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ORIGINAL ARTICLE

Soil fertility Evaluation and Management from Solapur district

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ABSTRACT
The current study was carried out to assess the soil fertility evaluation with regard to traditional soil testing in the Solapur district. This study presents the soil spatial variability for soil texture, pH, EC, organic carbon, available –N, P, K, S, Zn, Cu, Mn and Fe along with multi nutrient deficiency . The information generated will be useful for managing soil resources of the Solapur district on sustainable basis. Soil test-based fertility management is an effective tool for increasing productivity of agricultural soils that have high degree of spatial variability resulting from the combined effects of physical, chemical or biological processes .In India, these include the prevalence of small holding systems of farming as well as lack of infrastructural facilities for extensive soil testing. Besides these crops, oilseed, pulses, fodder and vegetables etc. are grown. The increased production per unit area of these crops led to more removal of nutrients and there deficiency of nutrients. The information on micro nutrients status in district is inadequate and hence an attempt has been made for the delineation of these nutrients.
Key Words- *Micronutrients, Soil fertility, Productivity, Yield, physiochemical properties.*

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INTRODUCTION

The challenge of crop nutrient management is to balance production and economic optimization with environmental impacts. Successful crop production is dependent upon effective nutrient management that includes identifying nutrient deficiencies and excesses. Soil sampling and soil testing provides an opportunity to check the "soil nutrient account" and is critical for developing a nutrient management plan. Knowing the nutrient requirements and nutrient removal by a crop is important for achieving a balance of nutrient inputs and crop removal outputs. Reliable nutrient recommendations are dependent upon accurate soil tests and crop nutrient calibrations based on extensive field research. At present, the greatest challenge before Indian agriculture is to boost food production and productivity as well as sustainability of agriculture as a whole [1-8]. There are problems that impose limits on these objectives or goals which raise serious concerns about national food security. These include deterioration of soil fertility, increase in cost of production, and low diversity of production systems. However, the need for improved crop productivity is more now than ever because of the increasing population and the consequent pressures from competing demands for land over time. Soil fertility is an important factor, which determines the growth of plant. Soil fertility is determined by the presence or absence of nutrients i.e. macro and micronutrients. Out of the 16 plants nutrients Boron, Copper, Iron, Manganese, Molybdenum, Zinc and Chlorine are referred as micronutrients. These elements are required in minute quantities for plant growth. The main sources of these micronutrients are parent material, sewage sludge, cow dung, farmyard manure and organic matter. These nutrients are present in small amounts in soils [9-15]. The availability of micronutrients is particularly sensitive to changes in soil environment. The factors that affect the contents of such micronutrients are organic matter, soil pH, lime content, sand, silt, and clay contents revealed from different research experiments..

MATERIAL AND METHODS

The experiment was conducted rabi session of 2015-16 at the research cum Solapur soil testing laboratory in solapur Maharashtra .The soil sample collected is good representative soil samples is first criteria applied. The analytical results are expected to be representative for the entire field.
Field sampling and soil testing has become an important tool for assessing soil fertility and arriving at proper fertilizer recommendations. It's also a valuable management aid for studying soil changes

resulting from cropping practices and for diagnosing specific cropping problems. Soil testing provides an index for the nutrient availability in soil and is a critical step in nutrient management planning. Soil sampling technique, timing of sampling and type of analysis need to be considered for accurate results.
This study was designed to determine the status of micronutrients in wheat growing areas of Solapur District. Represented soil samples were collected with wooden tools to avoid any contamination of the soils. Four to six pits were dug for each sample. From each pit sample was collected at a depth 0-30 cm. A composite sample of about 1 kg was taken through mixing of represented soil sample. All composite samples were dried, ground with wooden mottle and passed through 2 mm sieve. After sieving all the samples were packed in the polythene bags for laboratory investigations. Analyzed for micronutrient (Fe, Cu, Zn, Mn and B). Standard analytical methods used in the analysis of soil samples.
Sample Preparation:-Preparing samples for laboratory analysis is just as important as collecting the soil sample. Remove half a kilogram, and air dry to stop nitrate build-up. To air dry, spread a thin layer of soil on a clean piece of paper, plastic sheets or clean shallow containers (plastic, aluminum, etc) in a clean room at room temperature. Do not dry with artificial heat. Some laboratories accept moist samples, but these must be delivered to the laboratory the same day as when they are collected. Samples can also be stored in a refrigerator for a couple of days or frozen if sample delivery is delayed. Provide complete information for each soil sample on the sheet supplied.
Laboratory Analysis-:- Research in Alberta indicates that the typical soil analyses package for surface (0-15 or 0-30 cm) agricultural soils should include soil tests for nitrogen, available phosphorus, available potassium, and extractable sulfur, plus soil pH and salinity (electrical conductivity). If possible, the nitrate and sulfur analysis should be completed for subsurface soil samples. Additional analyses for micronutrients (Boron, Chlorine, Copper, Iron, Manganese or Zinc), or organic matter for the surface soil samples may be requested. Some laboratories may provide additional analyses as part of their routine analysis package that they may use to improve interpretations and recommendations. For analysis of soil sample following method is use-
Lindsay and Norvell [16] developed a method using DTPA (DiethyleneTriaminePenta Acetic Acid) which was found useful for separating soils deficient and non-deficient categories for micronutrients and macronutrients. Ten gram of soil sample will be taken from each set in a conical flask. 20 ml of the DTPA extracting solution will be added to it. All the flasks will be corked well and placed upright on a horizontal shaker .The samples will be shaken for two hours with a speed of 120 cycles per minute. Then the suspension will be filtered through filter paper No. 42. The filtrate will be stored in a polypropylene bottle the level of micronutrients will be estimated from these extracts by Atomic Absorption Spectrophotometer.

