

Reprinted with permission from: 1995 Leafy Spurge Symposium. Fargo, North Dakota. July 25-27, 1995. pp. 23-24.

Sponsored by: Great Plains Agriculture Council and North Dakota State University.

---

## Effect of leafy spurge biotype and herbicide application on *Aphthona* spp. establishment

RODNEY G. LYM, ROBERT B. CARLSON and DON A. MUNDAL

Professor, Plant Sciences Department, Professor and Research Specialist, Department of Entomology, North Dakota State University, Fargo 58105.

The timing of herbicide treatments on *A. nigriscutis* and *A. czwalinae* survival and establishment was evaluated. Two locations of *A. nigriscutis* and one location of *A. czwalinae* were established. The treatments included picloram plus 2,4-D at 4 plus 16 oz/A spring applied picloram plus 2,4-D at 8 plus 16 oz/A fall applied, and *Aphthona* spp. alone. Stem density was evaluated in the spring, and adult sweep counts were conducted through the summer. For the first experiment, *A. nigriscutis* were released in 1989 and herbicide treatments were initiated in spring (June) of 1992 at Cuba. Stem density in the insect-only treatment declined by 97% from 1992 to 1995. The most rapid control was from the insect plus fall-applied herbicide treatment which resulted in a 97% decline in leafy spurge stem density in only 2 years. The spring-applied herbicide plus insect treatment reduced leafy spurge less than the insects alone. The *A. nigriscutis* population in the non-herbicide treatments increased from 11 beetles/m<sup>2</sup> in 1992 to 125 beetles/m<sup>2</sup> in 1994 but then declined to an average of 70 beetles/m<sup>2</sup> in 1995 as leafy spurge stem density declined. The *A. nigriscutis* population averaged 76 beetles/m<sup>2</sup>, when herbicides were spring applied but only 30 beetles/m<sup>2</sup> when herbicides were fall-applied as very little leafy spurge remained in those plots.

Similar experiments were started in 1993 with 3,000 *A. nigriscutis* released at the Ekre Research station near Walcott and 30,000 *A. czwalinae* released at Camp Grafton South, near McHenry. As in the previous experiment, *Aphthona* spp. combined with a fall-applied herbicide treatment resulted both in better leafy spurge control than either control method used alone and a more rapid increase in the flea beetle population.

The establishment and movement of *A. nigriscutis* on leafy spurge patches is currently being evaluated. *A. nigriscutis* was released as 100, 200, 300, 400, or 500 adults per site along a 2.5 mile stretch of the Burlington Northern railroad right-of-way near Buffalo. The insects were released in dense stands of leafy spurge on June 28, 1993. Stem density and adult flea beetle population and spread have been determined annually in June. *A. nigriscutis* flea beetles were found at all release sites 1 year after release, and leafy spurge stem density began to decline in 1995, which was 2 years after release. In general, the greater the original number released, the more rapid the decline in stem density. The greatest leafy spurge decrease was from 17 stems/0.25 m<sup>2</sup> in 1993 to 10 stems/0.25 m<sup>2</sup> in 1995 when 500 insects/site were released. The insects had spread an av-

erage of 55 feet from the release site when 500 insects/site were released but only an average of 25 feet when less than 500 insects/site were released.

The survival of *A. czwalinae*, *A. flava*, and *A. nigriscutis* was evaluated on leafy spurge biotypes from Austria, Manitoba, Montana, Nebraska, North Dakota, South Dakota, and Wyoming. The seven biotypes were grown in a greenhouse for 4 to 5 months in 2.5-by 8-inch pots. These pots were planted directly outside in April. The pots were arranged in a RCB design with 12 replications in a 36 ft<sup>2</sup> area. Cages were placed over the experiments and 200 *Aphthona* spp. were released. The pots were dug in November, placed in a cooler at 3° C for 8 weeks, and then placed under greenhouse lights (16 hours) at 24° C.

The greatest number of *Aphthona* adults emerged from a Nebraska leafy spurge biotype followed by biotypes from Austria and South Dakota. The least number of adults emerged from biotypes from North Dakota and Montana. These are the same biotypes that, in previous research, had the greatest (NE, AU, and SD) and least (ND and MT) number of galls and larvae per gall when exposed to the leafy spurge gall midge (*Spurgia esulae*).