrimentally affected by a variety of forces. The Charlotte metropolitan area continues to grow at a rapid rate, and more and more of the habitat of *H. schweinitzii* is being converted to sub-

urban and urban uses. Several populations have been bulldozed in recent years for road improvements, pasture development, and clearing for building sites. At least one NC population has apparently succumbed in the last few years to a lack of management, being shaded out under a power line by various shrubs, including non-native and aggressive weed species such as *Ligustrum sinense* (privet). In addition to the direct impacts of urban and suburban development, future management of populations of *H. schweinitzii* by fire (likely the management tool of choice) is made more difficult (or even impossible) by the proximity of developed land and/or roads because of fire safety and smoke dispersion regulations.

Most of the remaining populations are on highway rights-of-way, in both NC and SC. While mowing serves to maintain the open habitat needed for the sunflower, mowing at certain seasons can limit seed production and thus, the potential reproduction and recovery of the species. For instance, in 1991 nearly all SC populations were mowed in August or September, severely limiting seed production because the mowed plants did not flower or fruit. Most populations were mowed again in early August of 1992, [making seed production doubtful].

In NC, one population and a portion of another are on land managed by The Nature Conservancy. A management agreement with private landowners at Gar Creek, Mecklenburg County, provides limited protection for one population. The long-term protection of this population is not, however, assured.

In SC, no populations have formal protected status. One population is subject to an informal management agreement whereby Duke Power has agreed to mow a power line right-of-way only after frost, in order to allow flowering and fruiting of *H. schweinitzii*.

The NC Botanical Garden plans to collect seeds from all NC populations of *H. schweinitzii*, following the Center for Plant Conservation's guidelines for ex situ conservation of genetic material (Rob Gardner, NC Botanical Garden, personal communication, 1992). If, as seems likely, currently extant populations of *H. schweinitzii* are extirpated in the future, propagules gathered and stored could be used to reintroduce the species to sites where it has been extirpated. Although such a method of conservation of the species is not ideal, it serves as a prudent backstop for a highly vulnerable species such as Schweinitz's sunflower.

#### Literature Cited

- Anachchenko, A. V. 1979. Phylogenetic relationships within *Helianthus* L. Trudy po Prikladnoi Botanike, Genetike i Selektivii 64 (2):146-156. (Only the English summary consulted.)
- Heiser, C. B., Jr., D. M. Smith, S. B. Clevenger, and W. C. Marting, Jr. 1969. The North American Sunflowers (*Helianthus*). Mem. Torrey Bot. Club 22 (3):1-218.
- Kral, R. 1983. A report on some rare, threatened, or endangered forest-related vascular plants of the South. US Forest Service, Southern Region Tech. Publication R8-TP 2.
- Nelson, J. 1992. The vanishing blackjacks. South Carolina Wildlife 39(2):34-39.
- Radford, A. E., H. E. Ahles, and C. R. Bell. 1968. Manual of the vascular flora of

the Carolinas. Univ. of NC Press, Chapel Hill, NC. 1,183 pp.

Schafale, M. P., and A. S. Weakley. 1990. Classification of the natural communities of North Carolina, third approximation. NC Natural Heritage Program, Raleigh, NC. 325 pp.

Sutter, R. D. 1990. List of North Carolina's endangered, threatened, and candidate plant species. Plant Conservation Program, NC Department of Agriculture, Raleigh, NC.

US Fish and Wildlife Service. 1991. Endangered and threatened wildlife and plants; determination of *Helianthus schweinitzii* (Schweinitz's sunflower) to be an endangered species. Federal Register 56(88):21087-21091.

Weakley, A. S. 1991. Natural Heritage Program list of the rare plant species of North Carolina. NC Natural Heritage Program, Raleigh, NC. 69 pp.

[Numerous personal communication references listed in the original document were deleted. Refer to that document for a complete listing.]

