

Original Research Article

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Estimation of Physical Properties of soil of Sri Ganganagar District-Rajasthan, India

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ABSTRACT

Keywords

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An estimation of physical properties of soil of block Raisinghnagar and Sri Vijayanagar of Sri Ganganagar district was carried out in 2016-17. The main objectives of this study was to carried out the survey, collection of information and analysis of physical properties of soil, for the analysis 8 sampling points were selected. Soil samples were collected at a depth of 0-15cm and 15-30 cm and 30-45cm and the study revealed that particle density ranges from 2.40 to 2.66 gcm^{-3} , bulk density ranges from 1.08 to 1.23 gcm^{-3} , water retaining capacity ranges from 43.40 to 60.50%, and specific gravity ranges from 1.74 to 2.39. A soil texture is classified from sandy soil to sandy loam soil. It clearly indicated that soil has good water holding capacity and has good physical condition. Soil is suitable for almost all tropical and sub-tropical crops and oil seeds.

Introduction

“Nutrients” may be defined as the chemical compounds required by an organism. The plant nutrients may be divided into macro-nutrients (primary and secondary nutrients) and micro-nutrients. Macro-nutrients are found and needed in plants in relatively higher amounts than micro-nutrients (Das, 2004).

Changes in land use and soil management can have a marked effect on the soil organic matter (OM) content. Several studies in the past have shown that deforestation and cultivation of virgin soils often lead to depletion of macro-nutrients (N, P, S) present as part of complex organic polymers.

Changes in the land use scenario and greediness of getting high return through intensive cultivation by the resource-rich farmers have resulted in changes in soil quality and leading to declined soil fertility (Singh and Singh, 2005).

Soil hydro-physical properties of soil may help in formulating improved water management strategies for improving the prospects of yield enhancement and stabilization of orchards in the region. Formulation of sound management strategy to improve water use efficiency will require a clear understanding of soil water functional

relationship, i.e. the capacity, intensity and rate variables (rate of water movement through soil) of moisture availability in the soils and relationship among them.

In Sri Ganganagar district rainfall less than 400mm, texture sandy to sandy loam, it contains a high percentage of soluble salt and has high pH value. It has varying percentage of calcium carbonate and generally poor in organic matter these soil are pale brown, single grained, deep and well drained. One million hectare area is under problematic soils (saline and alkaline). Due to scarcity of rainfall there is limited availability of ground water. The crops suffer due to high temperature and wind velocity. The soils are well supplied with potassium. Micro elemental deficiencies particularly zinc and sulphur has also been observed in pockets. Present investigation was useful in judging the deficiency of various element and thereby use of fertilizers depending on their status.

Hence, a detailed study for characterization and evaluation of soils is needed to realize the concept of soil health and quality analysis successfully. With this objective, a study has been undertaken in soil resources inventory for land use planning in Sri Ganganagar district of Rajasthan.

Materials and Methods

Sri Ganganagar is a Northern most district of Rajasthan state in Western India. The town of Sri Ganganagar is the district headquarters. Sri Ganganagar district is located between 28.8 to 30.6⁰ N latitude and 72.2 to 75.3⁰ E longitudes. Sri Ganganagar is situated at the point where the Sutlej waters enter Rajasthan. The region irrigated by the Gang canal and the Bhakhra canal tributaries.

Surface soil of the farmer's field from different village of Raisinghnagar block and

Sri Vijaynagar of Sri Ganganagar district, were sampled randomly to a depth of 0-15 cm, 15-30 cm 30-45 cm totally, 24 soil samples were collected from two tehsil of Sri Ganganagar, 4 villages were selected from each block and eight villages are selected they are 7KSD (V1), 6TK (V2), Slampura (V3), 6PTD (V4), 40GB (V5), 28GB (V6), 22GB (V7) and 46GB (V8). The soil sample was mixed thoroughly and about a half kilogram of composite samples from farmer's field of different villages was taken for analysis.

Results and Discussion

Of the following soils, particle density, bulk density, specific gravity, water retaining capacity of given in figure 1 to 4 and in table 1 the statistical data of soil texture was given. The highest value of particle density is found in 46GB (V8) village at depth 15-30 cm (2.65 gcm⁻³) and lowest value at depth 30-45 cm (2.40 gcm⁻³) of 22GB (V7) village. Soil Similar results were reported by Oyedele (2009). Bulk density in villages and depths was found to be significant at both levels. The highest value of is found at 22GB (V6) at depth 30-45cm (1.23gcm⁻³) and lowest value at depth 0-15cm (1.08gcm⁻³) of 46GB (V8), village. Similar results were reported by Chaudhari (2013).

