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A VERTICAL AND HORIZONTAL DISTRIBUTION OF SOIL PARAMETERS IN INTENSIVE AGRICULTURE ZONE AT CATCHMENT AREA OF MORNA RIVER AND EFFECT ON FERTILITY OF CANE

Dr. V. A. Kalantre

PG Department of Chemistry, Balasaheb Desai college,
 Patan Dist - Satara (M.S.).

ABSTRACT:

Western Ghats contains rich quality of soil towards the fertility of land. Morana river provide a good quality of soil in it's catchment area. The region around the river having land which contains different amount of Organic carbon, N, K, Ca, S and P. They are participated in the fertility of soil. The objective of this study was to determine such a parameters using different analytical instruments such as pH meter, conductometer, visible spectrophotometer, and S.T.F.R.T.

instrument. From those results, it's observed that it needs to increase soil fertility for to increase the crop yield like the cane, rice, and groundnut etc. Our work is very important for farmers residing in this area to improve their soil quality and fertility.

KEYWORDS: Soil, Parameters, Fertility, Quality, Instruments.

INTRODUCTION

Soil is the uppermost layer of variable depth of the earth consisting of loose material, which is the main support for Natural vegetation and other life forms of our planet soil is 'a Natural surface layer containing living matter and supports various tissues'. Soil is composed of different sized inorganic particulars, reactive and stable forms of organic matter, a myriad of living organism, water and gases. Soil organic matter is an important Name of Village in evaluating Management system of the forest soil fertility [1]. The forest soil vary unphysical- chemical

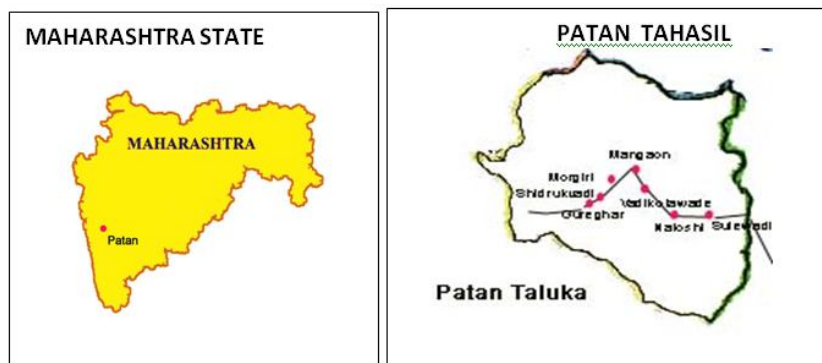
changes with time and space reting in variation among topography, climate, weathering processes, vegetation cover and microbial activities and also biotic and abiotic, factors [2]. The Western Ghats comprises and area of around 160000 km², with and elevation ranges from 300-2700 m mean sea level. It covers 34 biodiversity hotspots of the world and are a chain of mountain ranges stretching north to south along the western peninsular India.

The Western Ghats of Maharashtra lays in middle states of India covers 20% of its geographical area. Maharashtra is biodiversity rich region which has one of the mega diversities of the world, which comprises of climate, topography and soil. The Western Ghats of Maharashtra is

also known as "Sahyadri." The soils have rich sources of nutrients and help to serve as media for forest trees and thus aid for evaluating the fertility status. The types of soil present in Western Ghats of Maharashtra are red, red sandy, black soil and laterite soils. The castor is primary food plant of eri silkworm, besides play an important role in oil, seeds production in the world

MATERIALS AND METHODS –

Study area:



The study area consist of eight selected regions of Western Ghats of Maharashtra in PatanTahasil comprising ,Gureghar , Shudrak, Morgiri, Wadi-Kothawade , Mangaon , Natoshi , Kusurund , Sulewadiat the catchment area of Morna comparison [fig -1]

COLLECTION OF SAMPLES:

The soil samples were collected from 5-6 spots from each region at a depth of 45cm with , V shape pit by scraping the sides to collect 250 to 500 gm of soil from each spot . The collected samples were mixed thoroughly an removed unwanted materials and pebbles. Further , composite samples of 250 gm was collected from each region by adopting quadrant technique and were shade dried for 2-3 days and sieved with sieve plate of 2mm size and kept in air tight container . The soil samples were used for analyzing the following chemical properties.