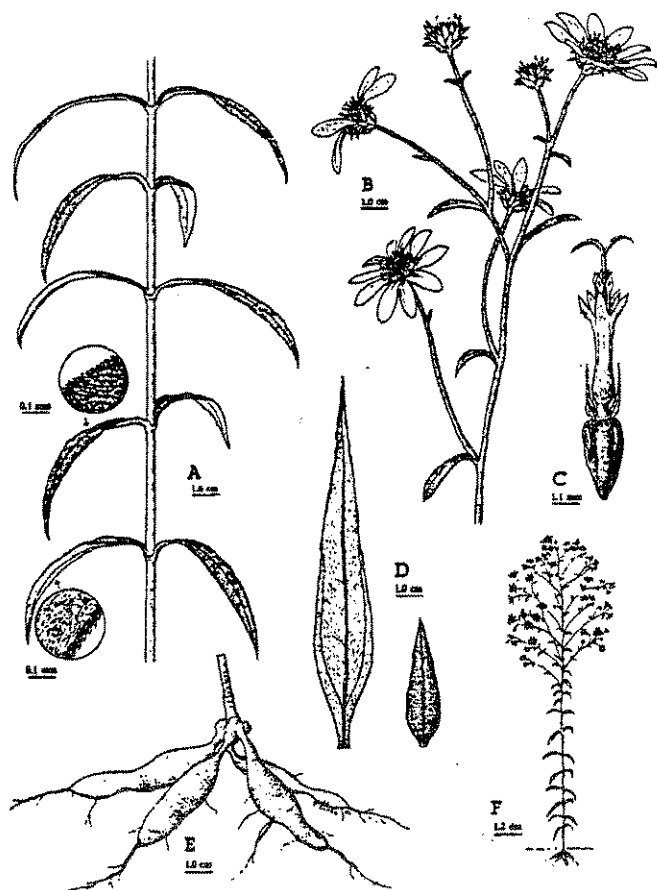


FIGURE 1. *Helianthus schweinitzii* detail by Julia Larke. (A) Stem and lower leaf ; (B) inflorescence; (C) disk flower; (D) leaf shapes; (E) tuberous rhizomes and roots; (F) plant in fruit.

*"What a trip to Heaven . . . and we didn't have to die to get there!"*

## A FIRST-TIMER'S NOTES ON THE NCWFPS SPRING MEETING April 23 & 24, 1994, Uwharrie Mountains

*reported by Alice Zawadzki*

I learned of the NC Wild Flower Preservation Society in the early spring of 94 on a Triangle Land Conservancy walk at the White Pines Natural Area. Benson Kirkman was the leader, and he introduced himself as the current president and chatted with me about the society's activities. "Bingo!" I found the group I had been searching for. He mentioned the spring and fall meetings. "Sign me up," I said, "I want to be a lifetime member. What a deal!"

In a few weeks my friend Evelyn Caldwell and I were in the lobby of the Days Inn in Asheboro at our first NCWFPS outing, amid friendly people, maps, and insect repellent. After a few minutes of instructions, we sorted ourselves into carpools and were off for our adventure.

Two things happened the first morning that told me I was with the right group of people for me. As we walked into Black Ankle Bog Preserve, we came upon a rut in the road under the power line. One exuberant lady got down on the ground to ooh and aah at a huge string of frog eggs. She got out a hand lens and filled us in on the thrills. A few minutes later, another lady said her friend's trip would be a success because she had seen her personal favorite, bluets.

I had found a wonderful new family for myself, loving people who loved the cosmos in all its beauty. During the day people called to me: "Alice, come see this." "Come down here for a wonderful view of the cross vine." "You'll appreciate this spider web." People were so patient. Such good teachers. So knowledgeable. I was touched by the warm welcome and enthusiasm.

Harry LeGrand introduced us to the Black Ankle Bog Preserve in his own special style. On our way in, we saw lycopodium, cinnamon fern, shadbush, highbush blueberry, and royal fern. Harry took us to a magnificent display of purple pitcher plant (*Sarracenia purpurea*) and incredible yellow pitcher plants (*S. flava*). We looked at greater coreopsis (*Coreopsis major*) with its opposite leaves divided in three, pink sundew (*Drosera capillaris* or was it *D. brevifolia*?), whorled coreopsis (*Coreopsis verticillata*) with its fine leafed foliage, mountain witch-alder (*Fothergilla major*), dwarf locust (*Robinia* sp.), blaspheme-vine (*Smilax laurifolia*), huckleberry (*Gaylussacia* sp.), netted chain fern with its alternate "leaflets," Southern lady fern, and winterberry. Close by a seepage source we found the federally listed bog spicebush (*Lindera subcoriacea*). As we rested under the powerline we were blessed with the delicate flight of an American painted lady butterfly. Harry also explained the positive effects of a controlled burn on part of the area on April 8, 1994.