Water retaining capacity was found highest at Slampura (V3) village at depth 0-15cm (60.50%) and lowest at 28GB (V6) village at depth of 30-45cm (43.40%). Similar results were reported by Sujatha *et al.*, (2016). Saturation of soil that is specific gravity was found highest at 6TK (V2) at depth 30-45cm (2.39) and lowest value founded at depth of 0-15cm (1.74) of 6PTD (V4) village soil. Soil textural classes (Table 1) were sandy soil and sandy loam soil which is varies depends on places. Analysis data graphs and tables are below.

Fig.1 Particle density values of soils of Sri Ganganagar district, Rajasthan

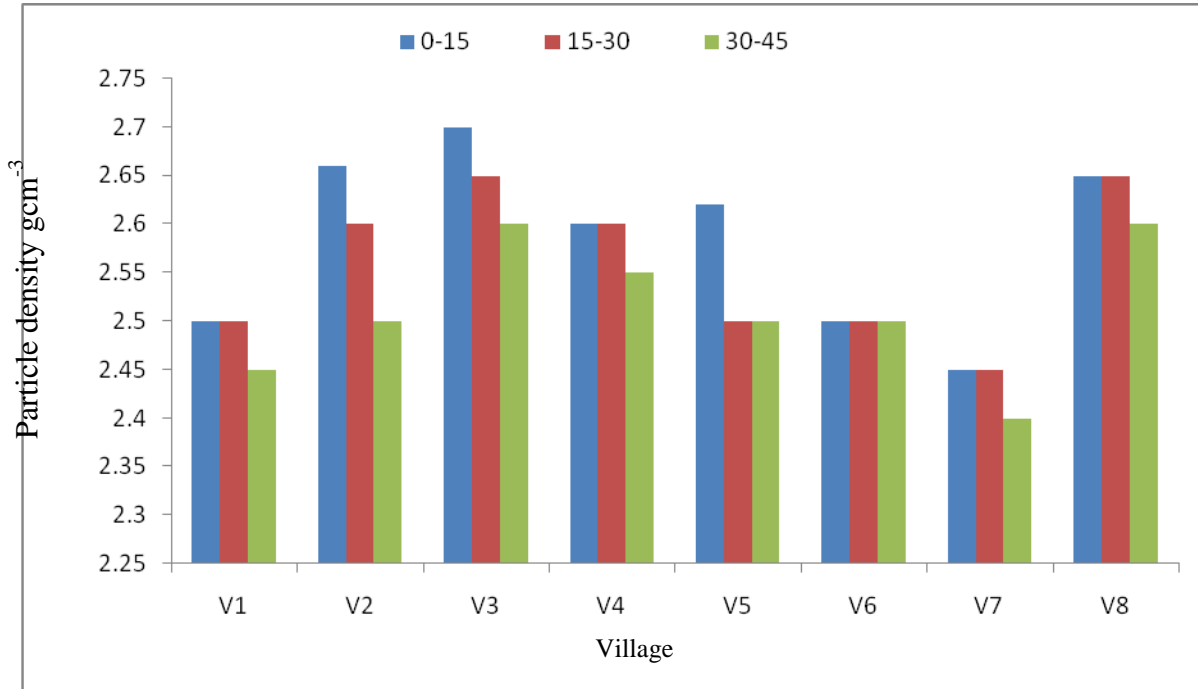


Fig.2 Bulk density values of soils of Sri Ganganagar district, Rajasthan

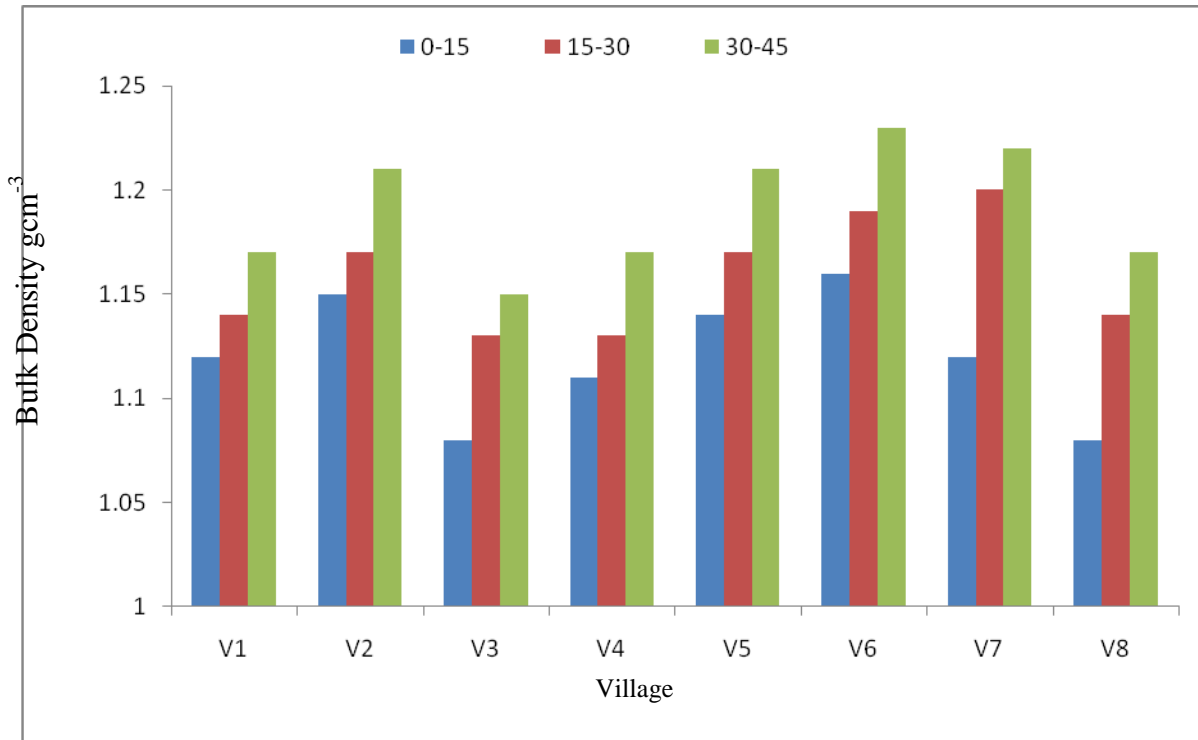


Fig.3 Water holding capacity values of soils of Sri Ganganagar district, Rajasthan