SOIL ANALYSIS TERMS:

A) Soil pH :

The soil pH measures active soil acidity or alkalinity. A pH of 7.0 is neutral. Values lower than 7.0 are acid; values higher than 7.0 are alkaline. Usually the most desirable pH range for mineral soil is 6.0 to 7.0 and for organic soil 5.0 to 5.5. The soil pH is the value that should be maintained in the pH range most desirable for the crop to be grown.

B) Phosphorous :

The Phosphorous test measures the available phosphorous to the plant. The optimum level will vary with crop, yield and soil physical conditions, but for most field crops a medium to optimum rating is adequate. For soils with pH above 7.3 the sodium bicarbonate test will determine the available P.

C) Potassium :

This test is measures available potassium. The optimum level will vary with crop, yield, soil type, soil physical condition and other soil related Name of Village. Generally high level of Potassium are sandy and low in organic matter. Optimum level colored. Coarse-textured soils, any range from 90 to 125 lbs/acre. On dark colored heavy textured soil level ranging from 125 to 400 lbs/acre may be required.

DETERMINATOSHIION OF SOIL pH

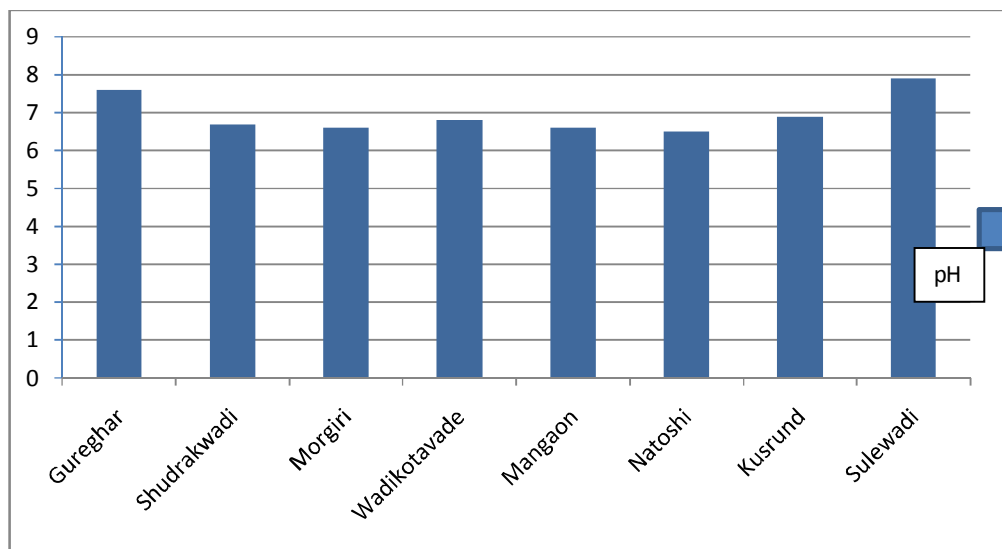
• Acidity and Alkalinity:

- 1) Take the clean beaker and add 20gm of soil sample.
- 2) Then add 100ml of distilled water and stir the solution and immediately measure the pH

RESULTS AND DISCUSSION:

Soil pH: The soil pH influences the rate of nutrients release through its influence on decomposition, carbon exchange capacity and solubility of materials. Further, soil pH influences plant growth by way of improving the soil physical condition and nutrients availability, whereas, high or low pH of nutrient medium as adverse effect on plant growth. In the study, soil pH in the selected regions of Western Ghats of Maharashtra registered greater amount of non- significant relationship with other chemical.

Name of Village	Gureghar	Shudrak	Morgiri	Wadikotade	Mangaon	Natoshi	Kusrund	Sulewadi
pH	7.6	6.7	6.6	6.8	6.6	6.5	6.9	7.9

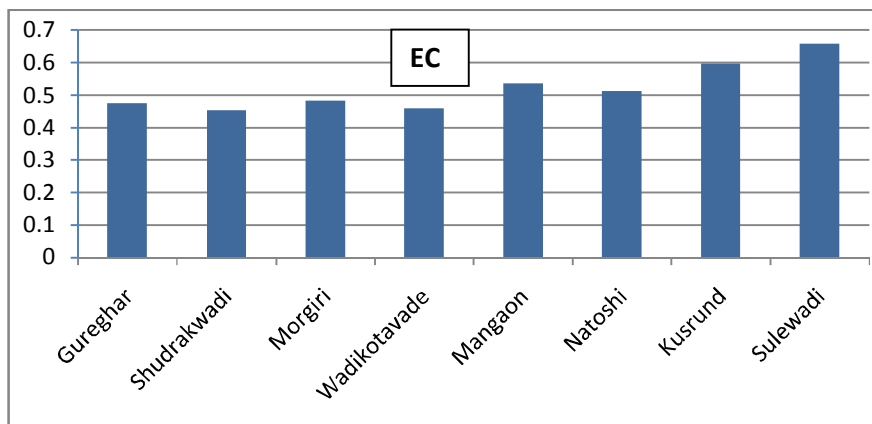


Electrical Conductivity [EC]:

