OBSERVATIONS ON THE MORPHOLOGY OF SOLONETZ SOILS IN NORTH CENTRAL NEBRASKA

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While engaged in Soil Survey work in the Prairie Plains region of north central Nebraska during the summers of 1932 and 1933, the writer found certain “types of soil formation” (Bodentypen, not soil types) in Brown County which were subsequently recognized in the State and Federal Soil Surveys covering Rock and Holt counties and are now known to extend westward into Cherry county.

These formations are intrazonal and hydromorphic in character and are mostly of the Solonetz type. However, they are unique in that they are sandy Solonetz in contrast to the clayey ones commonly described in soil literature.

The Prairie Plains region is a low wet country with a high water table, large areas of which are subject to seasonal inundations. Macro-relief is wanting, and over considerable areas differences in elevation are so slight as to be hardly noticeable, but are of primary importance in soil genesis. The soil forming material with local exceptions is sand. The following is a profile description of a sandy Solonetz soil under typical Prairie Plains conditions, which was observed about 2½ miles southwest of Ainsworth, at an elevation of about 2500 feet above sea level. The land surface is characterized by numerous small sandy hillocks rising 10 to 18 inches above the general land level. There is a slight slope to the east. The land is subject to intermittent inundation, especially during the spring, and the water table is almost continuously within a depth of 5 feet. The native vegetation consists largely of Andropogon with Bouteloua as a subdominant.

A

0-3”. Very dark grayish brown, very fine sandy loam, laminated.

A

3-5”. Ash gray layer, very fine sand with some amorphous silica, somewhat coherent, but easily crushed. It penetrates along cracks into the underlying horizon.

B

5-8”. Black clay loam, columnar. The columns have well rounded gray tops (biscuit-like in appearance). The silicious material penetrates the clay to about 4 mm. The columns are roughly rectangular or hexagonal, with a diameter averaging about 6 inches. They are not connected or are only loosely joined with neighboring columns to the depth of this horizon. After removal from their natural position the individual blocks break into sub-columns about 4 cm. in diameter, but are highly resistant to further crushing. Heavy root matting occurs along the breakage planes.

B

8-20.5”. Heavy dark olive-gray clay loam with irregular cloddy breakage. Salts, chiefly carbonates of calcium, appear in rather large, soft concretions up to 20 mm. long, 10 wide and 5 thick. They occur also in small spots, streaks and splotches but not in mycelial-like forms.

Many roots are along the breakage planes but few enter the clods. The organic matter penetrates into the soil material to a depth of 2 mm., making his portion of the clods very dark grayish-brown. Salts appear to be absent in cracks and are only rarely visible in the zone penetrated by organic matter. The humus coating becomes thinner with depth, and the color is correspondingly lighter.

From 15” downward the material has a tendency to break horizontally rather than vertically; salts are more disseminated, and the larger concretions are less numerous.

B

20.5-30.5”. Olive gray to light olive gray clay sand with a slight greenish tinge. Salts occur in streaks and seams mostly along the cracks which are penetrated by roots. Darker surface color in the breakage planes indicates humus coating. The breakage tendency is horizontal.

C

30.5-48”+. Light gray coarse to medium non-calcareous sand.

Besides this typical columnar Solonetz, other profiles representing less and more advanced stages of development were found. In some of the latter, disconnected large columns (exceeding 6” in diameter), or groups of columns, only slightly connected in their lower portions and surrounded by loose gray silicious “matrix”, all underlain by sand, were found as remnants of the formerly solid claypan.

B Horizon of Sand Solonetz exposed to show biscuit-like heads of columns.