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PHYSICO-CHEMICAL ANALYSIS OF SELECTED AGRICULTURAL SOIL SAMPLES IN JUNNAR TEHSIL OF PUNE DISTRICT, MAHARASHTRA

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Abstract: ***An experiment was undertaken at College of Agriculture Business Management, Narayangaon Maharashtra to investigate the physico- chemical properties of Onion and Tomato soil at ten different sites of Junnar tehsil of Pune District during February 2018 to May 2019. The soil parameters like soil pH, EC, Organic Carbon, Nitrogen, Potassium and Phosphorous content were analyzed. It was found that there was a marked variation in nutrients and parameters of various sample point in different farmers field. The results of the study show the low levels of Nitrogen, Phosphorous and Potassium in both sites. Also the organic matter is low during the study area.***
Keywords: ***Soil, Physico-Chemical, Higher.***

INTRODUCTION

Soil may be defined as a thin layer of earth's crust which serves as a natural medium for the growth of plants. It is the unconsolidated mineral matter that has been subjected to, and influenced by genetic and environmental factors – parent material, climate, organisms and topography all acting over a period of time. Soil differs from the parent material in the morphological, physical, chemical and biological properties. Also, soils differ among themselves in some or all the properties, depending on the differences in the genetic and environmental factors. Thus some soils are red, some are black; some are deep and some are shallow; some are coarse-textured and some are fine-textured. They serve in varying degree as a reservoir of nutrients and water for crops, provide mechanical anchorage and favourable tilth. The components of soils are mineral material, organic matter, water and air, the proportions of which vary and which together form a system for plant growth; hence the need to study the soils in perspective. Soil sampling is perhaps the most vital step for any soil analysis. As a very small fraction of the huge soil mass is used for analysis, it becomes extremely important to get a truly representative soil sample of the field.

Soil test based nutrient management has emerged as a key issue in efforts to increase agricultural productivity and production since optimal use of nutrients, based on soil analysis can improve crop productivity and minimize wastage of these nutrients, thus minimizing impact on environmental leading to bias through optimal production. Onions are a cool season crop. The germination of onions is slow at 6^0 to 7^0 C, the optimum germination temperature range is 10^0 to 35^0C, and the maximum temperature is 40^0 C. The onion crop is adapted to a growing season with air temperatures at 13^0 to 24^0 C. The tomato is a warm-season crop. The crop does well under an average monthly temperature of

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21^0C to 23^0C. Temperature and light intensity affect the fruit-set, pigmentation and nutritive value of the fruit. Long dry spell and heavy rainfall both shows detrimental effect on growth and fruiting.

Deficiencies of primary, secondary and micronutrients for both the crops have been observed in intensive cultivated areas. The present study was aimed to investigate the analysis of physicochemical in agriculture soil (Onion and Tomato) at Junnar tehsil of Pune district (MS). Physical parameters like pH, Electrical Conductivity (EC), Organic Carbon (%), Salinity, Soil Texture, Color and Chemical parameters of Nitrogen, Phosphorus, Potassium were analyzed.

MATERIALS AND METHODS

Study Area

The soil samples were collected from the area Junnar tehsil of Pune district (MS). The Junnar tehsil is located on the north part of Pune district in Maharashtra state of India. It lies between 19^o 12' north latitude to 73^o 58' east. The climate here is tropical. When compared with winter, the summers have much more rainfall. In Junnar, the average annual temperature is 24.4 °C. The average annual rainfall is 913 mm.

Soil sampling

Soil samples were collected randomly at 0 to 20 cm depths with ten plots, ten samples from each plot, respectively. In well sterilize polythene pouches. Onion and Tomato soil samples were air dried .Then they are ground using mortar and pestle and passed through 2 mm sieved. Sieved samples were mixed and stored for subsequent physical, chemical analysis.

