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Sodic Soils Are Occurring More Frequently in Utah. How Should They Be Managed?

D. W. James
Extension Soil Specialist

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Sodic soils are soils with excess sodium. Sodic soils are encountered with increasing frequency in Utah, usually in the lower, flatter areas of our valleys. Sodic soils probably developed over many years when the water table was high and the soils were too wet for cultivation.

Apparently these wet lands are drying out because farmers are changing their irrigation practices. Formerly, upland soils were flood and furrow irrigated. Sprinkling is replacing the older practices to conserve water. Thus, there is less recharge of the ground water and water tables are dropping in the lower parts of the valleys. Accordingly, lands that were formerly too wet are becoming susceptible to cultivation and production of more profitable crops.

Sodic soils represent a special management problem for farmers and land managers because of their peculiar nature. Whereas the pH of Utah soils normally lies in the range of 7.0 to 8.2, the pH of sodic soils will be above 8.5, to as high as 10.0. In addition, the exchangeable sodium percentage (ESP) will be above 15; clays and organic matter will be highly dispersed resulting in very slow water infiltration and percolation through the soil; and the soil will be very hard when dry. Sodic soils may appear black at the surface because of dissolved organic matter; years ago these soils were referred to as black alkali soils. The net effect of soil sodicity is extremely poor crop yields.

Reclamation of Sodic Soils

Sodic soils differ from saline soils, or soils that simply have high concentrations of dissolved salts. Saline soils have an ESP less that 15% and their structure will be good and water intake and percolation should not be a problem.

Reclamation of both sodic and saline soils requires the application of excess irrigation water after assuring adequate drainage. The important difference between sodic and saline soil reclamation is that, in addition to good drainage and excess irrigation, the excess sodium must be replaced on the soil cation exchange complex in order to mobilize the sodium and render it susceptible to leaching. For this purpose calcium is supplied by adding gypsum. Acid-forming materials such as elemental sulfur and sulfuric acid, which mobilize calcium already present in soil as lime, also serve this purpose.

The amount of gypsum needed to reduce the ESP to less than 15 is referred to as the gypsum requirement (GR). Whether or not a soil is actually sodic, and the determination of the GR, requires laboratory analysis of the soil. Instructions for soil sample collection, types

of analyses needed, and interpretation of results are available upon request from County Extension offices.

Gypsum Sources and Rates

Gypsum is readily available in the market place. High grade geologic deposits of gypsum found in Utah are mined for industrial purposes. Lower grade gypsum (that is, 90–94% gypsum) are sometimes mined here for use as a soil amendment. Gypsum is also available as a byproduct of phosphate fertilizer and other manufacturing processes. Because gypsum is so readily available in the market its cost to the consumer consists essentially of processing it into a desirable physical condition, and transport.

The amount of gypsum needed (GR) depends on the ESP, the soil texture, and the depth of soil to be reclaimed (e.g., 12 inches, 24 inches). Typical GR values range between 2 and 6 tons per acre and higher. It should be emphasized that applying gypsum without making provision for good drainage and excess leaching water will have little, if any, effect on the sodium problem.

For more information consult your Count Extension office or the Utah Fertilizer Guide (AG 431).

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