



ISSN 2278 – 0211 (Online)

Characterization and Classification of Pomegranate Growing Soils of Osmanabad District Maharashtra

Yogesh Pawar

Department of Soil Science and Agriculture Chemistry, College of Agriculture, Latur (M.S), India

Swati Kadam

Department of Soil Science and Agriculture Chemistry, College of Agriculture, Latur (M.S), India

Dr. P. H. Vaidya

Department of Soil Science and Agriculture Chemistry, College of Agriculture, Latur (M.S), India

Abstract:

Based on variation in physiography, soils and productivity of pomegranate, 15 were characterized in Osmanabad of Maharashtra their physical, chemical properties, nutritional status of soils and leaves these pedons were shallow (P_2, P_3, P_6, P_7 and P_9), moderately deep (P_4, P_8) and other were deep to very deep (P_1, P_5) and their munsell colour notation in soil colour of Lithic Ustorthents varies from dark brown (10 YR 4/3) to dark yellowish brown (10YR 4/4) in colour. Typic Ustochrepts soils are very dark gray (10YR 3/1) to dark brown (10YR 3/3), were as Typic Haplusterts soils are black (10 YR 2.5 /1) to very dark grayish brown (10 YR 3/2) in colour. soil structure varies from granular to angular blocky structure. The sub surface horizon shows a angular blocky structure due swell shrink phenomenon of smectitic clay minerals. The soils texture indicated that the pedons (P_2, P_3, P_6, P_7 and P_9) are loam, clay loam to sandy loam in texture, (P_4, P_8) clay to silty clay in texture (P_1, P_5) clay texture. Bulk density ranged from 1.34 to 1.79 Mgm^{-3} increased with depth The CEC of soils varied from (49.42 to 71.11 $cmol(P^+) kg^{-1}$) majority of surface and sub surface layer had relatively higher organic carbon content than the underlying ones. The available N,P and K content ranged from 88.8 to 389.89 $kg ha^{-1}$, 13.9 to 24.24 $kg ha^{-1}$, 207.20 to 557.13 $kg ha^{-1}$ respectively in different pedons. The DTPA –Zn was found to be different in all the soils.

1. Introduction

The Pomegranate (*Punica granatum* L.) belonging to the family Punicaceae with $2n=16$ number of the chromosome. It is one of the table fruit of tropical Maharashtra state accounts for 78 percent of the total area and 84 percent total production in country. Pomegranate is concentrated in 4-5 district such as Solapur, Nashik, Sangali, Ahmadnagar, Osmanabad and Beed. Maximum area of pomegranate and subtropical region.

Osmanabad district is the south western part of Marathwada region of Maharashtra state. Annual rainfall is 741-840 mm. Maximum and minimum temperature of this district is $43.3^{\circ}C$ and $11.9^{\circ}C$, respectively. The elevation is 600-750 m, from MSL and which comes under central Maharashtra Plateau and semi- arid region. Osmanabad district comprises 8 tahsils viz. Osmanabad, Tuljapur, Bhoom, Kallam, Paranda, Lohara, Omerga and Washi. The most of soil in osmanabad district is shallow soils generally underlined by murum layer. Murum layer developed from Deccan basalt is found to be rich in smectite mineral. Smectite is the important clay mineral for availability of nutrients in soil.

2. Materials and Methods

Depending on variability in yield maximum and minimum is 25 to 12 t/ha of pomegranate orchards. Nine pedons were studied chemical, physical and and morphological (Soil Survey Division staff 2000). There horizon wise soil samples were collected processed and analysed using standard analytical techniq (Schafer and singer 1976) piper 1950 jackson 1956 the soils were classified as per keys to soils taxonomy (Soil survey staff 2003) leaf samples from 8th leaf pair from tip collected in the month of August leaf were decontaminated using 2% tepol solution and 0.1 N HCL followed by dipped in distilled water and double distilled water in series samples were than dried $70^{\circ}C$ hot air oven till the constant weight achieved. Dry sample were grinded in grinder sample were digested in a di-acid mixture of $HNO_3: HClO_4$ (5:1). Aliquat of this solution was used for the determination of P, K, Ca, Mg, Fe, Mn,

Zn, & Cu for total N digestion was done using total P was determined using vanadomolybdic acid yellow colour method by spectrophotometer other nutrients were determined using atomic Absorption spectrophotometer.

