

Effects of spotted knapweed on soil erosion

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The influence of spotted knapweed on the elements of erosion surface runoff and sediment yield was evaluated in western Montana. Comparisons were made on paired plots under simulated rainfall conditions. Runoff and sediment were 56% and 192% higher, respectively, on the knapweed-dominated, rather than the bunchgrass-dominated plots. It was concluded that spotted knapweed invasion into bunchgrass rangeland of western Montana was detrimental to the objectives of protecting topsoil and conserving water.

Introduction: Spotted knapweed (*Centaurea maculosa*) has invaded about 4.7 million acres of range and pasture land in Montana. This invasion has caused ranchers and other land managers to be concerned about the possibility of increased soil erosion. This report evaluates surface runoff and soil erosion on sites dominated by either spotted knapweed or native bunchgrasses.

Methods: The study was conducted northwest of Garrison, Montana, on the Bill Murphy Ranch. Annual precipitation averages 13 inches and elevation averages 4,450 feet. Soils were fine-loamy, mixed frigid. Typical Ustochrepts, and loamy-skeletal, mixed, Aridic Haploborolls. Slopes ranged from 13 to 37%.

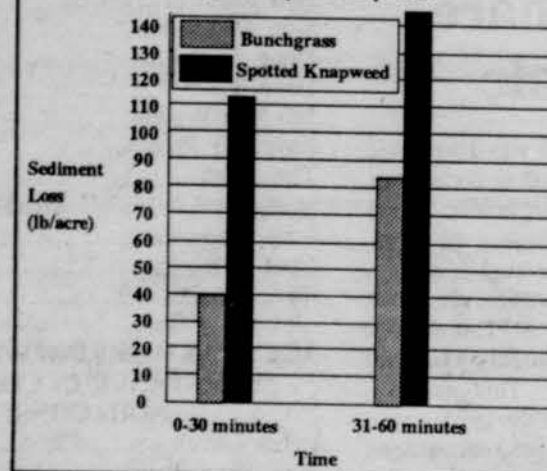
Bluebunch wheatgrass (*Agropyron spicatum*), spotted knapweed, rough fescue (*Festuca scabrella*), prairie junegrass (*Koeleria cristata*), hoods phlox (*Phloxhoodii*), Idaho festuca (*Festuca idahoensis*) and lupine (*Lupinus spp.*) were common species in the study area. The area was lightly grazed by cattle in the spring of 1987 and rested during summer and fall.

Paired-plots were located at 12

study sites. Percent slope, soil and range site characteristics were similar between members of each pair; however, vegetation differences existed. Bunchgrasses produced about 90% of the herbage on one plot of each pair,

Sediment yield was significantly less ($p < 0.10$) on grass-dominated rather than on knapweed-dominated sites. Sediment averaged 39 lbs/ac from grass sites during the initial 30-minute run. Sediment loss in-

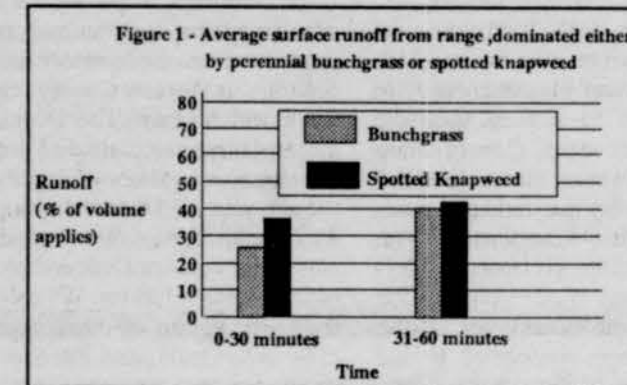
Figure 2 - Average sediment loss from range dominated either by perennial bunchgrass or spotted knapweed.



while spotted knapweed contributed about 90% of the herbage on the other.

A modified Meeuwig Rainfall Simulator was used to apply a controlled, consistent volume of rainfall to 26-inch X 26-inch plots. Rainfall was applied during two consecutive 30-minute periods. Vegetation was clipped at 0.5 inch stubble and removed before the second 30-minute application. Resultant overland flow was collected and measured, and the amount of sediment in the runoff calculated (figure 1).

Results and Discussion: Total runoff from the initial 30-minute rain on grass-dominated sites averaged 23% and varied from three to 49% of the total volume applied (figure 1). Runoff from the knapweed-dominated sites was significantly higher ($p < 0.10$). It averaged 36% and varied from 1 to 67% of the total volume applied (figure 1). Although runoff increased during the second 30-minute run, differences between knapweed-and grass-dominated sites were not significant ($p > 0.10$).



significantly higher on the knapweed plots than on the grass plots. Differences between knapweed and grass plots were not significantly different during the second 30-minute run. It was

concluded that spotted knapweed invasion into bunchgrass rangeland of western Montana was detrimental to the objectives of protecting topsoil and conserving water.

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SWCD works with lower Umatilla Basin Groundwater Management

Morrow SWCD worked with the Lower Umatilla Basin (LUB) Groundwater Management Area during the '91-92 fiscal year with both the Technical and Citizen Advisory Committee's members. Duane Neiffer replaced Rudy Bergstrom on the Citizens Ad-

visory Committee and Jerry Anderson, manager of Morrow SWCD is chairman of the Technical Advisory Committee. Loren Unruh, SCS district conservationist, is also a member of the Technical Advisory group. The Technical Advisory Commit-

tee was successful in obtaining Strategic Water Management Group (SWMG) grant monies from various wells in the basin. This information should be available in June or July of 1993. In addition to hiring a groundwater coordinator, the TAC was also successful in obtaining a Gid-

dings soil probe to be used in the basin to obtain soil samples from below the root zone to ascertain if nitrate accumulation is occurring and if utilizing "sponge" crops would avoid continued nitrate loading of the vadose zone.

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