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ASSESSMENT OF NUTRIENT STATUS OF SOIL AROUND THE COASTAL TAHSIL OF RATNAGIRI, MAHARASHTRA (INDIA)

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ABSTRACT:

Soil fertility is very important for growth of any crop. In present study soil fertility of rice field in costal tahsil of Ratnagiri is studied with 10 samplining sites. The parameters were analyesed for pH, electrical conductivity, Organic carbon, Nitrogen, Phosphorous, and Potassium by standard method. The results of soil are rich in nutrients, organic carbon is high, Nitrogen is low but fairly good in phosphorous and potassium is high in soil samples. The study suggests that farmers need to take up yearly soil testing; it may help not only higher plant production but also understand a general situation of soil. It is also suggested that farmers should use Biofertilizer at least 20% per year.

Keywords: *Fertility, Biofertilizer, Nutrients, Production.*

INTRODUCTION:

Soil is the surface on the earth's crust where geology and biology meet and the land surface that provides a home to plant, animal and microbial life (Pelczar et al., 1993). Soil fertility is one of the important factors controlling yields of the crops. Soil characterization in relation to evaluation of fertility status of the soils of an area or region is an important aspect in context of sustainable agriculture production (Patil and Saptarshi 2013). The present study area is in coastal area of Maharashtra i.e. in Konkan. Bell & Dell (2008) opined that the optimum plant growth and crop yield depends on the availability nutrients in soil which in turn is controlled by physico-chemical properties like- soil texture, organic carbon and calcium carbonate, cation exchange capacity, pH and electrical conductivity of soil. The 5% of Soil consist of organic

matter and 95% of the soil consist of inorganic matter (Joseph and Nagendran 2005; Camberto James 2001). Ellis and Foth (1997) opined that soil fertility and plant nutrition are two closely related subjects that emphasize the forms and availability of nutrients in soils, their movement to and their uptake by roots, and the utilization of nutrients within plants. Without maintaining soil fertility, one cannot talk about increment of agricultural production in feeding the alarmingly increasing population. Several workers like More (2008), Bhagat (2002), Singh (2008), Vaidya and Sahastrbuddhe (1996) clearly mentioned the importance of minerals, moisture, air and organic matter as derived from parent rock and climatic factors along with the biological setup. Therefore, to get optimum, sustained-long lasting and self-sufficient crop production, soil fertility has to be maintained.

STUDY AREA:

The study area is located at Ratnagiri in the Maharashtra state to the west coast of India. Using GPS all the 10 locations are focused on map, for further details following table with proper Longitude & Latitude will make easy to understand location measured by GPS.

