

Natural Resources Conservation Service

Soil and Plant Science Division

Soil Survey Region 5

Havre, MT Soil Survey Office

Irrigation Suitability Determinations Address Soil Salinization Issues in Montana's Milk River Valley

Purpose

The Havre MLRA Soil Survey Office covers the entirety of the Brown Glaciated Plains in north-central Montana. This Major Land Resource Area (MLRA 52) represents the driest portion of the glaciated plains in the United States, receiving on average between 10 and 14 inches (250 to 350 mm) of annual precipitation. The 165-mile stretch of the lower Milk River Valley provides the region with approximately 121,000 acres of intensively managed irrigatable land.

Background

Most soils in this area were mapped in the early 1970's with the Harlem soil series the most predominant soil in the valley. Unfortunately, over the past 50 years a variety of factors such as overirrigation, leaking ditches, inadequate drainage, and improper land-leveling or grazing when soils are saturated have contributed to salinization of the soils. Consequently, some of the major soil interpretations that are crucial in determining irrigation suitability may no longer be accurate.

Figure 1 shows a clod of Harlem clay with salts visible near the surface that illustrates this site has heavy clay and poor drainage.

Figure 2 shows infiltration rate of heavy clay soils coupled with the high evapotranspiration of the local semi-arid climate creates the conditions for salinization. Grazing these soils when wet creates pockets from hooves where water sits for an extended period causing salts to concentrate in this area. High levels of salt reduces the overall productivity of the site.



Figure 1. A clod of Harlem clay soil with visible salts near the surface.



Figure 2. Grazing livestock leave behind hoove pockets that catch and retain water; elevating salt concentrations caused by poor drainage of the heavy clay soils.



It is crucial that conservation planners have current soils information when conducting cost-benefit analysis and practice prioritization. Severely salinized soils will often yield negligible crop results or could further degrade the site. Funding conservation practices on this site without addressing the drainage issues would result in little to no improvement of the soil and could result in financial losses for the landowner.

Key Outcomes

Stuart Veith, soil scientist and Scott Brady, ecological site specialist assisted the NRCS field offices along the Milk River Valley by assessing the soils and providing on-site Irrigation Suitability Determinations. Suitability determinations provide limitations and capabilities of the soils in a specific area. By identifying soil properties such as depth to salts in the soil, soil conservationists can determine and prioritize best land management practices for the area. This knowledge ensures that cutting and filling will not expose salts or move them to other portions of the field. By reducing or limiting salinity through best practices, will provide a more productive field.

Figure 3 shows a healthy stand of the shallow-rooted grasses utilizing the upper 4 inches of the soil that is not salinized. Plowing this field would result in bringing salts to the surface making the germination of seeds difficult. The best practice in this instance is to leave the current stand of grasses in place.

Figure 4 shows a site that has proper drainage and a low amount of salts. A new planting of grasses and legumes should respond favorably.

Future Goals

- Provide accurate information about soil properties to NRCS field offices and land managers
- Help beginning farmers and ranchers avoid costly mistakes
- Provide hands-on training to NRCS field office staff
- Identify and document high priority areas for future Soil Survey and Soil Health updates



Figure 3. Scott Brady, ecological site specialist and Russell Snedigar, soil conservationist, examine the shallow rooting depth of grasses in a field of salinized Harlem clay.



Figure 4. A field of Harlem clay loam that has not been salinized is plowed in preparation for seeding of alfalfa hay.