Estd.: 1954

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(AN AUTONOMOUS COLLEGE - Affiliated to Shivaji University, Kolhapur)

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"Education through self-help is our motto"

I Karmaveer I

• Principal :

Dr. Mohan Rajmane

M.Sc., Ph.D.

•Founder•

Padmabhushan

Dr. Karmaveer Bhaurao Patil

D.Lit.

Ref. No. 1199/2021-22

Date : 10/ 11/ 2021

To

The Principal,
Vijayadevi Desai Senior College, Daultnagar,
Tal.Patan, Dist. Satara.

Sub. : Submission of Research Project under Research Promotion Activity ofr College Students.

I am pleased to inform you that the Research Project under the Research Promotion Activity of the Shivaji University, Kolhapur is received with following details.

Name of Project Advisor	Name of Students	Title of Project	Amount Estimate Rs.
Mr.Salunkhe A. N.	1) Gosavi Priyanka Rajendra	Vertical and horizontal distribution of soil parameters in intensive agriculture zone at catchment area of morna river and effect on fertility of crops	10000/-
	2) Molawade Chandani Prasharam		
	3) Jadhav Tejasvi Prakash		
	4) Kumbhar Ajit Bapurao		

Financial assistance under this scheme is subject to final approval and directions of the university.

Thank you,

Yours faithfully,

SADGURU GADAGE MAHARAJ COLLEGE KARAD

Principal,
Lead College,
Sadguru Gadage Maharaj College,
KARAD

Shivaji University, Kolhapur

Balasaheb Desai Foundation's

Smt. Vijayadevi Desai Sr. College, Daulatnagar

Project Report On,

"Vertical & Horizontal Distribution of Soil Parameters in Intensive Agriculture Zone at Catchment Area of Morana River & Effect on Fertility of Cane"

Submitted To,

DEPARTMENT OF CHEMISTRY

RESEARCH SENSITIZATION SCHEME FOR COLLEGE STUDENTS

Submitted By,

Miss. Jadhav Tejasvi Prakash, Miss. Gosavi Priyanka Rajendra,

Miss. Molawade Chandani Parshuram, Mr. Kumbhar Ajit Bapurav

Under The Guidance Of

Miss. Pisal T. M. (M.Sc.)

Head of Department of Chemistry, Smt. V. D. C. Daulatnagar

Department of Chemistry

Smt. Vijayadevi Desai Sr. College, Daulatnagar

Year 2021-2022

Balasaheb Desai Foundation's

Smt. Vijayadevi Desai Sr. College, Daulatnager

(Department of Chemistry)

CERTIFICATE

This is to certify that Miss. Jadhav Tejasvi P., Miss.Gosavi Priyanka R. ,Miss Molawade Chandani P. , Mr. Kumbhar Ajit B. studying in B. Sc –III (Semester V-VI). They have completed project report entitled with "Vertical & Horizontal Distribution of Soil Parameters in Intensive Agriculture Zone at Catchment Area of Morana River & Effect on Fertility of Cane 'Under the guidance Miss. Pisal T.M. , Submitted to Shivaji University , Kolhapur for the partial fulfillment of the "Bachelor of Science " program for academic year 2021-22.

To the best of my knowledge and belief, this is their original work and submitted earlier, anywhere for any purpose.

Date: 30/ 5 /2022

Place: Daulatnagar

Miss. Pisal T. M.
(M.Sc)

Project Guide

HOD
Chemistry
Smt.Vijayadevi Desai Sr. College

Head of Department

Examiner

I/C Principal
Smt. Vijayadevi Desai Sr. College
Daulatnagar,Tal.Patan,Dist.Satara

DECLARATION

To,

The Head,
Department of Chemistry,
Smt. Vijayadevi Desai Sr. College, Daulatnagar
Daulatnagar- 415211
Respected sir,

We undersigned here by declared that the project report entitled with **"Vertical & horizontal Distribution of Soil parameters in Intensive Agriculture Zone at Catchment Area of Morana River & Effect on Fertility of Cane"** under the guidance of **Miss. T.M. Pisal** and submitted to Shivaji University, Kolhapur for the partial fulfilment of **"Bachelor of Science"**. This is our original work.