The measure of electrical conductivity shows the total amount of soluble salts present in the soil. It is the most common measure of soil salinity. The variations found in respect of electrical

Name of Village	Gureghar	Shudrak	Morgiri	Wadikotawade	Mangaon	Natoshi	Kusrund	Sulewadi
EC	0.475	0.452	0.481	0.460	0.535	0.511	0.596	0.657

conductivity among the soil of the selected regions of PatanTahasil were significant.



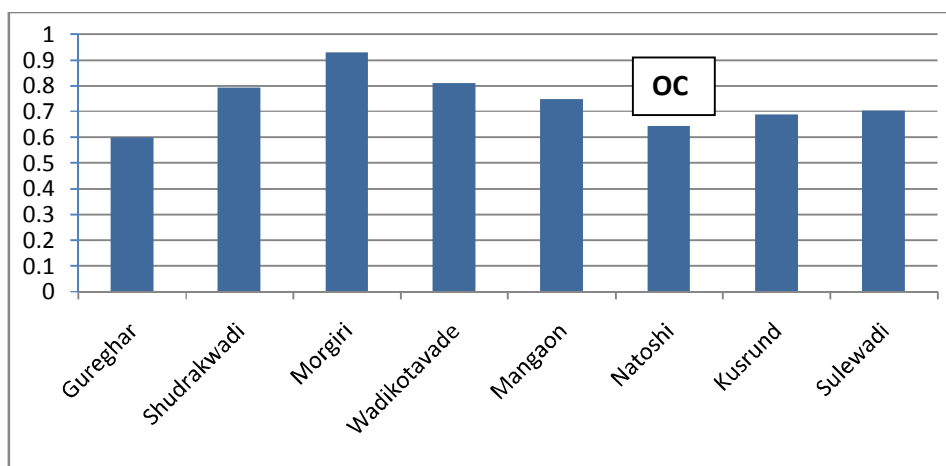
Organic Carbon [%]:**Procedure :-**

- 1) Take 1.5gm of soil sample
- 2) Then add 10ml of potassium ($K_2Cr_2O_7$).
- 3) Again add 20ml of H_2SO_4 solution
- 4) Then add 200ml d/w.
- 5) Again add 10ml of Orthophosphoric acid
- 6) 0.5 gm of Sodium Fluoride [NaF]
- 7) Then add 1ml of Diphenyl Amine indicator and these solution is titrate against 0.5 N Ferrous Ammonium Sulphate[FAS].
- 8) The end point is Blue to Green then record the burette reading.

RESULTS AND DISCUSSION:

The level of soil organic matter determines the multiplication of microorganisms and makes the system more dynamic. The organic carbon content in the soil samples drawn from eight different regions of Western Ghats of Maharashtra showed significant differences in their values.

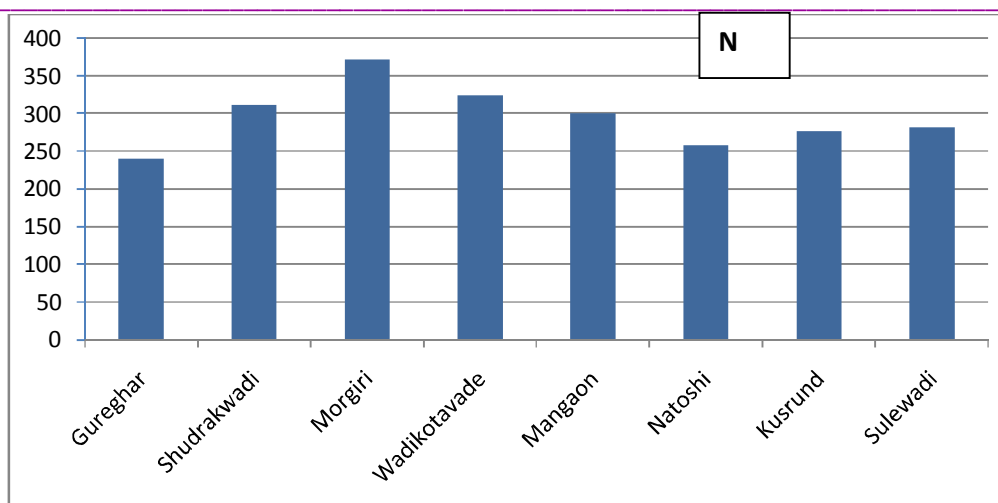
Name of Village	Gureghar	Shudrak	Morgiri	Wadikot	Mangaon	Natoshi	Kusrund	Sulewadi
OC	0.600	0.795	0.930	0.810	0.750	0.645	0.690	0.705



