

## Efforts to Save an Endangered Species -*Echinacea laevigata* (Smooth Coneflower)

James E. Arnold  
South Carolina Botanical Garden  
Clemson, South Carolina

Lonnette G. Edwards  
USDA Forest Service &  
Department of Biological Sciences  
Clemson University

Timothy P. Spira  
Department of Biological Sciences  
Clemson University

Joan L. Walker  
Southern Research Station  
USDA Forest Service  
Department of Forest Resources  
Clemson University

The South Carolina Botanical Garden contains living collections of several rare plants. Among these, *Echinacea laevigata* (Boynton and Beadle) Blake is federally listed as endangered. The Garden staff and plant ecologists from the USDA Forest Service's Endangered and Threatened Species in Southern Forests Research Work Unit have been cooperating on a research project involving this rare species. Botanical Gardens play an indispensable role not only in research, but also in the education of students, visitors, the citizens of South Carolina, and others regarding natural resources.

### Research

*Echinacea laevigata* (Asteraceae), is a perennial herb. Originally reported to occur in eight states, the current range is limited to Virginia, North and South Carolina and Georgia. Little is known of the life history or the basic biology of any stage in the life cycle of *E. laevigata*. Aerial shoots arise from underground rhizomes as basal rosettes of glabrous leaves (hence, the common name, Smooth Coneflower) or as flowering, leafy stems. A single rhizome can have various combinations of the above and may be connected to as many as a dozen (or more) above-ground parts. Flowering rosettes usually produce a solitary head of perfect disk and pistillate ray florets between May and August. Ray petals are pink to pale purple (infrequently white) and drooping. The attractive inflorescence and prominence of plants along roadsides and open, sunny areas led people to uproot entire plants from the wild. Collection of plants from natural populations was a significant factor in placing this species on the national list of endangered species. South Carolina recognizes the federal listing for this species.

The SC Botanical Garden and the Endangered Species Research Work Unit applied for and were granted permission by the US Department of Interior's Fish and Wildlife Service, the South Carolina Non-Game and Heritage Trust Program and the US Forest Service to conduct basic research projects on *E. laevigata* plants maintained in Garden facilities. In addition to other Forest Service research on *E. laevigata*, pilot studies are also being conducted to determine: 1. the potential of *E. laevigata* for vegetative reproduction and 2. the optimal time of year for such events. Results are very encouraging. As suspected, *E. laevigata* has the potential to produce physiologically independent plants from a single mother plant when the rosettes are severed from each other; and from rhizome cuttings which include roots. In the second part of this study, rhizome segments were taken early in the growing season and again in late summer. In general, more new plants developed from cuttings made later in the year, than from cuttings taken at the start of the growing season. Although applications of exogenous hormone (indole-butyric acid, or IBA) were effective in small concentrations (i.e., treated segments developed both shoots and roots); controls (no hormone treatment) also developed into plants.

Among other on-going projects at the South Carolina Botanical Garden, the Forest Service's Clemson unit has been conducting research to determine what environmental factors are necessary

for successful seed germination of additional rare plant species, as well as seedling growth and establishment of *E. laevigata*. Plants were grown outside under shade cloth of varying densities in order to measure effects of light intensity on growth and development (including flowering).

The Forest Service sought not only the facilities of the South Carolina Botanical Garden, but also its wide expertise in horticulture and plant research. Research alone, however, will not recover rare, endangered or threatened species. Education, an on-going activity at the Garden, is also a vital tool. In its Smooth Coneflower Recovery Plan (The U.S. Fish and Wildlife Service. 1995. Atlanta, GA) the FWS identifies this and other activities as important to the conservation of *Echinacea laevigata*. The Botanical Garden in its collaboration with the Forest Service, Clemson University and private industry is uniquely suited to further address at least three (if not more) of these targets: 1. "conduct research on the biology of the species that includes (...sun/shade...asexual reproduction via rhizomes, conditions and requirements for seedling ...survival, etc)."; 2. "maintain cultivated sources for the species"; and 3. "(encourage and assist) nurseries in the development of cultivated stock". Public education about the need for conservation efforts can also include outdoor exhibits (which the Garden has) of other commercially available native coneflowers and equally attractive flowering plants with a similar appearance. Successful conservation efforts are collaborative ventures; the SC Botanical Garden and the US Forest Service have initiated just such an association.