The empirical findings in these project reports are based on the data collected by us project report we have not copied from any source, we understand that any copying is liable to punish in way the university authorities deem fit.

Place:- Daulatnager

Date: / / 2022

Your's Sincerely

1. **Miss. Jadhav Tejasvi Prakash**
2. **Miss. Gosavi Priyanka Rajendra**
3. **Miss Molawade Chandani Parshuram**
4. **Mr. Kumbhar Ajit Bapurav**

ACKNOWLEDGEMENT

We take this opportunity to thanks all those who has directly inspired , directed and helped us towards successful completion of this project report.

We express our sincere thanks to our **Principal Mr. V. N. Kamble, Smt. Vijayadevi Desai Sr. College, Daulatnager** for their encouragement throughout the project report.

We are thankful to our project guide, **Miss .T. M. Pisal** for his guidance and help to giving the project a decent shape. We are also thankful to our **H. O. D. Miss. R.M. Shrike** for his valuable guidance.

We express our since of gratitude towards our friends and parents for their constant morale support during my project report.

Place:- Daulatnager

Date:- / /2022

Your's sincerely

1. **Miss. Jadhav Tejasvi Prakash**
2. **Miss.Gosavi Priyanka Rajendra**
3. **Miss. Molawade Chandani Parshuram**
4. **Mr. Kumbhar Ajit Bapurav**

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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 factor in evaluating management system of the forest soil fertility. 1-The forest soil vary unphysical – chemical changes with time and space resulting in variation among topography , climate , weathering processes, vegetation cover and microbial activities and also biotic factors . 2- The Western Ghats comprises and area of around 160000km2, with and elevation ranges from 300-2700m 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.

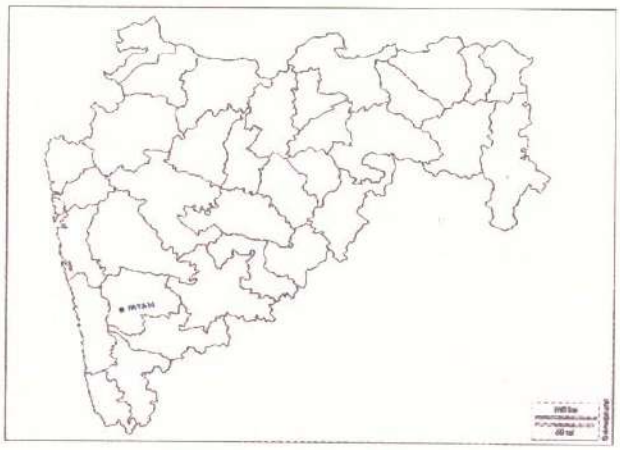
The Western Ghats of Maharashtra lays in middle states of India covers 20% of its geographical area. Maharashtra is biodiversity rich region which has one of the mega diversities of the world, which comprises of climate, topography and soil. The Western Ghats of Maharashtra is also known as "Sahyadri." The soils have rich sources of nutrient 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 era silkworm, besides play an important role in oil, seeds production in the world.

Collection of sample:-

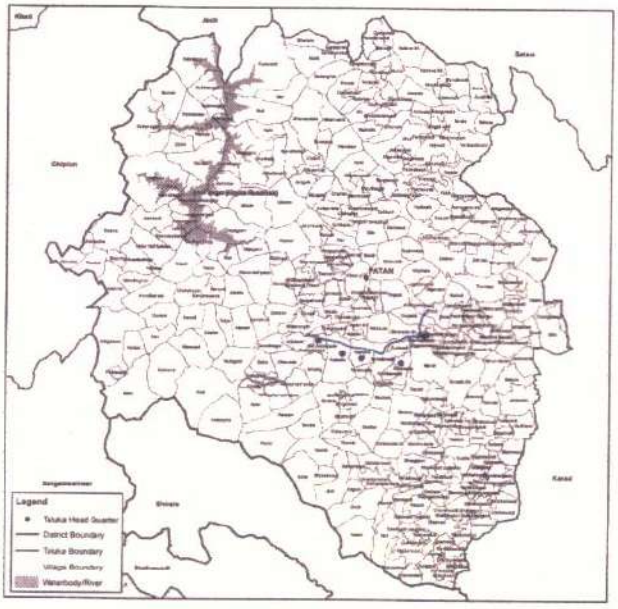
The soil sample were collected from 5-6 spots form each region at a depth of 45cm with shape pit by scraping the sides to collect 250 to 500 gm. of soil form each spot . The Collected sample was mixed thoroughly a removed unwanted materials and pebbles. Further ,composite samples of 250gm was collected 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 sample was used for analyzing the following chemical properties.