Organic carbon content was found with Morgiri region [0.930]. Organic carbon content in soil can be taken as an index for available nitrogen content in soil as a highly significant relationship existed between them [$r = 0.885$ at $p < 0.01$]. However, organic carbon content of soil showed positive non-significant relation with, while it was negatively non-significant association with electrical conductivity, available phosphorous and available potassium contents of soils. The soils of upland areas showed a regular decrease of organic carbon content with depth of soil, while the soil in interhill valleys exhibited an irregular trend with depth.

Available Nitrogen [N] :

Nitrogen is an important factor affecting decomposition and this has been confirmed. The availability of nitrogen is due to the regular addition of plant residues on the soil and decomposition. The organic compounds are converted into inorganic nitrogen by certain bacteria, which can be absorbed by the plants. In total cycle, about 4-7 tons of nitrogen/ha is added to the soil each year. The composite soil samples of the selected regions of Patan Tahasil were processed for estimating the available nitrogen content; the values being higher for Morgiri region [372 kg/ha].



Name of Village	Gureghar	Shudrak	Morgiri	Wadikot	Mangaon	Natoshi	Kusrund	Sulewadi
Nitrogen	240	311	372	324	300	258	276	282

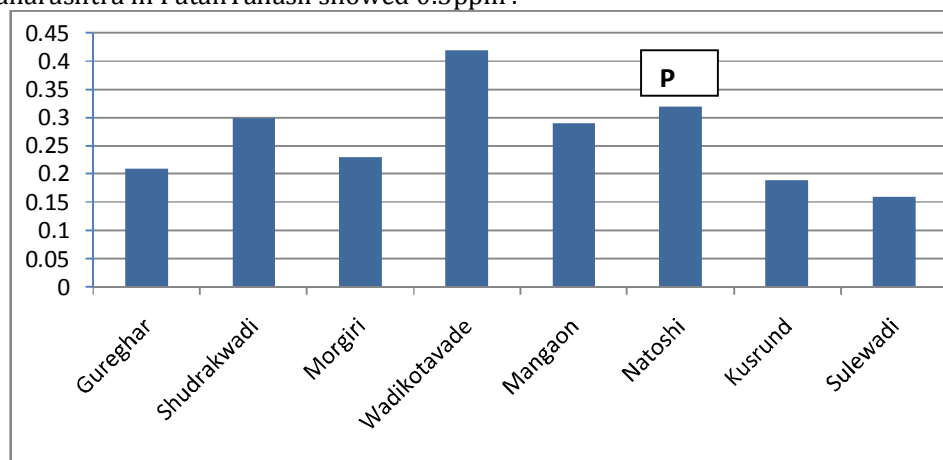
Available Phosphorus [P]:

Procedure:-

- 1) 2.5 gm of soil sample and add one spoon charcoal powder and add 50 ml NaHCO_3 .
- 2) Then 30 min shake the solution and filter.
- 3) Then 30 ml of filtrate and add 10 ml D/W then one drop of Nitro- Phenol indicator.
- 4) Then add 2.5 ml of H_2SO_4 solution, then solution is colourless then add 8.0 ml off Marfi solution.
- 5) Then above solution is dilute to 50 ml of volumetric flask with distilled water.
- 6) After 15 min measure the absorbance using visible spectrophotometer at 565 nm it is fixed wavelength.

RESULTS AND DISCUSSION:

Phosphorus is an essential constituent of protoplasm .It does not move radially through the soil and is not reached by rain or watering . Phosphorous is absorbed by the plants as H_2PO_4 or PO_4 depending upon soil pH Most of the total phosphorous is tied up chemically in compound of limited solubility. The available phosphorous content in the collected soils of selected regions of the Western Ghats of Maharashtra in PatanTahasil showed 0.5ppm .



