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The *Aphthona* pilot study

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The *Aphthona* pilot study consists of seven treatments and matching checks at four sites [Montana (2), Nebraska and North Dakota] and three treatments and matching checks at two sites [Colorado and Idaho]. The study was initiated in 1990 with *Aphthona nigriscutis* as the only test agent. This program studies the impacts on leafy spurge of three flea beetle release rates [150, 450, and 1350 beetles]. Variables studied at the sites include: 1) flea beetle establishment; 2) vegetation complex (a reflection of environmental conditions); 3) soil texture, composition, and aspect; 4) chemical and grazing history; 5) sun versus shade; and 6) density, robustness, and type of leafy spurge plants.

In 1991, *Aphthona nigriscutis* was recovered from 14 of 34 pilot study plots. In 1992, recovery increased to 22 plots. All 1991 established plots contained beetle in 1992. The second year following release [1992], fewer beetles were recovered per sweep at the plots with 450 beetles released than at the plots with 150 beetles released. On average, 1.8 times more beetles were recovered per sweep at the plots with 1350 beetles released than at the plots with 150 beetles released. The area occupied by the beetles averaged 2.32 times greater in the plots with 450 beetles released and 5.66 times greater in the plots with 1350 beetles released than in the plots with 150 beetles released. Leafy spurge plant height and flowering periods were visibly retarded in more than 80% of the plots from which beetles were recovered.

In 1992, *A. cyarissiae*, *A. flava*, and an additional *A. nigriscutis* treatment were added to three of the sites [Montana, Nebraska and North Dakota] at a rate of 450 beetles per species released. The purpose being to compare how the three flea beetle species perform under identical conditions.

In 1993, severe rain and hail storms strongly influenced many plots. Several Nebraska plots were under nearly one foot of water. In Montana, fields hit with hail storms lost the “bomb blast” appearance created by the beetles on the leafy spurge. Of the six new 1992 released, four established [two in Montana and two in Nebraska].

Information obtained in this study is still being processed. However, certain points are apparent. No insects have been recovered from any of the ten North Dakota plots in any sampling year, indicating unidentified detrimental conditions. Release of beetles in very dense spurge greatly reduces the possibility of establishment. Under ideal conditions, the first year following release of the gregarious flea beetles, a depression or “bomb blast” appears in the leafy spurge stand where plants are shorter in height and retarded in flowering. The second year, the canopy cover of leafy spurge decreases to approximately 2% over a limited area averaging 18 x 20 yds. The third year, this area expands to about 53 x

59 yds. In the fourth year, the area averages 100×100 yds. with the beetle located in an area of roughly 500 yds. diameter. Each of the flea beetle species has its own preferred ecosystem. Flea beetle populations can be influenced by many factors including hail, intense trampling or grazing by large animals, or feeding by other insect species. These factors appear to reduce the gregarious habit of the beetles, as evidenced by their reduced "bomb blasts". Shade reduces establishment and population build-up of all three species studied. Some herbicides do not prevent beetle establishment or affect impact.