



Studying the Mighty Canada Thistle Rust Mite

The Question: What is the basic biology of the native Canada thistle rust mite, *Aceria anthocoptes*?

The Canada thistle (*Cirsium arvense*) is a widespread exotic plant found throughout North America. Where significant infestations occur in pristine areas such as Rocky Mountain National Park, the thistle reduces the abundance of forage grasses and native plants. The Canada thistle rust mite, a spider relative, is free living and feeds on the epidermal cells of thistle leaves and flowers. Little is known about the mite. While some biologists are hopeful that rust mites can be used to prevent the spread of Canada thistle, much more is needed to understand how mites affect native thistles in the park before considering mites as a biological control.



Canada thistle in bloom.

The Project: Study the rust mite, including its distribution on the plant.

In 2005, Rich Hansen of the US Department of Agriculture initiated a study of the Canada thistle rust mite with the objectives of (1) describing mite biology under field conditions in northern Colorado, (2) documenting potential utilization of native *Cirsium* species, and (3) locating mite populations in Colorado and adjacent states. The mite is known from seven eastern and mid-western states, but its distribution in the West is largely unknown.

Initial studies focused on determining the density of populations of the mites under field conditions and what parts of the thistles harbored the most mites. Hansen harvested Canada thistles along transects at the Agricultural Research Station farm site northeast of Fort Collins, Colorado. He measured plant height, crown width, and flowering status. He picked ten leaves and five flower buds or flowers from each plant and returned to the laboratory where he recovered the mites by liquid extraction and filtering. Hansen also collected five large plants and divided these into subsamples of the upper, middle, and lower thirds of the plant to determine if mites were differentially distributed. In the park, he searched for mites on the native *Cirsium* thistles.



Dr. Hansen found mites on the native *Cirsium scariosum* thistle in the park.

The Results: Rust Mites are present on thistle during the growing season, but the reason for a bimodal fluctuation in mite numbers is presently unknown.

Rust mites were present on thistles during the growing season from the time of initial stem growth through winter senescence, or death. Populations exhibited a bimodal pattern, with peak populations in July and September-October, though it is not known what causes these fluctuations. Although mite numbers showed a statistically weak relationship between thistle height or crown width, it is not biologically meaningful. The relationship between thistle development and mite abundance is difficult to sort out because flowering status, plant height and crown width, and sampling date are significantly interrelated. Mites were most abundant in the upper third of the thistles, and least abundant in the lower third. Further, mites were more abundant on thistle leaves than on stems/branches or flowers. Thus, leaves may prove to be the sampling unit of choice.

Sampling at other sites, including the park, found that mites are common in the western US and are found on four species of native thistles. In 2007, Hansen sampled 7 native thistles at 14 sites in northern Colorado. He found mites on all thistle species, and the mites from Canada thistle and native species are superficially similar. Mites from the native thistles may or may not be *A. anthocoptes*; taxonomists are currently examining the specimens.

This summary is based on published, peer-reviewed and/or unpublished reports available at the time of writing. It is not intended as a statement of park policy or as a definitive account of research results.

For more information on the park's research program, see www.nps.gov/romo

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