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Leafy spurge management with sheep and flea beetles

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An experiment was initiated in 1993 along a riparian area to evaluate the effects of sheep grazing and flea beetles on leafy spurge populations and the associated plant community. The experiment was designed as a four by three factorial arranged as a split-plot. Main plots are four sheep stocking rates (2, 4, 6, or 8 sheep/A) and three grazing durations (10, 20, or 30 days); a control treatment also was included where no sheep grazing occurred. Each plot is 1 acre in size. The experiment was designed such that regression analysis was appropriate and response surfaces were generated. Only two replications were used because of experimental logistics and this represents a compromise between accuracy of the response surface and variability encountered across the experimental area. All plots were split in 1993 and 500 *Aphthona flava* were released on a single point in one-half of each plot. Sheep grazing began in 1995. Separate permanent transects were constructed in each plot to measure the effects of flea beetles plus sheep and sheep alone. Plots where only flea beetles were present were used to determine the effects of flea beetles alone. Cover and density of leafy spurge and cover of all plants present were measured four times each growing season; in early June before grazing began, half-way through each grazing treatment, two weeks after each grazing treatment ended, and in September.

June, 1996: Data collected in June, 1996 reflected the results of both animals from 1995. Where sheep grazed alone, leafy spurge density was greater compared to non-grazed plots. The lowest leafy spurge density was found in plots grazed by 4 sheep for 10 days but this was 17% higher than in non-grazed plots. Within each stocking rate, leafy spurge density increased as grazing duration increased from 10 to 20 days then decreased slightly as duration increased from 20 to 30 days. As a result of all stocking rates invoked in 1995, smooth brome cover in June, 1996 increased as duration increased from 10 to 20 days then decreased sharply as duration increased from 20 to 30 days. There was about 2.5 times more smooth brome in plots grazed by 8 sheep for 20 days in 1995 compared to non-grazed plots. Leafy spurge density where sheep and flea beetles were grazing simultaneously was influenced only by sheep grazing duration. Leafy spurge density at all stocking rates was about twice as much when sheep grazed for 30 days with flea beetles compared to 10 days.

September, 1996: Where sheep grazed alone, Kentucky bluegrass cover was influenced only by sheep stocking rate and all grazed plots had more cover than non-grazed plots. Kentucky bluegrass cover was greatest where 4 sheep grazed and was 2.5 times more than in non-grazed plots. Smooth brome, western wheatgrass, and blue grama were influenced by stocking rate and grazing duration. The pattern for smooth brome cover resulting from sheep grazing treatments was similar to that observed in June, 1996. At all stocking rates, western wheatgrass cover decreased as duration increased from 10 to 20 days then increased as duration increased from 20 to 30 days; all grazed plots had more western wheatgrass cover than in non-grazed plots except where 2 sheep grazed for 20 days. Within a stocking rate, blue grama cover was greatest at the 10 day duration, and among grazed plots, the most blue grama was found in plots grazed by 4 sheep for 10 days but this was about half that found in non-grazed plots. Where sheep and flea beetles grazed simultaneously, at each grazing duration leafy spurge cover and density increased as stocking rate increased and at each stocking rate, leafy spurge cover and density decreased as duration increased from 10 to 20 days then increased as duration further increased from 20 to 30 days. The highest leafy spurge cover was found where 8 sheep grazed for 10 days and the greatest density where 8 sheep grazed for 30 days. Maximum smooth brome cover (13%) was found where 8 sheep grazed for 20 days and coincided with a significant dip in leafy spurge cover and density.