Upland chorus frogs serenaded us on our way out of this enchanting place. Along the trail we saw flypoison, trailing blackberry, shortleaf pine, Virginia pine, bird's-foot violets, a wonderful scarlet tanager, poison ivy in bloom, dwarf iris, pussy toes (*Antennaria plantaginifolia*), cinguefoil, oxalis, toadflax, and wild geraniums.

ums.

After a brief stop in Troy, our car got separated from the others. Thank goodness for the detailed trip map! Finally, Morrow Mountain State Park greeted us with mountain laurel in gorgeous bloom.

Ranger Wade Stubbs, Tom Howard, and Benson Kirkman joined us as we traded groups for the afternoon excursion in the park. We first shuttled to a rich area along Mountain Creek. We heard wonderful stories about the intimate lives of the Jack-and-Jill-in-the-pulpits from Tom. I learned that Jill usually has two leaves, and it is death to the fungus gnat who visits Jill (as her pollinator). We saw wild comfrey, star of Bethlehem, ebony spleenwort, Christmas fern, meadow rue, Atamasco lilies, painted buckeye, green and gold, bloodroot, and foamflower. The fragrance of the storax blossoms was heavenly.

Then came Tom's explanation of how to tell the difference between bluets and "bluettas." The male bluet corolla tube is very narrow with a trumpet flare in the top quarter with the anthers inside and never outside the flower. The bluetta on the other hand has a shorter tube that is wider and straight up without the vee shape on top. Her stigma extends out the top beyond the flat corolla.

We saw monkshood (*Aconitum uncinatum*), with its elongated backward toe, and felt the retrospers of the bedstraw (*Galium* sp.), used to stuff mattresses in colonial times. The chocolate smell of the crossvine (*Bignonia capreolata*) blooms was fabulous.

Wade took us to a rock wall that may have been used to make a pond a hundred years ago to grow rice. We saw the fertile frond of Adder's tongue (*Ophioglossum*) and learned about the tiny gland at the base of the tree of heaven leaf. We watched water striders on the creek at the park boundary and gazed at the mountain laurel covered bluff across the creek. The combination of the sights and the sounds was wonderful. We talked about the chalk maple (*Acer leucoderme*) with its chalky colored bark and the high pH tolerance of sparkleberry (*Vaccinium arboreum*) versus other vacciniums. Benson gave us the paratroopers analogy to remember the parachute shape of the deerberry (*Vaccinium stamineum*) flowers.

We then shuttled to Biles Mountain. As we started our hike we saw the funny ghost moth with its dark eyelashes and white feet. We walked the Xeric Hardpan Forest with its high pH, highly compacted soil, and exposed boulders. Root systems are shallow with no taproot here. We saw post oak, blackjack oak, the very shaggy bark of Carolina shagbark hickory (*Carya carolinae-septentrionalis*), and waves of beautiful northern oatgrass (*Danthonia spicata*). We saw the browse line of deer with everything down below the line eaten off. The beautiful understory of chalk maple and African parkland atmosphere were striking.

We came upon wonderful rocks that looked like fossilized porpoises lined up side by side. Benson showed us the habitat for the crested coralroot orchid (*Hexalectris spicata*) first discovered in the park in 1991. Its gorgeous flowers appear in July, but finding it is difficult, even when you know where to look.

On the summit, we viewed at a distance the Upland Depression Swamp Forest dominated by willow oaks as Benson explained that it was prime seed tick habitat. He recalled how Ed Swab and Mike Baranski got their ankles peppered with ticks



when they ventured into the depression in 1991. We observed a deer stand just outside the park boundary overlooking the depression. As we learned about the significance of these important natural communities, we all appreciated the need for funding to purchase and manage these areas for the park.

Starting back down the mountain, we observed the fringe tree (*Chionanthus virginicus*), Georgia hackberry (*Celtis tenuifolia*), and turpentine root (*Aristolochia serpentaria*). At a cluster of magnificent huge boulders we found woolly lip fern (*Cheilanthes tomentosa*), with its lovely grayish sheen, and resurrection fern (*Polypodium polypodioides*). Along an old roadbed with exposed subsoils of poorer quality, we observed masses of crustose lichens. These Uwharrie Mountains, the oldest mountains in North Carolina, formed millions of years ago, are home to many precious treasures.

