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A microcage method for studying *Aphthona* spp. flea beetles in the field

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Aphthona flea beetles are used to facilitate suppression and control of leafy spurge. The root-feeding larvae are the most destructive stage in the life cycle. Often, sweeps for adults are conducted in the release area after one or more years to determine if the insects have established. Unfortunately, this technique does not provide information about the number of larvae present and their impact on leafy spurge. A microcage technique was developed to help answer questions about establishment and overwintering of the *Aphthona* larvae in natural field conditions.

A microcage consists of a 15 cm dia. × 15 cm length segment of PVC pipe that was centered over a leafy spurge stem and hammered into the soil to a depth of 13 cm. A fine-mesh screen is fastened to the top of the pipe segment and supported by a wire flag. Microcages were located on a southeast-facing slope in northeastern South Dakota at three topographic sites: hilltop, midslope, and toeslope. Fifty adult *A. cyparissiae* or *A. nigriscutis* flea beetles were released in each of 60 cages (40 *A. cyparissiae* and 20 *A. nigriscutis*) in 1992 and 35 (30 *A. cyparissiae* and 5 *A. nigriscutis*) cages in 1993. Soil from the microcages was harvested by unearthing the pipe with the soil core intact. In 1992-1993, four cages were harvested in the fall and 10 were harvested in the spring. In 1993-1994, number of cages harvested was dependent on species and topographic site. Larvae were recovered from the soil by sieving and using the Berlese method. In late May screens were replaced over the cages to be monitored for adult emergence.

The use of the microcage technique allowed for the successful recovery of *Aphthona larvae* and adults. Larvae were recovered in late fall, 1992 with numbers ranging from 0 to 44 per cage. The larvae were small (2 mm length) and head capsule measurements indicated that the larvae were first or second instar. The April 1993 sampling also was a success with numbers ranging form 0 to 62 larvae per cage. Larvae in spring-harvested cages were predominantly third instar. Analysis of number of larvae recovered in the fall versus spring indicated that there was little or no overwinter mortality in 1992. No adults were recovered in microcages in 1993. In 1994 adult *A. cyparissiae* were recovered in two cages in late June. Monitoring will continue through the 1994 summer. This microcage technique may be an extremely useful research tool to answer questions about *Aphthona* and other root-feeding insects in natural conditions.