3. Result and Discussion

Soil Characteristic: The soil colour of Lithic Ustorthents varies from dark brown (10 YR 4/3) to dark yellowish brown (10YR 4/4) in colour. Typic Ustochrepts soils are very dark gray (10YR 3/1) to dark brown (10YR 3/3), were as Typic Haplusterts soils are black (10 YR 2.5 /1) to very dark grayish brown (10 YR 3/2) in colour. Soils structure varies from granular to angular blocky in structure. The subsurface horizon shows a angular blocky structure due to swell shrink phenomenon of smectitic clay minerals

The soil texture indicated that the pedons P₂, P₃, P₆, P₇ and P₉ (Lithic Ustorthents) are loam, clay loam to sandy loam in texture. The Typic Ustochrepts (P₄, and P₈) have clay to silty clay in texture where as the Typic Haplusterts (P₁ and P₅) are clay in texture.

The bulk density of Typic Hyplusterts (P₁ and P₅) varies from 1.38 to 1.68 Mgm⁻³ and in Typic Ustochrepts (P₄ and P₈) varies from 1.55 to 1.79 Mgm⁻³ and Lithic Ustorthents (P₂, P₃, P₆, P₇ and P₉) soils varies from 1.29 to 1.78 Mgm⁻³. Higher bulk density value may be due to its more compactness and presence of weathered murrum layer in subsurface horizons. The saturated hydraulic conductivity of soil varies from 2.26 to 25.06 cm hr⁻¹. This variation attributed to textural difference. The soils are slightly to moderately alkaline in reaction with pH ranged from 7.3 to 8.02. Electrical Conductivity of the soil is < 1.0 dSm⁻¹ (0.31 to 0.74 dsm⁻¹). Which is well within safe limit of electrical conductivity range, designated for normal soils (Richards, 1954) and all soil comes under non saline class. The calcium carbonate of soils ranged from 3.0 to 21.1 per cent indicating the soils were calcareous in nature.

The available N, P and K ranged from 88.8 to 389.87, 13.9 to 24.24 and 207.20 to 557.13 kg ha⁻¹. In general the available nitrogen, phosphorous and potassium content of these soils was decreased with increase in depth, which was found to be rich in surface layer than subsurface layer, possibly due to application of fertilizers.

The soils of the study area under pomegranate Fe, Mn, Zn, Cu, and Br varies from 2.97 to 11.85, 4.70 to 11.57, 1.78 to 2.81, 2.06 to 5.3, 0.22 to 0.68 mg kg⁻¹, respectively. This indicated that the soils are high in Mn followed by Fe, Cu and Zn and found to be above critical limit.

The leaf nutrient status of pomegranate orchards in the study area shows that the total N, P, K Zn, Cu, Mn, Fe and B content in leaf ranged from 1.18 to 2.57 per cent, 0.12 to 0.15 per cent, 0.72 to 1.41 per cent, 20.5 to 29.3 mg kg⁻¹, 83.5 to 158.5 mg kg⁻¹, 21.5 to 55.4 mg kg⁻¹, 96.0 to 132.4 and 29.14 to 50.76 mg kg⁻¹ respectively and the significant positive correlation with available nutrients in soil (Table 4.15 b). This indicated that the availability of nutrients increased in soil increases the total nutrients content in plant.

4. Conclusion

The present study indicates that variability indicates the productivity of Pomegranate. The relatively shallow Inceptisols (underlain by saprolite) exhibited higher productivity as these soils offer better drainage than the deep vertisols. To refine the proposed suitability criteria, large number of pedons and productivity of pomegranate there in are to studied in this tract.

5. References

1. Anonymous, (2011-12). Quality of pomegranate fruit. (Annual report) NRCP, Solapur. pp.1-129.
2. Dhale. S.A. and Prasad J. (2009). Characterization and classification of Sweet Orange-growing soil of Jalna district, Maharashtra. J.Indian Soc. Soil Sci.57 (1): 11-17.
3. Jackson, M.L. (1958). Soil Chemical Analysis. Prentice Hall, Englewood Cliffs, New Jersey. 498p.
4. Likhar and Jagdish Prasad (2011). Characteristics and classification soil developed from different parent materials. J. of the Indian society of soil science Vol. 59, no 3, 209-217(2011).
5. Piper, C.S. (1950) Soil and Plant Analysis. The university of Adelaide, Adelaide, 368p.
6. Schafer, C. S. And Singer, M. J. (1976) A new method of measuring shrink-swell potential using soil paste. Soil Science Society of America Journal 40, 805-806
7. Singh, S.P. (2004) Commercial fruits, Kalyani Publication, New Delhi, pp.163-179.
8. Soil Survey Staff. (1975). Soil Taxonomy. USDA-SCS Agril. Handb.436, U.S. Govt. Printing Office, Washington, D.C.436.
9. Vaidya, P.H. and Mali, C.V. (2008). Effect of Gliricidia plantation on soil properties of very shallow soil underlain by murrum layer in Basaltic Area of Osmanabad district. National Seminar on developments in soil Science. 2008. 308 pp