Name of Village	Gureghar	Shudrak	Morgiri	Wadikotawade	Mangaon	Natoshi	Kusrund	Sulewadi
P[ppm]	0.21	0.30	0.23	0.42	0.29	0.32	0.19	0.16

Available Potassium [K]:

Chemicals:-

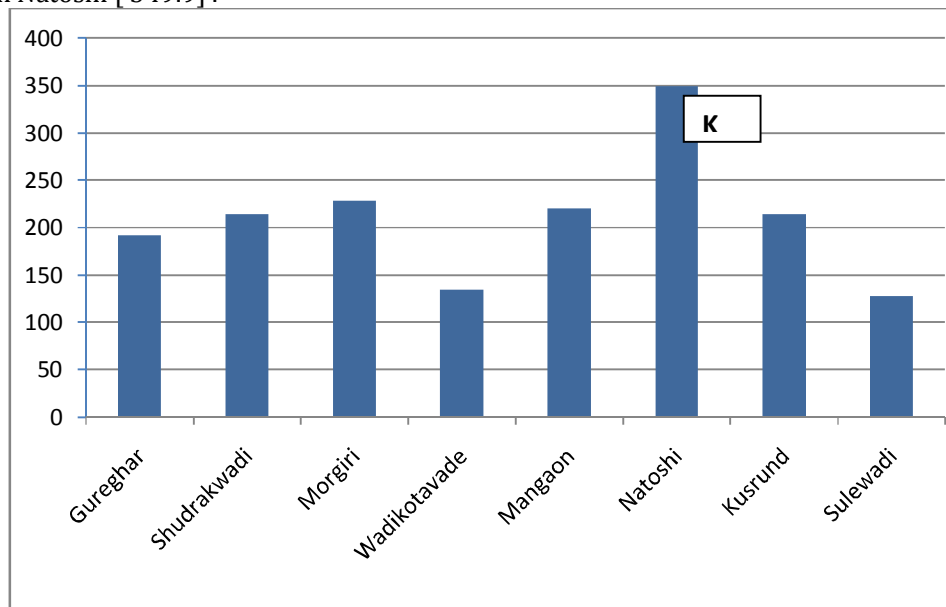
- 30 gm of PSX₁ and add 10 gm of PSX₂ dissolve in 200 ml of distilled water.
- These solution in known as PSXsolution.

Procedure:-

- Take 2.5 gm soil sample in conical flask then add 15 ml of PSX solution and 0.3 gm of charcoal Powder.
 - Then stir the mixture for 30 min. Then filter the solution using Whatmann Filter Paper No.1.
 - Take 1 ml of filtrate (For blank 2 ml.)
 - Then add 1 tube PT₁ solution.
 - Again add 11 drop PT₂ solution.
 - Still wait for 3 min.
 - Add 3 drop of PT₃ solution then wait for 1 min.
 - Measure the absorbance using S.T.F.R.T. instrument.
- (Note- we have first measure the absorbance of blank solution.)

RESULTS AND DISCUSSION:

Potassium is an activator of dozens of enzyme responsible for energy metabolism starch synthesis, nitrate reduction and also plays a major role in protection against diseases by thickening the other cell walls of plant tissues. In the study, significantly highest available potassium content was recorded in Natoshi [349.9].



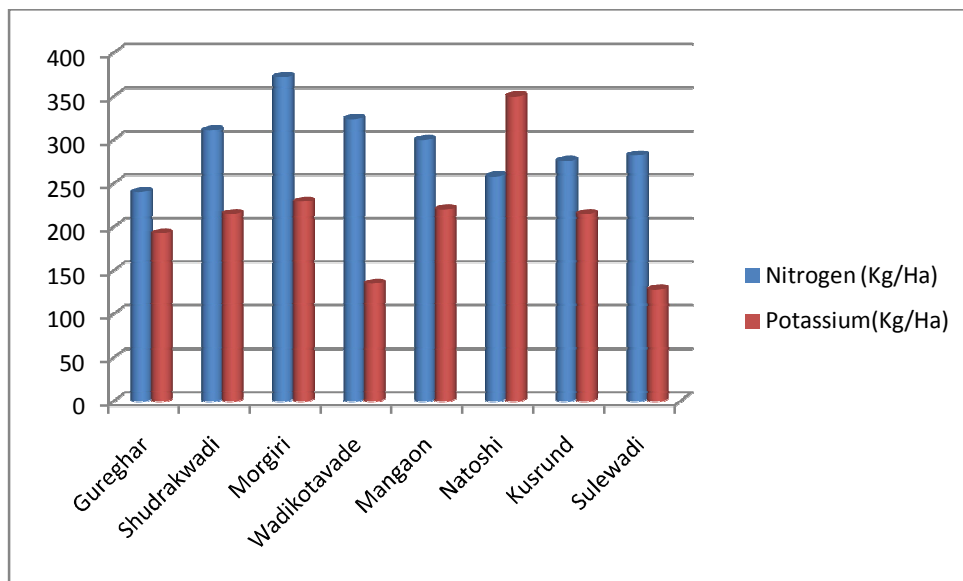
Name of Village	Gureghar	Shudrak	Morgiri	Wadikot	Mangaon	Natoshi	Kusrund	Sulewadi
K	192.4	214.7	228.8	134.8	220.2	349.9	214.7	128.2