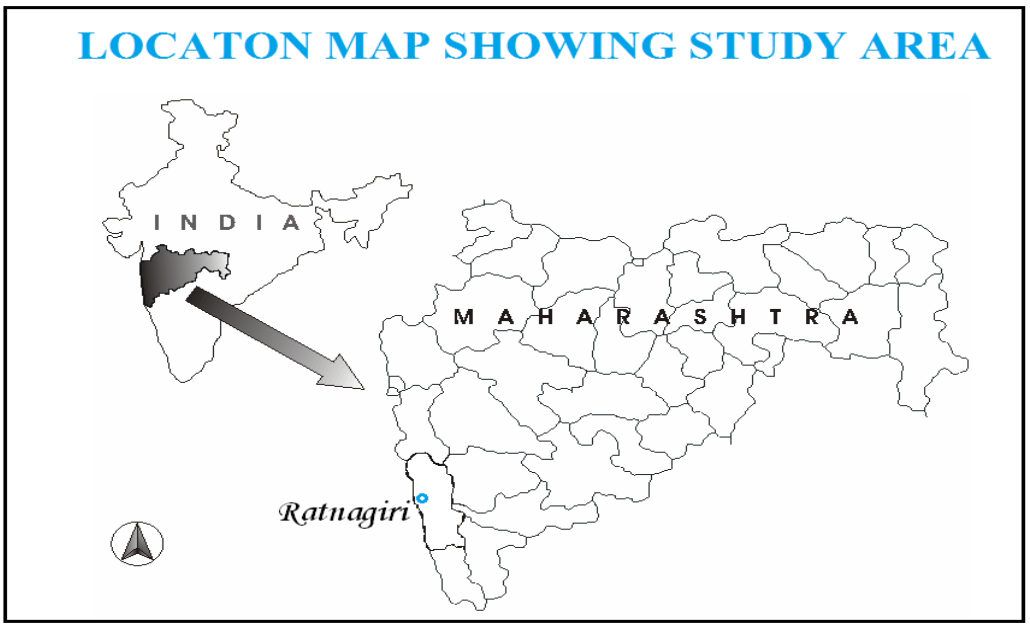

Fig.No.: 1 Study Area

Table No:1 Latitude & Longitude of Sampling Stations

Sr. No.	Location	Latitude	Longitude
1	Nandivade	N-17^{0}17' 08.8"	E-073^{0}12' 27.2"
2	Undi	N-17^{0}14' 06.3"	E-073^{0}14' 15.2"
3	Varawade	N-17^{0}12' 26.8"	E-073^{0}14' 54.3"
4	Malgund	N-17^{0}10' 21.9"	E-073^{0}15' 40.4"
5	Neware	N-17^{0}05' 37.4"	E-073^{0}17' 14.9"
6	Kalbadevi	N-17^{0}03' 23.3"	E-073^{0}17' 29.6"
7	Shirgaon	N-17^{0}01' 51.7"	E-073^{0}17' 20.3"
8	Ranpur	N-16^{0}53' 48.0"	E-073^{0}18' 28.4"
9	Pawas	N-16^{0}52' 50.7"	E-073^{0}19' 23.2"
10	Purnagad	N-16^{0}50' 08.1"	E-073^{0}19' 03.2"

MATERIALS AND METHODS:

Soil samples (0-15 cm) were collected from 10 sites (Fig No: 01) covering 10 revenue villages in the Ratnagiri tahsil. Soils were completely air dried and sieved through 2mm sieve and stored in properly labeled plastic bags for analysis. The names of the sampling stations are given in Table No: 1. The processed soil samples were analyzed for basic soil parameters (pH, EC, OC) and for macronutrients (N, P, K) by using standard procedures set by Ministry of Agriculture, Government of India (MOAGOI 2011).

OBSERVATIONS:

Table No: 2 Ratnagiri Costal Area Soil Parameters.

Sr. No	Location	pH	E.C mhoss	Organic Carbon 'OC' %	Nitrogen 'N' Kg/ha	Phosphorus 'P' Kg/ha	Potassium 'K' Kg/ha
1	Nandivade	5.7	0.85	1.19	168	05	282
2	Undi	5.4	0.87	1.32	164	09	577
3	Varawade	6.1	0.11	1.76	190	22	538
4	Malgund	5.4	0.75	1.12	181	10	255
5	Neware	5.5	0.70	0.96	203	16	806
6	Kalbadevi	5.4	0.10	1.49	219	25	201
7	Shirgaon	5.3	0.70	1.54	210	13	560
8	Ranpur	5.4	0.77	2.52	152	19	309
9	Pawas	5.4	0.82	1.44	177	06	361
10	Purnagad	5.5	0.79	1.85	224	15	846
	Average	5.5	0.64	1.51	188	14	473

RESULTS AND DISCUSSION:

pH:

Soil pH is the one the driving forces effecting overall soil fertility and the management. It directly and indirectly affects the ability of plants to utilize soil nutrients. The pH influences chemical solubility and availability of plant essential nutrients, pesticide performance, and organic matter decomposition (Prasad and Powar 1997). pH of soil depends on relative amount of the absorbed hydrogen and metallic ions, it provides a good information about the chemical nature of the soil. Soil pH is the one of the driving forces effecting & the management. It directly & indirectly affects the ability of plants. The pH range of coastal area is 6.5-7.5 and actually the concluding average pH of study area is 5.5, which is low but good for paddy crops in laterite soil.