On our way back to Asheboro we passed a spectacular patch of native pink dogwood on Highway 49 near Tot Hill Farm Road. Back at the motel, we were treated to dinner and a wonderful slide show by Eric Hawkins and his narrator Craig Moretz. Retiring president Benson Kirkman announced the new officers and trustees, passing the reins to incoming president Bob Tuggle. Bob's election means that the society is annexing a small portion of Virginia for North Carolina.

On Sunday morning we convoyed as one entire group, complete with flagging on people's cars and a different color on the last car to denote the tail of the caravan. We visited a heartleaf plantain (*Plantago chordata*) site in a slate-bottomed creek on Slate Mine Road. The maroon flower stalks were fascinating close-up.

On Route 109 near Blaine, we came upon a gorgeous display of Atamasco lilies. Road 555 had a marvelous collection of foamflower and dwarf larkspur (*Delphinium tricorne*) amid the slate outcrops. We explored the magnificent slopes along the Uwharrie River as our grand finale. In the very rich, higher pH soils we found cliff stonecrop (*Sedum glaucophyllum*), creeping phlox (*Phlox stolonifera*) common in the Smokies, the great smell of sweet shrub (*Calycanthus floridus*), the wonderfully delicate divided leaf of sweet cicely (*Osmorhiza longistylis*) which looked a lot like toothwort, divided toothwort (*Cardamine dissecta* = *C. multifida*), green dragon (*Arisaema draconitum*), and dwarf larkspur that looked like friendly purple gnomes. I tried the stinging nettle and "Ow!" it did hurt. Here we again saw Adder's tongue and several species of bedstraw. This slope was so verdant: rattlesnake fern, the dimple of Southern (or dimpled) trout lily (*Erythronium umbilicatum*) fruit, may apples, hepatica foliage, buttercups, galls on hickory trees, saxifrage, woodland stonecrop (*Sedum ternatum*) sprinkled like pepper next to the rocks, witches broom, loblolly pine, early meadow rue (*Thalictrum dioicum*) that looked so much like northern maidenhair fern, ghost pipes (*Orobancha uniflora*) with singular flowers and a light hint of purple, cancer root, starflower, lousewort, snake vetch, green-headed coneflower (*Rudbeckia laciniata*), golden Alexander, hairy jointed meadow parsnip, hispid buttercup, wild lettuce, alumroot, and crossvines in the trees.

Our first outing with the NCWFPS ended too quickly. As Evelyn and I drove back to Raleigh, our minds soared with memories of this wonderful weekend in paradise. Out of my mouth tumbled: "What a trip to heaven, and we didn't have to die to get there."

## 1994 ENPA MEETING

*by Benson Kirkman*

Benson Kirkman and Kirk Kirkman represented the N.C. Wild Flower Preservation Society (WFS) at the 1994 Annual Meeting of the Eastern Native Plant Alliance (ENPA), of which the WFS is a constituent member. This year's meeting was hosted by Winterthur Museum and Gardens near Wilmington, Delaware, on August 26-27, 1994. The theme of the meeting was "Landscape Planning, Restoration, and Management," and the discussions paralleled topics regularly discussed at local WFS meetings.

Both natural and cultivated (man-altered) landscapes were dissected and reconstructed in the sessions and on field trips. One session dealt with "The use of meadows as landscape options in eastern North America." Participants split into groups and explored issues such as use of regionally native species (and sources), public education programs, the impacts of various approaches to maintaining regional biodiversity, problems with invasive exotic species (plant and animal), and defining "regionally native or appropriate."

An ENPA position paper on "Invasive Exotic Plant Species" is being drafted by John Ambrose, Curator of Botany at the Metropolitan Toronto Zoo, with input from members of ENPA. The paper is an attempt to define in summary and understandable terms the multitude of issues involved in this broad topic. The final draft will be available for a future WFS Newsletter and should represent much of the philosophy and mission of ENPA. Quoting from the current draft:

"Natural adaptations to local conditions have led to the great biological diversity of the Earth. The spread of exotic species into new habitats around the world has greatly accelerated the natural phenomenon of long distance dispersal. This accelerated state of global dispersal through inadvertent human activities and intentional introductions is overwhelming the ability of natural ecosystems to absorb new immigrants. The results are the breakdown of biogeographically distinct floras, including genetic variants of the same species that reflect minor biophysical differences in different bioregions."