Soil sample were collected from following Farmers fields

Sample Number	Field sample	Name of the farmer	Village	Field from where samples collected
1	O-1	Shankar Kondaji Bochare	Sawargaon	Onion
2	O-2	Dasharath Tukaram Bochare	Umbraj	Onion
3.	O-3	Pratik Tanaji Dhule	Ale	Onion
4	O-4	Ganesh Kisan Lamkhede	Otur	Onion
5	O-5	Vittha Suresh Durafe	Narayangaon	Onion
6	T-1	Dharma Budha Dudhavade	Ambe gavhan	Tomato
7	T-2	Mangesh Tukaram Sahane	Padali	Tomato
8	T-3	Auti Shankar Kisan	Khodad	Tomato
9	T-4	Nalawade Mohan Sakharam	Dholwad	Tomato
10	T-5	Khilari Balasaheb Dadu	Rajuri	Tomato

O-Onion, T-Tomato

The collected samples were analyzed for major Physical and Chemical soil quality parameter like pH, Electrical Conductivity (EC), and Organic Carbon (OC), Nitrogen (N), Potassium (K) and Phosphorus (P) analysis by standard method (DIRD Pune 2009).

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RESULTS AND DISCUSSION

Physico-chemical analysis of selected agricultural soil samples in Junnar Tehsil of Pune District, Maharashtra

Table 1. Physicochemical Parameters of Soil Samples

Sr.No	Parameters	O1	O2	O3	O4	O5	T1	T2	T3	T4	T5
1	Soil Nature	SCL	SCL	SCL	SCL	SCL	SCL	SCL	SCL	SCL	SCL
2	Ph	7.2	6.6	6.5	6.4	7.1	6.4	6.4	6.7	6.8	6.9
3	E.C	0.4	0.2	0.3	0.4	0.2	0.11	0.14	0.13	0.20	0.16
4	Salinity	0.10	0.14	0.15	0.13	0.14	0.11	0.12	0.13	0.12	0.11
5	Organic Carbon (%)	0.31	0.35	0.33	0.31	0.29	0.39	0.40	0.36	0.37	0.39
6	Available Nitrogen (Kg/h)	210	225	217	209	222	169	182	177	198	186
7	Phosphourus (Kg/h)	44	37	61	45	69	55	61	59	67	71
8	Potassium (Kg/h)	121	110	127	117	133	201	135	141	133	149

The physicochemical observations of ten soils of Onion and Tomato field samples were presented in Table-1. The nature of soil in study area was Sand Clay Loam from all samples. In the present study, pH ranges from 6.4 to 7.2. The soil pH was found to be slightly acidic to neutral in all soils. Total biomass was greatest for Onion plants grown at a solution pH of 6.5.(C.D Kane et al,2006).The pH of soil is one of the most important parameter. Soil EC is an important characteristic that can be used for nutrient availability and the soluble salt present in the soil. Soil electrical conductivity (EC) is a measurement that correlates with soil properties that affect crop productivity. The conductivity values ranges from 0.11 to 0.4 µS/cm. The electrical conductivity of field sample O1 and O4 was found to be higher as compared to rest of field samples. Madhava Sarma (2015) studied crops vary to the degree of sensitivity to salts, but most crops tolerate levels of 1.1 or less with no effect on yield. Excess salinity may cause moisture stress within the plant. However, too pure of can also be detrimental. Water with too few salts can lead to surface soil dispersion and soil crusting. Salinity is a measure of the total amount of soluble salts in soil. As soluble salt levels increase, it becomes more difficult for plants to extract water from soil. The salinity values ranges from 0.10 to 0.15 dS/cm. The salinity values for field sample Onion was found to be higher as compared to field sample Tomato. Salinity values above 2 dS/m begin to cause problems with salt sensitive plants, and values above 4 dS/m are problems for many garden and landscape plants (Vernon Paren 2010).

The Organic Carbon ranges from 0.29 to 0.40 %. Soil organic carbon is remarkably low in study area. This shows the potential of Poor soil organic carbon (SOC) reduces microbial biomass, activity, and nutrient mineralization due to a shortage of energy sources. Soil organic carbon results in less diversity in soil biota with a risk of the food chain equilibrium being disrupted which can cause disturbance in the soil environment (E.G., plant pest and disease increase, accumulation of toxic substances (Venkata Ramana 2015). Available nitrogen (N) ranges between 169 to 225 kg/ha. Available phosphorus (P) ranges between 37 to 71 kg/ha. Available potassium is ranged between 110 to 201 kg/ha.

Conclusion

The soil physicochemical play as an important role in agriculture for better plant growth. From the results of the work carried out, it can be concluded that the pH of soil samples were slightly acidic to neutral in all soils and Conductivity, Organic carbon was found to be very low. It is also observed that available nitrogen (kg/ha) was found to be higher in samples collected from Onion field while available phosphorus(Kg/ha) and available potassium (kg/ha) were found to be higher in field samples collected from Tomato field.

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