

Biological Control of Musk Thistle in the Southeastern United States: A 20-year Assessment of Benefits and Risks

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Abstract

A state-wide, multi-agency project was initiated in 1989 in Tennessee to implement an integrated pest management (IPM) program, emphasizing classical biological control, against a widespread and problematic exotic weed, musk thistle (*Carduus nutans* L.). The biological control component included releases of two herbivorous weevils, *Rhinocyllus conicus* (Froelich) and *Trichosiocalus horridus* (Panzer), at numerous locations throughout Tennessee. This program was widely embraced by farmers, landowners, urban dwellers, state agencies, federal agencies, extension personnel, and others. Funding was provided by state and federal agencies, including the Tennessee Department of Transportation (TDOT). In 1991, this program was expanded regionally into the southeastern U.S. (Georgia, North Carolina, Tennessee, and Virginia [where releases began in 1970s]). Program benefits to farmers and the citizenry of Tennessee are tremendous. Densities of musk thistle have been reduced by approximately 90% in areas where introduced herbivorous insects have become established. This reduction in weed densities has contributed to a significant economic savings to farmers and landowners, as well as state and federal agencies. For example, TDOT saves about one million dollars annually in reduced costs for labor and materials for herbicide applications and mowing of thistle-infested areas. Although program benefits are extensive, potential risks, especially environmental concerns and impacts on non-target native thistle species, do exist. In studies conducted in other areas of the continental U.S., feeding of *R. conicus* and *T. horridus* on non-target, native *Cirsium* species has been documented. Research conducted in Tennessee did not document *R. conicus* on naturally-occurring populations of native thistles; however, field-cage studies demonstrated the potential for *R. conicus* to use several native thistle species as hosts. Several non-target native thistle species also supported populations of *T. horridus* in Tennessee. This paper addresses the benefits and risks of using biological control as a component of an IPM program directed against musk thistle in the southeastern U.S.