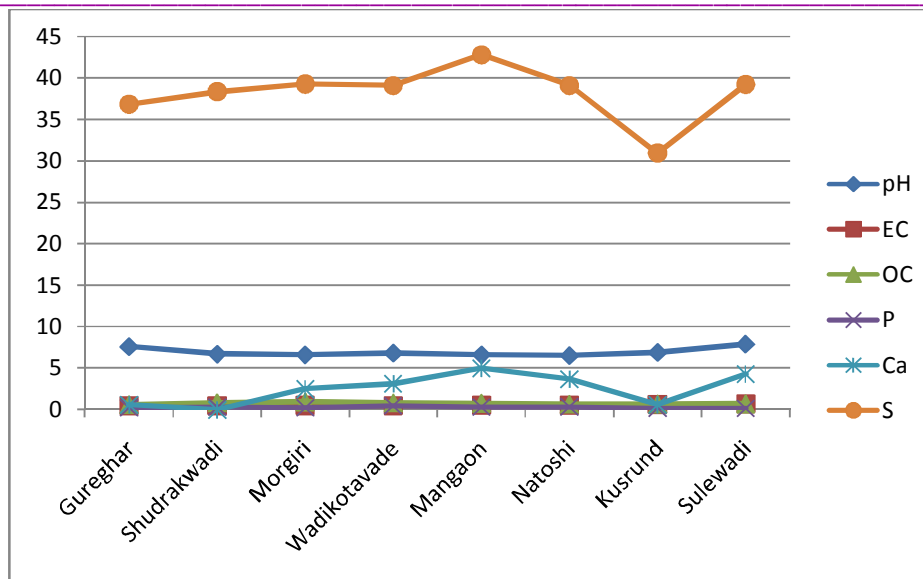
Region	N [Kg/Ha]	K[Kg/Ha]
Gureghar	240	192.4
Shudrak	311	214.7
Morgiri	372	228.8
Wadikot	324	134.8
Mangaon	300	220.2
Natoshi	258	349.9
Kusrund	276	214.7
Sulewadi	282	128.2

From above things we can also calculate the values of Phosphorous, Calcium and Sulphur

Mean values of chemical properties of soils Parameter

Name of Village	pH	OC[%]	EC[m.mhos]	N[Kg/ha]	P[PPM]	K[Kg/Ha]	Ca[%]	S[%]
GUREGHAR	7.6	0.600	0.475	240	0.21	192.4	0.6	36.08
SHUDRAK	6.7	0.795	0.452	311	0.30	214.7	0.0	38.32
MORGIRIGIRI	6.6	0.930	0.481	372	0.23	228.8	2.5	39.26
WADI KOT	6.8	0.810	0.460	324	0.42	134.8	3.1	39.09
MANGAON	6.6	0.750	0.535	300	0.29	220.2	5.0	42.79
KUSRUND	6.9	0.690	0.596	276	0.19	214.7	0.6	30.92
NATOSHI	6.5	0.645	0.511	258	0.32	349.9	3.7	39.07
SULEWADI	7.9	0.705	0.657	282	0.16	128.2	4.3	39.24





CONCLUSION:

The result of the study revealed that, the potassium content is medium ; for the fertility of the soil for cane land required Morgiri percentage of potassium. Land of Kusrund is good for cane and nitrogen percentage is also medium which give good parametric value for cane. The land of Gureghar , ShudrakWadikot, Morgiri is good for rice .In general the dose required for cane is 400:170:170.

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