In the business sessions, the duties of Mary Pockman, who served as coordinator for ENPA, and Benson Kirkman, who served as treasurer, were transferred to Wilbur Rittenhouse of the Adkins Arboretum. Wilbur and the Adkins Arboretum will perform the business functions of ENPA. Mary Pockman has retired from the ENPA Steering Committee after years of dedicated service in the founding and maintainance of ENPA. Benson will continue on the steering committee as back-up signatory and a resource for financial policies. In addition, he was asked by the steering committee to draft by-laws for ENPA, so that the organization could apply for nonprofit status with IRS.

All participants in the meeting left feeling that the need for and benefit of ENPA were both escalating. The restructured ENPA Steering Committee and the transfer of duties to Wilbur Rittenhouse should also help the effectiveness of the

organization. Communication among the members (networking) and education of the public will continue to be major goals.

The 1995 ENPA Annual Meeting will be hosted by the Louisiana Native Plant Society (John Mayronne of the ENPA Steering Committee) in Baton Rouge, Louisiana, on June 1-4. Benson Kirkman is currently planning to attend; other members of the WFS are also encouraged to attend. [For more information on ENPA or the ENPA meetings, contact Benson Kirkman.]

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## **SPRING 1995 DEADLINE AND EDITORIAL NOTE**

Deadline for submission for the Spring 1995 WFS Newsletter is February 20, 1995. All members or readers are encouraged to submit articles or suggest topics or authors for articles.

Authors are asked to submit typed (preferred) articles with a copy on computer disk (DOS = IBM compatible preferred) if possible but not required. Illustrations for articles or as stand alone material are encouraged. All material submitted may be subject to some editing. The editorial staff will notify authors of any substantive changes prior to printing. Unfortunately, we cannot guarantee that everything submitted will be printed. some material may also be held for a future newsletter.

Send materials for the WFS Newsletter to:

Ken Perkins, 268 Purcell Road, Reidsville, NC 27320-8401

The Editorial Staff apologizes for the delays in publishing this newsletter. The "retirement" of our previous staff, Jane Welshmer and Jean Stewart, and the recruitment of and transition to an entirely new staff took additional time. In addition, the transition to all computer entry for the graphics setup and other changes also required additional time. Hopefully, these changes will eventually increase our efficiency and reduce our printing costs.

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## **NOTES ON OUR NEW CONTINUING SERIES OF ARTICLES**

At the suggestion of society members, the editorial staff has started what we hope will be continuing series in the newsletters.

1. "The Good Guys," a series on our special native flora, starting with Schweinitz's sunflower.
2. "The Bad Guys," a series on noxious, invasive exotics, starting with tropical soda apple.
3. "Native Plant Gardens & Natural Gardens," a spinoff on an idea from the past for a special issue devoted to places to view and learn our native flora. This series will begin with the spring issue.

## UPCOMING EVENTS

### **SPRING 1995 MEETING – MAY 20-21 CHIMNEY ROCK PARK, BAT CAVE, AND HICKORY NUT GORGE**

Those who attended our fall 1990 outing at these locations will remember the spectacular beauty of the area and wonderful leadership of Elisabeth Feil, Simon Thompson, and Millie Blaha. Good news! We are returning for a late spring visit to enjoy a different season in this scenic and florific area! Hopefully, we will be even have supper on the mountain again. Watch for more details in the Spring WFS Newsletter.

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### **REID GARDEN WORKSHOPS AND TOURS OFFERED BY THE TRIANGLE LAND CONSERVANCY**

Margaret Reid's sensational native plant rescue garden in Raleigh will again be open for workshops and tours this spring. Leaders for the workshops, which include tips on rescuing, propagating, nurturing, and designing with our native flora, will include Benson Kirkman (Ph.D. in Ornamental Horticulture and Plant Ecology), Beverly Norwood (landscape architect), and Amy Mackintosh (landscape architect). Low maintenance gardening and ecological landscaping will be featured topics. Plants from the Reid Garden will be offered for sale.

Fee: \$6.00 for TLC members; \$8.00 for nonmembers.

Dates: February 26, March 11, March 19, April 1.

All workshops begin at 2:00 PM and last about two hours.

