A better understanding of the impacts of grazing sheep

March 14 2013

A U.S. Department of Agriculture (USDA) scientist is giving guidance to growers in Montana and the Dakotas on how grazing sheep when fields are left fallow will affect soil quality.

Grazing sheep and other livestock was once common in the region before fertilizers were introduced in the 1950s. While fertilizers increased yields, they also have increased nitrogen runoff and leaching, made soils more acidic, and contributed to greenhouse gas emissions, according to Upendra Sainju, a soil scientist with the Agricultural Research Service (ARS) in Sidney, Mont. ARS is USDA's principal intramural scientific research agency.

Growers looking for alternatives have turned once again to grazing sheep during seasons when fields are left fallow. The trend in Montana and North Dakota prompted Sainju and his ARS colleagues to study the grazing's effects on crop quality, soil chemistry, and amounts of nutrients in the soil. Each can have long-term effects on crop yields.

Sainju and his colleagues set up three cropping systems (continuous spring wheat, spring wheat-fallow, and winter wheat-fallow) in southwestern Montana. They compared soil qualities on a series of plots where, during the fallow season, sheep were grazed, herbicides were used, or the soil was tilled for weed control.

Over four years, sheep were grazed at rates of up to 153 sheep per hectare (2.47 acres), glyphosate was applied at standard rates, and soils

were tilled to a standard depth of 15 centimeters (5.9 inches). Soil samples from varying depths were analyzed for organic matter, nutrients, pH and electrical conductivity, which affects nutrient availability and plant growth.

The results showed that tillage did return more of the beneficial wheat residue to the soil than either grazing or the herbicide treatments, resulting in higher levels of calcium, sulfur, and electrical conductivity in the soil.

But grazing generally had no negative effects on soil organic matter and crop yields. The sheep returned to the soil some of the phosphorus and potassium they ate up in the wheat residue by way of their feces and urine. Grazing also increased levels of magnesium and sodium in the soil, possibly because the urine and feces contained higher levels of them.

More information: Read more about this research in the March 2013 issue of Agricultural Research magazine. www.ars.usda.gov/is/AR/archive/mar13/soil0313.htm

Provided by United States Department of Agriculture