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Niche specificity of insects introduced for leafy spurge control

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Leafy Spurge, a noxious perennial weed of Eurasian origin, is a major rangeland problem on the northern Great Plains of the United States and in the prairie provinces of Canada. Because it is an introduced plant, leafy spurge has few native natural enemies. Thirteen host specific insect species have been imported from Europe to the United States for leafy spurge control. Due to the limited occurrence of leafy spurge and closely related species in western Europe and Eurasia, there is limited habitat information for the introduced species. Three flea beetle species, *Aphthona cyparissiae*, *A. flava* and *A. nigriscutis*, were released at multiple sites in eastern Montana and North Dakota between 1990 and 1993. Ecological data and insect numbers were collected subsequent years. Analysis of the data indicates a relationship between leafy spurge plant height and density and the numbers of *Aphthona* species in succeeding generations.

A. nigriscutis is well adapted to the dryer portions of the northern Great Plains. In areas where leafy spurge density is low, plant height under 18 inches and water stress apparent in late summer, *A. nigriscutis* does well. Under these conditions, insect mortality is reduced and leafy spurge control is seen over a limited area within three to five years. As site conditions become more moist, *A. nigriscutis* mortality is increased and spurge control is limited to non-existent. *A. cyparissiae* is difficult to distinguish from *A. nigriscutis*. Similarly, the two species occur in overlapping niches. *A. cyparissiae* will establish in slightly wetter niches than *A. nigriscutis*. Both *A. nigriscutis* and *A. cyparissiae* are well adapted to climatic conditions on the northern plains. *A. flava* remain an enigma. Two sites, in Alberta and Montana, produced large insects numbers and good leafy spurge control. These successful establishments have not been duplicated. There are other *A. flava* sites in Montana and North Dakota with increasing insect numbers. We do not yet understand the characteristics of these sites and how to successfully establish new colonies. Successful insect establishment is important to leafy spurge biological control. Flourishing insect colonies is dependent on a knowledge of insect niche requirements.