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Leafy spurge management with sheep and flea beetles

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Abstract:

Leafy spurge (*Euphorbia esula*) is an aggressive, perennial rangeland weed that displaces native vegetation and causes millions of dollars to be lost annually in the agricultural and non-agricultural sectors. Many cultural, chemical, and biological control methods have been evaluated, but herbicides are used primarily. Leafy spurge infests a wide array of habitats and is considered difficult to impossible to control in sensitive shelterbelts and riparian areas where herbicides are very difficult to use. An experiment was initiated in 1993 to determine an optimum sheep stocking rate and grazing duration that is compatible with flea beetle herbivory, and to determine the impact of sheep grazing alone and sheep grazing plus flea beetles on the entire plant community within a defined leafy spurge infested habitat.

The experiment was conducted in a riparian area 25 miles east of Denver, CO. The site is characterized by low organic matter, sandy, gravelly soil, with primarily a leafy spurge-western wheatgrass (*Agropyron smithii* Rydb.)-Kentucky bluegrass (*Poa pratensis* L.) understory and a semi-open plains cottonwood (*Populus sargentii* Dode) overstory. A factorial design arranged as a split-plot was used. Main plots were four stocking rates (two, four, six, or eight sheep/A) by three grazing durations (10, 20, or 30 days). Each plot was 1 acre in size. In 1993, all main plots were split; 500 flea beetles (*Aphthona flava*) were randomized and released onto a single point into one-half of each main plot. There were 12 treatments and one control plot per block. Each treatment was replicated twice and all data were subjected to regression analysis.

Data collected reflect the results of treatments invoked in 1995, 1996, 1997, and 1998. These data show that 8 sheep grazing alone for 10 days were exerting biological control of leafy spurge. Leafy spurge density within this treatment was decreased 94% while smooth brome cover increased 22-fold. All 30-day grazing treatments stimulated

leafy spurge recovery; cover and density increased 8- and 10-fold from their lowest points where 8 sheep grazed for 10 days. The combination of 8 sheep grazing for 10 days along with flea beetles decreased leafy spurge density to zero. A positive response from western wheatgrass and Kentucky bluegrass did not occur where leafy spurge cover or density were at their lowest, but occurred after smooth brome cover decreased. Peak western wheatgrass and Kentucky bluegrass cover occurred where 6 sheep grazed for 30 days. Smooth brome cover within this treatment combination decreased to less than 2%, but leafy spurge cover had increased from less than 3% at its lowest point (8 sheep for 10 days) to 22%, which was still less than half that in the non-grazed control. The presence of flea beetles did not substantially alter the relationship among the three major perennial grasses. These data suggest that while leafy spurge was competing with all three perennial grass species, smooth brome's influence on western wheatgrass and Kentucky bluegrass was at least that of leafy spurge because western wheatgrass and Kentucky bluegrass showed no positive response until smooth brome populations decreased, even though leafy spurge recovery from treatment ensued simultaneously.

Sheep and *Aphthona flava* flea beetles are compatible and both animals may be used to graze leafy spurge simultaneously to achieve adequate control. The management system developed from this research may be used to effectively manage leafy spurge in riparian areas or shelterbelts where herbicides may be difficult or impossible to use.