VEGETATION CHARACTERISTICS, GRAZING DISTURBANCE AND SOIL EROSION*

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BACKGROUND

Annual domestic forages may provide temporary ground cover and pasture in reclamation situations where perennial domestic forages are not desired, cannot be established, or where a rapid ground cover is needed. Potential soil erosion is a concern in annual compared to perennial forages because of the requirement for yearly establishment. The row seeding of annual pasture may exacerbate rill erosion and the lack of litter buildup may leave the soil exposed to raindrop impact and surface flow (Tomanek, 1969; Wilcox, 1994). In comparison, perennial domestic pastures can protect against erosion by providing permanent cover (Meeuwig, 1970), forming sod and generating adequate litter (Naeth et al., 1991).

The objectives of this study were to quantify runoff and sediment during snowmelt and rainfall events and to measure differences in bare ground and litter on annual and perennial pasture at different grazing intensities.

MATERIALS AND METHODS

The study site was at the Agriculture and Agri-Food Canada Lacombe Research Station in the aspen parkland. Annual precipitation averages 447.5 mm. Soils at the study site are Orthic Black Chernozems of a sandy loam texture. Slopes average 1 to 3%.

Heavy, medium and light grazing intensity treatments were implemented on a rotational basis throughout the growing season. Grazing was initiated and ceased at different specific target forage heights for each grazing intensity. Four forage treatments with potentially differing abilities to control erosion and produce litter were used. Smooth bromegrass (*Bromus inermis* L.) and meadow bromegrass (*Bromus riparius* Rehm.) were the perennial treatments; triticale (*X Triticosecale* Whittmack) and a triticale/barley (*Hordeum vulgare* L.) mix were the annual treatments. The twelve resulting treatments were arranged in a randomized complete block design within four parallel blocks across an east-facing 3.8% slope.

A runoff frame assembly consisting of an above-ground 1-m^2 frame and an underground bucket collection system was installed in each treatment. Buckets within each frame assembly were checked after each rainfall event and during snowmelt. Runoff was subsampled for sediment content.

Litter was sampled in three randomly located 0.05 m^2 quadrats in each treatment before first grazing and after final grazing each year. Bare ground was measured in each treatment in five randomly located 0.10 m^2 quadrats during July of each year.

RESULTS AND DISCUSSION

Snowmelt was the dominant source of runoff. Few statistically significant treatment differences occurred for runoff and no consistent trends were noted other than snowmelt runoff in 1996 was greater than snowmelt runoff in 1995. All values were very low. Sediment yields were low and similar for snowmelt and rainfall. Few statistically significant treatment differences were measured and no consistent trends were noted other than snowmelt sediment

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yield in 1996 was consistently greater than in 1995. The high infiltration capacity and well-aggregated nature of the study site soils are reflected in these results.

Litter levels generally increased with decreased grazing intensity. Differences in litter with grazing intensity were more apparent in smooth bromegrass and meadow bromegrass treatments than in the annual treatments. Litter accumulated with time in these perennial treatments, however, this accumulation was considerably reduced at heavy grazing intensity.

Bare ground was higher under annuals than perennials in both years of the study and generally decreased with decreasing grazing intensity, especially in perennial treatments. Inter-row spaces in annuals greatly increased bare ground in this forage type, while the creeping habit of the perennial species tended to lose gaps in the canopy and provide more complete soil cover.

CONCLUSIONS

Snowmelt dominated annual runoff while sediment yield was similar for snowmelt and rainfall events. Runoff and sediment values were low. Bare ground was greater under annual than perennial forage treatments. Litter tended to decrease with increasing grazing intensity. Grazing intensity is a key factor in controlling erosion, especially erosion from growing season runoff. The soils at this site have a high infiltration capacity and are not as severely impacted by compaction as other more erosion prone soils might be.

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