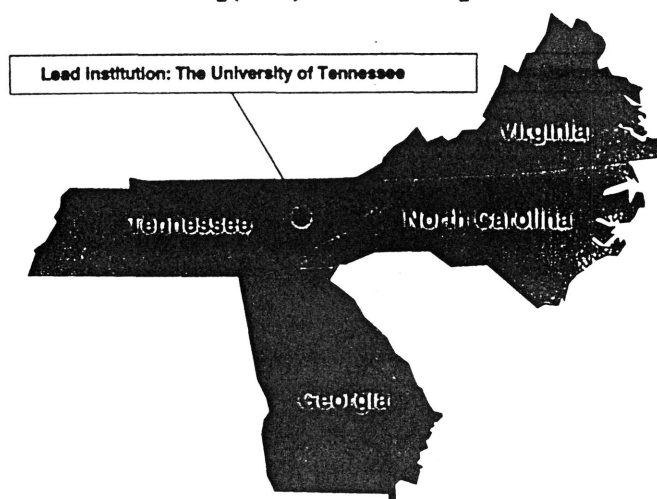


COOPERATIVE MULTI-STATE BIOLOGICAL CONTROL EFFORT DIRECTED AGAINST MUSK THISTLE IN THE SOUTHEASTERN UNITED STATES

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INTRODUCTION Musk thistle, an introduced plant, is classified as a "noxious" weed in many areas of the southeastern United States, where it invades pastures, croplands, orchards, nurseries, highway and railroad right-of-ways, and urban landscapes. Musk thistle, which grows in many areas that are inaccessible and uneconomical for herbicide use or mowing, impacts land utilization over a broad geographical region.

Because of current environmental and economical concerns, the area-wide or regional management of musk thistle should be approached from a broad perspective. The overall goal of this multi-state, multi-institution/agency project is to develop and integrate a sustainable weed management program that incorporates the release and establishment of two introduced thistle-feeding biological control agents. This regional project emphasizes farmer education and the functional integration of research technology for implementation of sustainable management of musk thistle into ongoing farm systems.

This regional project is supported by a grant from the Southern Region Sustainable Agriculture Research and Education/Agriculture in Concert with the Environment Program (SARE/ACE), the Federal Highway Administration, and the Tennessee Department of Transportation. The University of Tennessee is serving as the lead institution for a regional biological control research project against musk thistle. Other cooperating states (and contact persons) are: Georgia [David Buntin and Randy Hudson, (404) 228-7288], North Carolina [Richard McDonald, (919) 733-6930], and Virginia [Loke Kok, (703) 231-5832].

MATERIALS AND METHODS This multi-state, multi-institution/agency project includes cooperators in Georgia [University of Georgia Agricultural Experiment Station/Agricultural Extension Service], North Carolina [North Carolina Department of Agriculture], Tennessee [University of Tennessee Agricultural Experiment Station/Agricultural Extension Service, Tennessee Department of Agriculture, and Tennessee Department of Transportation], and Virginia [Virginia Polytechnic Institute and State University]. Research knowledge from previous studies in Virginia and elsewhere will be transferred and developed into a practical, integrated sustainable management program for musk thistle.

This project involves the release and establishment of two introduced plant-feeding weevils (native to Europe) [the head weevil, *Rhinocyllus conicus* Froelich, and the rosette weevil, *Trichosiromus horridus* (Panzer)] into thistle-infested areas of each state. Both weevil species feed, develop and reproduce specifically on thistles. The initial phase of this project concentrates on the establishment and maintenance of several field insectaries in each cooperating state. Large numbers of these biological control agents will be propagated and redistributed into other thistle-infested areas.

During 1994, weevils were collected from field insectaries in several states and released on farms, nurseries, and along highways in Georgia, North Carolina, and Tennessee. Releases of head weevils and rosette weevils are planned for 1995, 1996, and 1997 at selected thistle-infested sites in each state.

RESULTS AND DISCUSSION During 1994, about 15,000 head weevils and 5,000 rosette weevils were collected and redistributed onto 45 other thistle-infested sites in Tennessee. Since 1989, head weevils have been released at about 220 selected sites along roadways and in pastures in 49 counties in eastern and middle Tennessee. Weevils have survived and reproduced at most sites. Weevil eggs were commonly found at most sites during 1994 (five years after the initial releases). At a few sites, 10 to 30 eggs/bud were observed in 1994.

During 1994, 5,200 head weevils and 2,700 rosette weevils were collected in Tennessee and Virginia and released at 17 sites in 8 counties in Georgia. Since 1989, weevils have been released into several thistle-infested counties in northern Georgia.

During 1994, 7,200 head weevils were collected in Tennessee and released in 12 counties in North Carolina. Populations of rosette weevils, naturally dispersing from Virginia, are well established in some areas of North Carolina.

SUMMARY The overall goal of this multi-state, multi-agency/institution cooperative program is to reduce thistle infestations across the region by integrating a sustainable weed management program that incorporates the release and establishment of biological control agents. The compatibility of this approach with the limited use of mowing and chemical herbicides in readily accessible areas provides an important advantage to the use of this strategy for management of thistle from a broad perspective. Because of the sustainable nature of biological control, this tactic provides tremendous economical and environmental benefits for long-term management of musk thistle.

This program strongly addresses regional education [through grower education days, field days, county meetings, publications, etc.] to improve public awareness of sustainable management systems of this type. This regional program should provide a long-term, area-wide, economical, and environmentally compatible method of suppressing thistle populations in the southeastern United States.