Electrical Conductivity (EC):

It is the measures of current carrying capacity, gives a clear idea of soluble salts present in soil. The standard conductivity of coastal zone is 0-2 mhoss & the all samples are ranges between 0-2 mhoss & that's salt free in nature.

Table No: 3 General Interpretation of Electrical Conductivity values (MOAGOI 2011).

Soil	EC mhoss	No. of Samples
Salt Free	0-2	1,2,3,4,5,6,7, 8,9,10 **(100%)**
Slightly Saline	4-8	Nil
Mod Saline	8-15	Nil
Highly Saline	<15	Nil

Organic Carbon (OC):

Soil organic Carbon of plant and animal residues at various stages of decomposition, cells and tissues of soil organisms, and well-decomposed substances (Brady and Weil, 1999). It increases the cation exchange capacity and water holding capacity by helping to bind particles into aggregates. It prevents nutrient leaching and is integral to organic acids

that make minerals available to plants. All Soil samples are having high organic carbon.

Table No : 4 General Interpretation of Organic Carbon (MOAGOI 2011).

Soil	Organic Carbon 'OC' %	No. of Samples
Low	< 0.50	Nil
Medium	0.50 to 0.75	Nil
High	> 0.75	1,2,3,4,5,6,7, 8,9,10 **(100%)**

Nitrogen (N): Nitrogen is an integral component of amino acids that make up the protein and enzymes in all living organisms. (Camberato 2001). It is basic nutrient & make up 1-4% of dry weight of plants and it forms chlorophyll, acetic acid, proteins, alkaloids & protoplasm. The value of Nitrogen is < 280 kg./ha for all soil sample, which is low in study area so farmers has to require use Nitrogen fertilizers so as to increase production.

Phosphorus (P): High soil Phosphorus status allows greater flexibility in use of all fertilizer Nutrients (Tiwari 2001). It is an essential element classified as a macronutrient which simulates early plant growth and hastens maturity. In study area the phosphorus value is low in 3 samples i.e.30%, Medium in 6 samples i.e. 60%, High in only 1 i.e.10%.

Potassium(K): Potassium (K) is one of the three main pillars of balanced fertilizer use, along with nitrogen (N) and phosphorus (P) (Hasan 2002). It is associated with movement of water, nutrients and carbohydrates in plant tissue. In study area the potassium value is Medium in 2 samples i.e. 20%, High in only 8 i.e. 80%.

Table No: 04 Nutrient Status of Soil Generally Followed At National Level (MOAGOI 2011).

Nutrients	SOIL FERTILITY RATING		
	Low	Medium	High
Av. Nitrogen 'N' (Kg/ha)	**< 280**	**280-560**	**> 560**
No. of Samples	1,2,3,4,5,6,7, 8,9,10 **(100%)**	Nil	Nil
Av. Phosphorous 'P' (Kg/ha)	**<10**	**10-24.6**	**>24.6**
No. of Samples	1,2,9 **(30%)**	3,4,5,7,8, 10 **(60%)**	6 **(10%)**
Av. Potassium 'K' (Kg/ha)	**<108**	**108-280**	**>280**
No. of Samples	Nil	4,6 **(20%)**	1,2,3,5,7,8, 9,10 **(80%)**

CONCLUSION:

The pH & EC of study area is fairly good for agriculture. However, Organic Carbon is high in all samples, Pottasium is medium in 20% of samples and high in 80% of samples. Phosphorous values are low in 30% of the samples, medium in 60% of samples and high in 10% samples in study area. Whereas Nitrogen values are low in all samples.

The overall nutrient status is good for paddy crop, based on base line data proposed in research work, farmers are suggested to take up yearly soil testing to know idea of nutrient required and add required nutrient is before plantation of rice in fields. Considering the results of soil analysis & field observation it may be suggested that the farmers should use water resources properly & crop diversity maintained without compromising profitability. This may further be reinforced by increasing use of Biofertilizer replacing chemical fertilizer at least 20% per year. If this policy is accepted by majority of farmers the agriculture as a medium of utilizing soil resources can become sustainable in future.

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