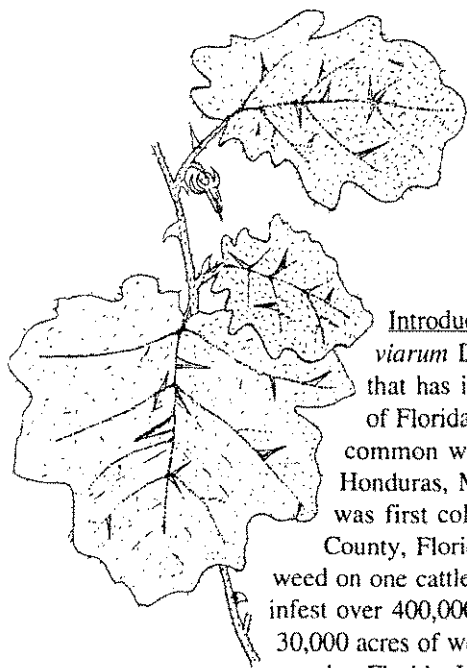
To register: Call Benson Kirkman at 919-859-1187.

All proceeds go to the Willis Alton and Margaret Baker Reid Stewardship Endowment for maintenance of the garden and funding of an internship attached to the garden.

Special group tours or workshops may be arranged. Volunteers get free tours and free plants by helping with the maintenance of the garden. Additional workshop leaders are also needed. Contact Benson Kirkman for more information.

## TROPICAL SODA APPLE - A SERIOUS NEW WEED FROM BRAZIL THAT THREATENS NORTH CAROLINA

Randy G. Westbrooks and  
Rebecca M. Westbrooks'  
Whiteville, North Carolina



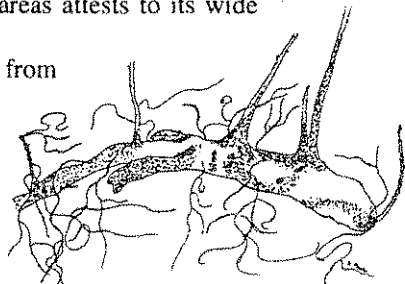
**Introduction.** Tropical soda apple (*Solanum viarum* Dunal) (TSA) is a new perennial weed that has invaded pasture land and natural areas of Florida. TSA is native to Brazil, but is now a common weed in other parts of South America, Honduras, Mexico, the West Indies, and India. It was first collected in the United States in Glades County, Florida in 1988, and had become a serious weed on one cattle ranch by 1990. It is now estimated to infest over 400,000 acres of improved pastures and over 30,000 acres of woodlands in 26 countries in central and souther Florida. In the past three years, it has also begun

to appear in croplands, state parks, citrus groves, and sugarcane fields, and is moving northward. The University of Florida has estimated losses to the Florida cattle industry to now be over \$10 million per year (1% of gross revenues). TSA is being spread in Florida by wild animals and livestock that eat the fruit, and by movement of contaminated articles such as hay and sod.



**Biology of Tropical Soda Apple.** TSA is a nightshade and thus a member of the tomato family (Solanaceae). This particular species is characterized by extensive and massive prickles over the entire aerial surface of the plant. Unlike most other nightshades, TSA forms thick, impenetrable strands that severely reduce the carrying capacity of pasture land. In addition, TSA is an alternate host for gemini virus, which is a major pest of solanaceous crops such as tomatoes and peppers. TSA grows well in sun or shade, but seems to prefer semi-disturbed areas. However, its appearance also in natural areas attests to its wide ecological amplitude.

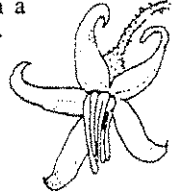
In Florida, TSA grows as a perennial from massive rootstocks. However, it is also a very prolific seed producer with germination rates up to 75% (most nightshades have germination rates of about 10%). Seedling emergence occurs primarily from October to May with new plants coming





from seeds or roots. At maturity, TSA grows 3-6 feet tall, and produces hundreds of fruits, with up to 400 seeds per fruit.

**Diagnostic Features.** TSA has typical nightshade leaves and flowers, and is therefore sometimes confused with Carolina horse nettle (*Solanum carolinense* L.). However, the most unique feature of TSA is the dark green lines that form a cross hatch pattern on the skin of the immature fruit. On the other hand, Carolina horse nettle has straight lines that radiate from the apex of the fruit. The watermelon like appearance of the immature fruit is a signature feature that clearly distinguishes TSA from all other species in the genus.



