ABSTRACT

The present investigation was undertaken with a view to study the morphology, important physical, physico-chemical and chemical characteristics to characterise and classify the soils of Banka and Bhagalpur districts under Chandan river system. Keeping these objectives in view, nine pedons, one each from Barahat, Banka, Sultanganj, Shambhuganj and Sabour blocks of Banka and Bhagalpur districts were studied in the field and soil samples were collected, processed and analysed in the laboratory as per standard procedures.

These soils were brown (10 YR 5/3) to yellowish brown (10 YR 5/4); dark grayish brown (10 YR 4/2) to light olive brown (2.5 Y 5/4) and dark yellowish brown (10 YR 3/4) to dark grayish brown (10 YR 4/2) in upper, middle and lower pedons respectively under moist conditions. The upper three pedons were sandy loam to sandy clay loam in texture and medium to lower pedons were clay in texture; angular to sub-angular in structure; neutral to slightly alkaline in reaction; very hard, very sticky and plastic as well as very firm under dry, wet and moist conditions respectively.
Polygonal horizontal and vertical cracks, ferruginous nodules were observed in almost all the pedons.

The macro-water stable aggregates were relatively higher than micro-aggregates. The total aggregates increase with depth in almost all the pedons. The surface soils had lower value of bulk density as compared to the sub-surface soils. The saturated hydraulic conductivity of these soils were found to be very slow to slow from upper to lower pedons. The infiltration rate were low to very low in class. The top soils were found to be lower soil penetration resistance as compared to sub-surface layers.

The values of EC (0.03 to 0.17 dSm\(^{-1}\)) indicated non-hazardous concentration of soluble salts. The organic carbon was found to be medium to low. These heavy textured soils were highly base saturated mainly with Ca\(^{2+}\) and Mg\(^{2+}\); they were low to medium in available nitrogen and available P\(_2\)O\(_5\) and medium in potash. It was further observed that these soils were generally sufficient in DTPA-extractable copper, iron and manganese whereas this was true generally in surface soils in case of available Zinc. The quality of irrigation water of canal water was under C\(_4\)S\(_1\) which was good for irrigation water to the crops.

The 2:1 lattice type of clay minerals were found in almost all the profiles. Pedons I to III was found to be dominant in illite followed by smectite and kaolinite whereas pedons IV to IX was found to be dominant in smectite followed by illite and kolinite. According to soil taxonomy, these soils were classified as fine, mixed, hyperthermic, typic hapludalfs (Pedons I to IV); Fine, mixed, hyperthermic, vertic ustochrepts (Pedon V); fine, mixed, hyperthermic, udic ustochrepts (Pedon VI); fine, hyperthermic, typic chromusterts (Pedons VII and IX) and very fine montmorillonite, hyperthermic, udic chromusterts (Pedon VIII) up to the family level.