Materials and Methods: -

Study area:-



Maharashtra Map



Patan Taluka Map

The study area consists of eight selected region of Western Ghats of Maharashtra in Patan Tahsil comprising Sonawade, Gavhanwadi , Kusrund , Natoshi and Morgiri. At the catchment area of Morana comparison.

SOIL ANALYSIS TERMS:-

A) Soil pH:

The soil pH measures active soil acidity or alkalinity. A pH of 7.0 is a neutral. Values lower than 7.0 are acid; value higher than 7.0 are alkaline. Usually the most desirable pH range for mineral soil 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 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 condition, 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 measure available potassium. The optimum level will vary with crop, yield, soil type, soil physical condition and other soil related factor. Generally high level of potassium is sandy and low in organic matter. Optimum level coloured. Coarse textured soils, any range from 90 to 125 lbs. /acre. On dark coloured heavy textured soil level ranging from 125 to 400 lbs. /acre may be required.

DETERMINATION OF SOIL pH

Acidity and Alkalinity:-

1) Take the clean beaker and add 5gm of soil sample.
2) Then add 25ml of distilled water and stir the solution and immediately measure the pH.

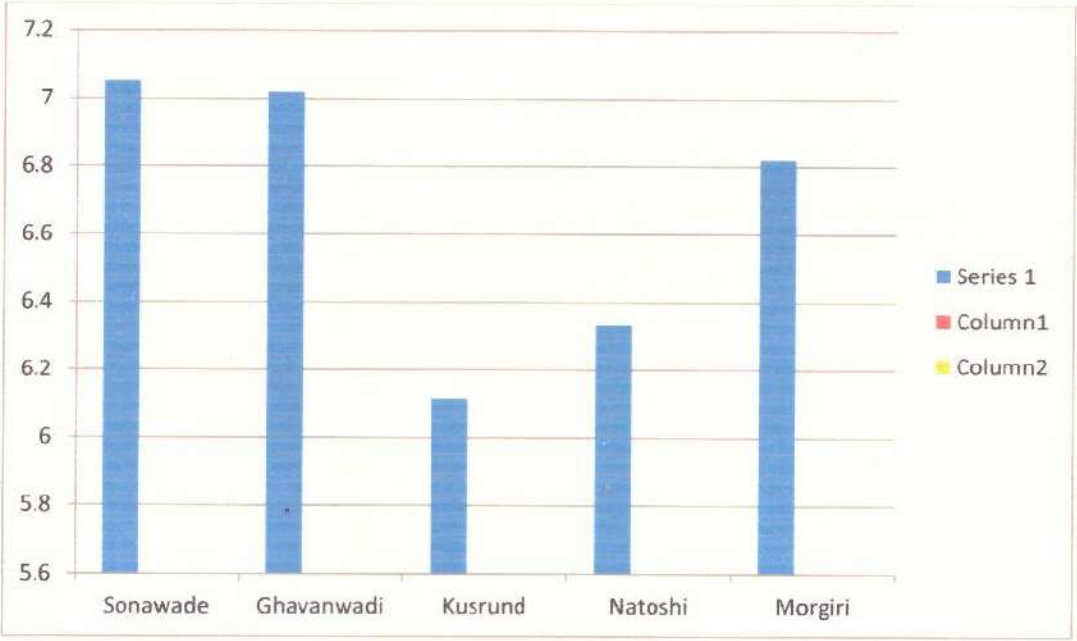
Observation table

Sample No.	1	2	3	4	Average
Village Name	10 M Distance	50M Distance	100M Distance	200M Distance	
Sonawade	7.052	7.011	7.041	7.032	7.034
Ghavanwadi	7.020	7.014	7.016	7.018	7.017
Kusrund	6.116	6.115	6.114	6.113	6.114
Natoshi	6.332	6.330	6.331	6.332	6.331
Morgiri	6.820	6.819	6.810	6.818	6.816