**Movement of Tropical Soda Apple by Animals and Humans.** Localized spread of TSA into natural areas in Florida is mostly by wildlife such as raccoon, deer, and feral hogs that feed on the fruit. However, beef cattle also consume the fruit and are mainly responsible for the spread of the plant throughout the southern peninsula of Florida. Hay and sod from infested pastures are also prime vectors of the plant, as evidenced by the appearance of TSA along roadsides in south Florida where sod is often planted instead of grass seeds. The appearance of TSA in oak hammocks, cypress heads and other natural areas is of prime concern to conservation groups in Florida because it is seen as another threat to the biodiversity of natural ecosystems that are already being overwhelmed by hundreds of exotic species. In addition, these areas serve as a source of seeds for wildlife and cattle to reinfest improved pastures and cultivated fields where TSA is being controlled.

**Movement of Tropical Soda Apple to Other States.** According to Animal Health Certificates provided by the Florida Division of Animal Industry, during 1993, a total of 125,791 cattle were exported from the 26 TSA infested counties in Florida, to 144 counties in 11 other states. States involved include Alabama (10,712 cattle), Georgia (9,219), Illinois (671), Indiana (2,165), Kansas (29,015), Kentucky (1,153), Louisiana (218), Mississippi (14,353), Missouri (2,860), Oklahoma (36,297), and Tennessee (2,041).

Infestations that have been confirmed in other states include 10 sites in six counties in Mississippi (eight extant), and three infestations in three counties in Georgia. In all cases but one, the infestations have been tied directly to cattle that originated in Florida. Counties with extant infestations in Mississippi include Forrest, Lamar, Pearl River, and Stone. Infested counties in Georgia include Bacon, Baker and Appling. Currently, federal and state officials are conducting a survey at all cattle farms in Mississippi that were listed as having received cattle from TSA infested counties in Florida during 1993.

The 80-acre infestation in Baker County, Georgia, apparently resulted from cattle that were purchased at a livestock market in Thomas County, Georgia. Already this fall, the farmer has manually removed two truckloads of TSA plants from the pasture and plans to burn them in a pit. The 40-acre infestation in Bacon County,

Georgia, resulted from manure that was spread on the field from a meat packing house on the same property. The most recent report is a 100-acre infestation on a dairy farm in Appling County, GA, that is now being investigated. Currently, state and federal officials are developing plans for a cooperative survey to detect other infestations of the plant in Georgia as well.

Is Tropical Soda Apple in the Carolinas? So far, TSA has not been detected anywhere in the Carolinas. One reason for this is that North and South Carolina are brucellosis free and do not allow the importation of cattle from states such as Florida that are infested with the disease. However, trucking companies that transport cattle from infested counties in Florida could accidentally introduce TSA while passing through the Carolinas enroute to other states (by cleaning manure from their trailers at truck stops, etc.).

Research on Biology and Control of Tropical Soda Apple in the United States.

The main coordinator of research on TSA in the United States is Dr. Jeff Mullahey, a range specialist with the Southwest Research and Education Center, IFAS, University of Florida at Immokalee<sup>2</sup>. Jeff's work has concentrated on the biology of the plant and developing practical methods for control of the plant under field conditions in south Florida. He currently recommends application of 1 qt. of Remedy (triclopyr; a broadleaf herbicide) in 40 gallons of water to control actively growing seedlings that are 16-24 inches tall. Mowing is recommended for mature plants that are 3-6 feet tall. If the plants are sprayed too early, new seedlings will emerge as the sprayed plants are dying. Initial broadcast treatments must be followed up with spot treatments to prevent further reproduction and to eventually exhaust the seedbank in the soil. Herbicides that have given acceptable control with spot treatments include Weedone CB, 2.8% Roundup solution, and a 1% Remedy solution.

Other research that is being done on TSA is a rumen study by scientists at the University of Florida in Gainesville, to determine the length of time that it takes for TSA seeds to pass through the digestive system of cattle. This study is very important to regulatory officials who have suggested holding cattle on a TSA fruit free area prior to movement of cattle from infested farms to other states.

In Tifton, GA, Dr. Clyde Dowler of USDA ARS has set up a state/federal certified weed containment facility and is conducting an intensive herbicide screening program to determine the effectiveness of all commercially available broadleaf weed killers against TSA. This will be very helpful to scientists and other officials as TSA begins to appear in other states.

At Duke University, Dr. David Patterson of USDA ARS is working in the Phytotron to determine the potential ecological range of TSA in the United States. David's work is critical in determining what areas of the country are at risk by accepting cattle from infested counties in Florida.

