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## Integration of herbicides with *Aphthona nigriscutis*

JEFF A. NELSON, RODNEY G. LYM, and CALVIN G. MESSERSMITH

Graduate Research Assistant and Professors, Department of Plant Sciences, North Dakota State University, Fargo, ND 58105.

### Abstract:

*Aphthona nigriscutis* has reduced the density of leafy spurge at many locations. However, there are locations where *A. nigriscutis* has not established or is found at densities too low to be effective. Therefore, it may be necessary to integrate biological and chemical control to reduce leafy spurge densities to non-economic levels. The objective of this experiment was to integrate picloram plus 2,4-D and *A. nigriscutis* for leafy spurge control.

Experiments were conducted at Chaffee and Fort Ransom, North Dakota. Approximately 450 *A. nigriscutis* were released into 1.8- by 1.8- by 1.8-m cages. Picloram plus 2,4-D at 0.56 plus 1.1 kg ae /ha were applied on four dates, August 15, September 1 and 15, and October 1. The experiment at each location was repeated the following year on leafy spurge that was not infested with flea beetles.

The effect of picloram and 2,4-D on *A. nigriscutis* population was estimated by counting the number of adults emerging from soil cores harvested in the fall and spring. A golf-cup cutter was used to harvest soil cores which were 10.8-cm diameter to a depth of 15 cm. Soil cores harvested in the fall were held at 3° C for 75 days. Each sample was then placed into a 2-L paper container and maintained in the laboratory at 21° C with a 16-hour photoperiod until *A. nigriscutis* adults emerged. Soil cores harvested in the spring were placed directly in trap chambers and then treated identically to soil cores harvested in the fall.

The number of beetles collected from soil cores was similar among herbicide application dates both across locations and years. An average of 2 *A. nigriscutis* adults were recovered from each soil core harvested in the fall of 1995 compared to only 1 per core from spring harvested soil cores across both locations in 1996. Overwintering mortality decreased the number of flea beetles recovered from spring harvested soil cores. Overwintering mortality was not observed in the *A. nigriscutis* population from soil cores harvested in the second year of the study in 1996 and 1997. An average of 2 and 3 flea beetles were collected from each soil core harvested in the fall and spring, respectively.

Leafy spurge stem densities 12 months after treatment were lowest in the plots that were treated with picloram plus 2,4-D on or after September 1 compared to the August 15 application, insects only, and the check in 1996. Leafy spurge stem density was lower inside the cage when picloram plus 2,4-D was applied to established flea beetles compared to picloram plus 2,4-D and insects alone. This integrated treatment of flea beetles and herbicide has an additive/synergistic effect with respect to leafy spurge control.