Result and discussion:-

The soil is measure of the acidity or basicity in soil .The optimum pH range for most plant is between 6 and 7.5, however many plants have adapted to thrive at pH values outside this ranges.

Name of the Village	Sonawade	**Ghavanwadi**	**Kusrund**	**Natoshi**	**Morgiri**
pH	7.052	7.020	6.116	6.332	6.820
Remark	Alkaline	Alkaline	Acidic	Acidic	Neutral



Electrical conductivity [EC]:-

The measure of electrical conductivity shows the total amount of soluble salts present in soil. It is the most common measure of soil salinity. The variations found in respect of electrical conductivity among the soil of the selected regions of Patan Tahsil were significant.

Sample No.	1	2	3	4	Average
Village Name	10M distance	50M distance	100M distance	200M distance	
Sonawade	0.129	0.128	0.129	0.127	0.128
Ghavanwadi	0.347	0.345	0.346	0.340	0.344
Kusrund	0.204	0.203	0.202	0.204	0.203
Natoshi	0.255	0.250	0.253	0.252	0.252
Morgiri	0.162	0.160	0.162	0.161	0.161

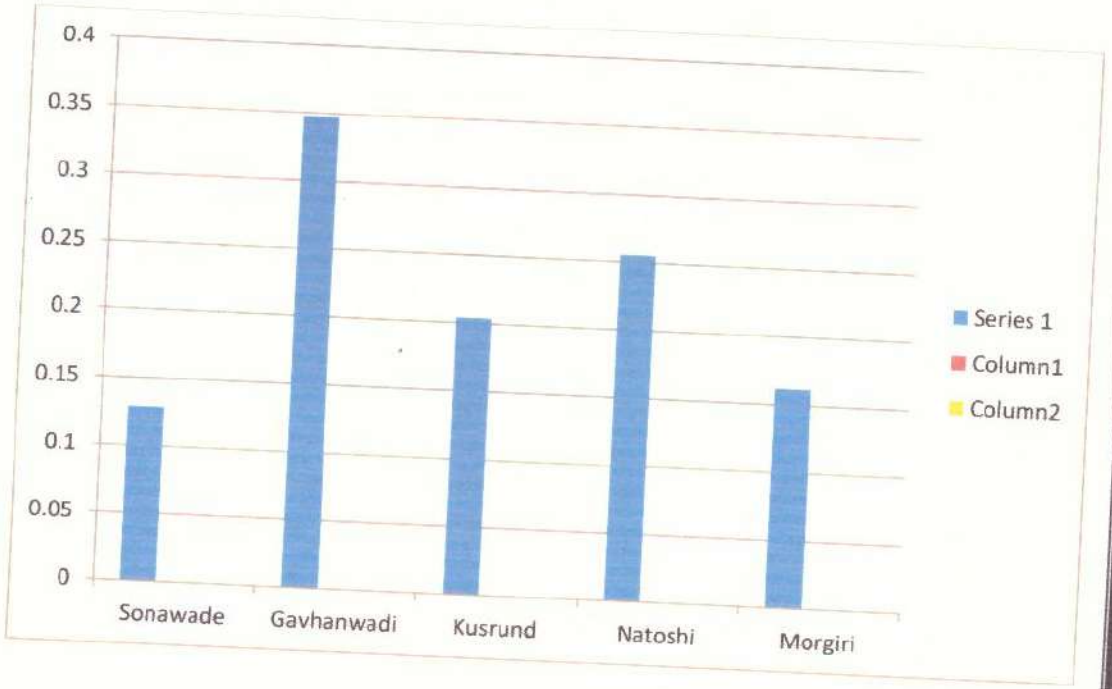
Result and Discussion:-

The EC soil gives a measure of the soluble salt content of the soil. It is observed that entire sample from the area under study exhibits EC has less than 1 M/cm.