Regulatory Status of Tropical Soda Apple. During 1994, TSA was officially listed as a state noxious weed by the Florida Division of Plant Industry. This provides

a mechanisms to take regulatory action when TSA is detected as a contaminant in seed, feed, or other commercial products. At this time, TSA is also being listed as a Federal Noxious Weed by USDA APHIS PPQ. This will provide regulatory authority to prevent further introductions of TSA into the United States. It will also allow PPQ to regulate the interstate movement of TSA and to eradicate incipient infestations of the weed in cooperation with affected states.

**Summary.** The first line of defense against TSA is to prevent it from moving into noninfested areas. Prevention will require a concerted efforts to regulate the movement of contaminated livestock, hay, sod, and other high risk commodities from the infested areas into areas that are found to be at risk. The second line of defense will be to eradicate incipient infestations as soon as they are detected. The third line of defense will be to develop methods and procedures for eradication or economical control of large populations in the core infested area of south central Florida. In the southern hemisphere, tropical soda apple grows to about 37° south, which corresponds to Norfolk, VA, in the northern hemisphere. Therefore, TSA could pose a significant threat to agricultural production and to the biodiversity of natural areas if it becomes established in North Carolina. If you observe TSA in North Carolina, please contact Gene Cross of NCDA (919-733-6930) or Randy Westbrook of APHIS PPQ (910-648-4115).

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<sup>1</sup>Regulatory Weed Specialist, USDA APHIS PPQ, Whiteville Plant Methods Center; and Biology Instructor, Southeastern Community College, Whiteville, North Carolina.

<sup>2</sup>Jeff is a native of Cary, North Carolina, and a graduate of North Carolina State University.

## **LONGLEAF LEGACIES**

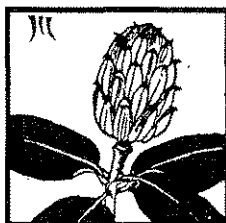
### **Longleaf Pine - The Forest That Built America** *(A new educational calendar co-authored by Julie Moore)*

Never one to pass up an opportunity to educate in an innovative manner, particularly on a subject so dear to her heart, Julie Moore has helped create a beautiful and useful new calendar. Larry Earley and Benson Kirkman have seen it - and love it. They highly recommend this new production for a late holiday gift or any other use, or as a treat for yourself.

The calendars are \$8.00 for individual copies or \$7.00 if you are ordering five or more copies. (Additional discounts for larger quantities.) Send your check to:

Long Needle Press  
P.O. Box 141464 • Gainesville, FL 32614-1464





## NORTH CAROLINA WILD FLOWER PRESERVATION SOCIETY, INC.

### Aims & Objectives

The North Carolina Wild Flower Preservation Society was formed in 1951 by a group of individuals appreciative of native plants throughout the state and region. The purpose of the Society is to promote enjoyment and conservation of native plants and their habitats through education, protection, and propagation.

Spring and fall meetings are held at "natural gardens" across the state. Members exchange seeds and propagated plants at these meetings. Other excursions are organized on a local basis throughout the year.

The Society Newsletter is issued twice a year with articles and illustrations by professional and amateur contributors.

The Society publishes the "N.C. Native Plant Propagation Handbook," new edition available late in 1995.

The Shinn Scholarship/Grant Fund sponsors research on native plants by undergraduate and graduate students. The fund is supported by member contributions and by gifts and memorials. Applications are made to the Scholarship/Grant Fund Committee for awards in May of each year.

The Society is a nonprofit organization under North Carolina and Internal Revenue Service regulations. Donations are tax deductible.

Correspondence concerning the Society and its programs should be addressed to: North Carolina Wild Flower Preservation Society, Inc., c/o North Carolina Botanical Garden, Totten Center 3375, UNC-CH, Chapel Hill, NC 27599-3375.

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## MEMBERSHIP APPLICATION

### ANNUAL DUES:

Individual or Family:	\$15.00
Sustaining:	\$25.00
Lifetime Membership:	\$180.00

Scholarship Fund Donation: \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

New  Renewal

*Please send this and all address corrections to:*

*North Carolina Wild Flower  
Preservation Society, Inc.*

*Ms. Nancy C. Julian*

*1933 Gaston Street*

*Winston-Salem, NC 27103-3733*

*Please include your added four digit zip number for your address in your dues payment.*

*It will soon be mandatory.*

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