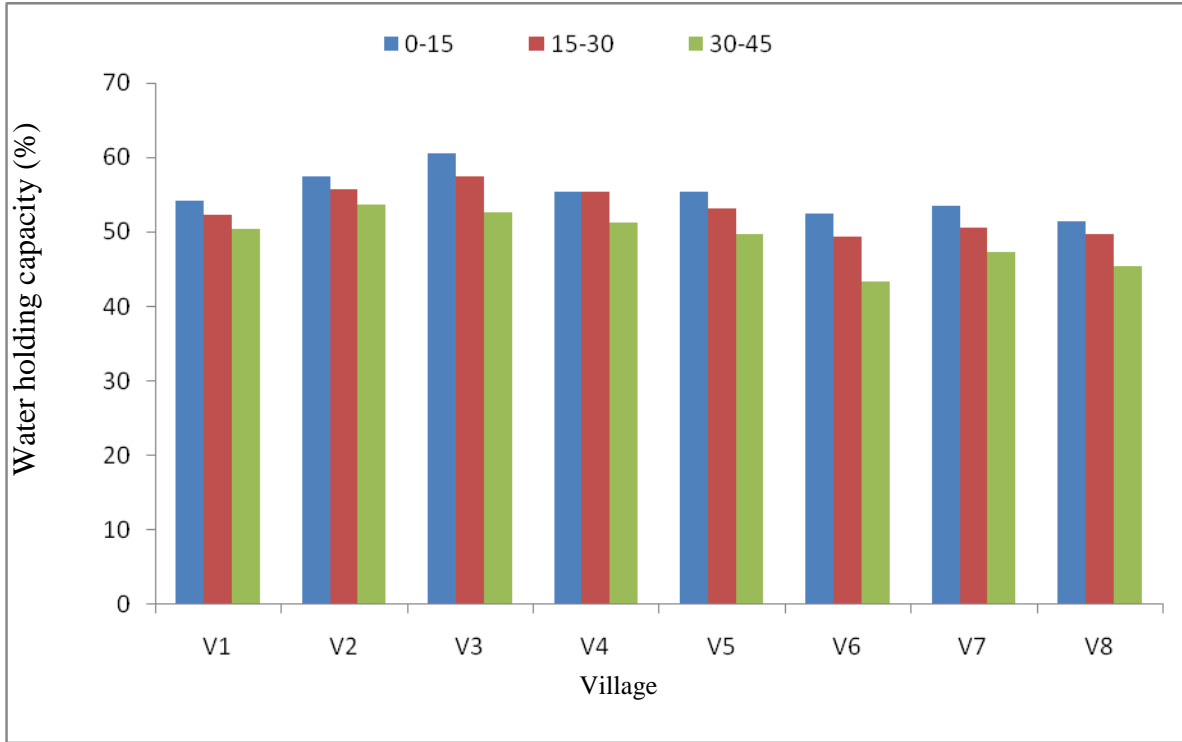


Fig.4 Specific gravity values of soils of Sri Ganganagar district, Rajasthan

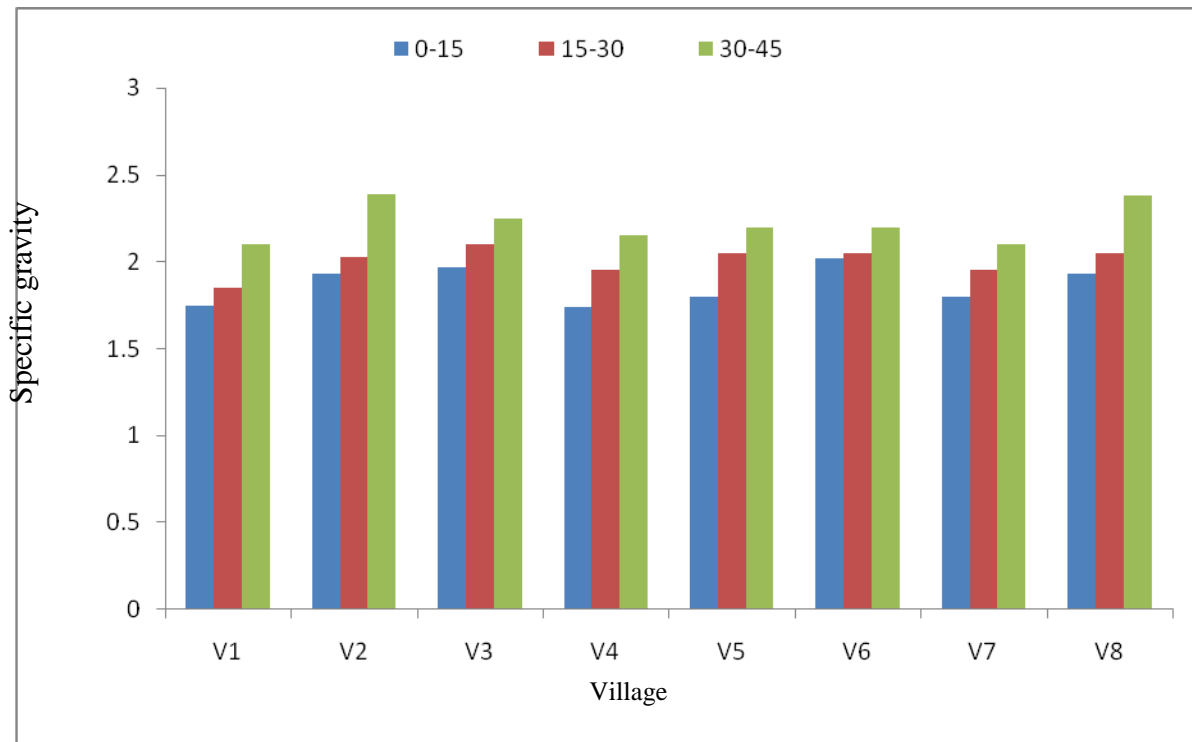


Table.1 Soil textural classes of soils of Sri Ganganagar district, Rajasthan

Villages	% Sand	% Silt	% Clay	Textural Class
7KSD(V ₁)	69.8	15.5	14.7	Sandy loam
6TK(V ₂)	73.3	18.5	8.20	Sandy loam
Slampura(V ₃)	84.8	7.3	7.9	Sandy
6PTD(V ₄)	87.3	5.9	6.8	Sandy
40GB(V ₅)	60.3	24.5	15.2	Sandy loam
28GB(V ₆)	75.7	10.0	11.0	Sandy loam
22GB(V ₇)	74.5	9.5	12.5	Sandy loam
46GB(V ₈)	67.3	19.6	13.1	Sandy loam

In conclusion, the present study of physical analysis of soil samples of Sri Ganganagar district has showed difference in the physical characteristics. Particle density of the soil was higher in top depth (0-15cm) of the soil compared to the middle and lower depth. Bulk density of the soil was increases with increase in depths, this may be because of Bulk density was dependent on calcareous and saline nature of soils. Water holding capacity of the soil was decreases with increase in depths, it may be because of presence of low amount of organic matter in lower depth compared to the top soil. Specific gravity decreases with the increase in depth because specific gravity does not express the actual situation of a water saturated soil, where the pore water is saline and this dissolved salt will start precipitating during the preparation of the soil sample. Subsequently, the weight and volume of the precipitated soil will be added to that of the original soil solids. Texture of soil is varies from sandy to sandy loam soil because from the fraction of each soil separates the sand separates are found relatively higher in comparison to other soil separates.

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