RESULTS ANDDISCUSSION

Available Soil Nutrients: To study this, there were surface soil samples collected from growing fields of Solapur . The soils were analyzed for physicochemical properties and status of available micronutrients. The results shows that majority of the soil sites were alkaline in nature with medium amount of organic matter and lime content. Considering textural classes most of the sites were sandy loam. The soils of Solapur district are neutral to alkaline in soil reaction, safe in electrical conductivity, medium in organic carbon content and calcareous in nature. The soil p^H range from 6.88 to 8.06.The organic matter content ranged from 0.65 to 2.07 % . The lime content ranged from 1.00 to 9.37 % as reported in Table No.1.

Table-No.1: Range and average values of Physiochemical properties of tested soil Samples from district Solapur.

Sr. No	Physiochemical Properties	Range
1	**Soil P^H**	6.88-8.06
2	**Organic Matter %**	0.65-2.07
3	**Lime %**	1.00-9.37
4	**Sand %**	31.12-81.12
5	**Silt %**	8.56-46.00
6	**Clay %**	8.88-26.88

According to the concept of soil nutrient index soils are deficient in Zinc, Iron, and Boron while sufficient in Copper and Manganese content .*Soil micronutrients in the study area* varied with depth and elevation, though the variations were not statistically significant. The average concentrations of B, Cu, Fe, Mn, and

Zn were in sufficient ranges for supporting plant growth. Soil pH increased as descending down slope from strong acidic in the high elevation to strong alkaline in the lowlands. Soil pH was shown to correlate positively with B, Fe, and Mn and negatively with Cu and Zn. Correlations among micronutrients were significant for Fe versus Mn, B versus Zn, B versus Cu, and Cu versus Zn. Comparing the extractable micronutrients (Iron, Copper, Zinc and Manganese) and hot water soluble Boron content range and average value of micronutrient in soil of the studied area are presented in Table No.2.

Table- No.2: Range and average values of Micronutrients of tested soil samples of district Solapur.

Nutrients	An Ideal Nutrient Condition For crop	Actual Nutrient Condition	
		Irrigated	Non-irrigated
pH	6.5- 7.8	7.6	7.96
Nitrogen	128	326.14	175.62
Phosphorus	46	47.04	38.51
Potassium (K)	219	680	616
Calcium	27	75	35
Magnesium	19	46	23
Sulphur	22	37	15.62
Iron (Fe)	1.8	2.74	3.23
Zinc	0.5	2.87	0.45
Manganese	0.5	4.81	5.03
Copper (Cu)	0.15	1.87	2.38

CONCLUSION

Proper nutrition is essential for satisfactory crop growth and production and use of soil tests can help to determine the status of plant available nutrients to develop fertilizer recommendations to achieve optimum crop production. The profit potential for farmers depends on producing enough crop per acre to keep production costs below the selling price. Efficient application of the correct types and amounts of fertilizers and manure for the supply of the nutrients is an important part of achieving profitable yields and minimizing environmental impacts. Deficiency of micronutrients in soil may cause decline in crop yields and total productivity in future. As par the nutrient index value, soil factors such as pH, EC, OC and CaCO3 were contributed lower fertility status in relation to availability of micronutrients. Strategies involving the soil application of micronutrients by seed treatment, foliar sprays or use of organic manures can adopt to sustain an optimum yield of crop.

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