Reading of soil on the basis of EC

EC range [M/cm]	Rating
0-1	Good soil
1-2	Poor seed emergence
2-3	Harmful to some crops
3-4	Harmful to most of crops

Name of Village	Sonawade	Ghavanwadi	Kusrund	Natoshi	Morgiri
EC	0.129	0.347	0.204	0.255	0.162
Remark	Good Soil	Good Soil	Good Soil	Good Soil	Good Soil



Organic Carbon [%]:-

Procedure:-

1) Take 1 gm 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 Ortho-Phosphoric acid
6) 0.5gm of Sodium Fluoride [NaF]
7) Then add 1ml of Di-phenyl Amine indicator and these solutions is titrating against 0.5 N Ferrous Ammonium Sulphate [FAS].
8) The end point is Blue to Green then record the burette reading.

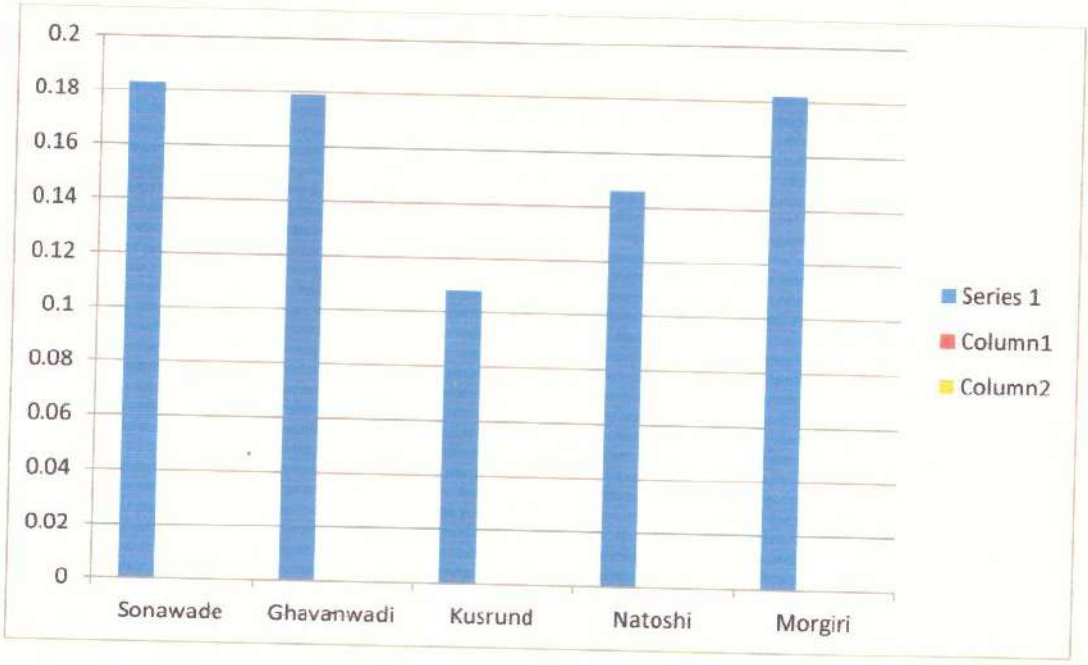
Sample No.	1	2	3	4	Average
Village Name	10M distance	50M distance	100M distance	200M distance	
Sonawade	0.183	0.180	0.182	0.183	0.182
Ghavanwadi	0.179	0.176	0.177	0.178	0.177
Kusrund	0.108	0.107	0.108	0.106	0.107
Natoshi	0.146	0.144	0.145	0.145	0.145
Morgiri	0.180	0.181	0.180	0.182	0.181

Result and Discussion:-

The level of soil organic matter determines the multiplication of micro-organisms and makes the system more dynamic. The organic carbon content in the soil samples draw from five different region of Western Ghats of Maharashtra show the significant differences in their values.

OC= (Blank –Reading)*0.20

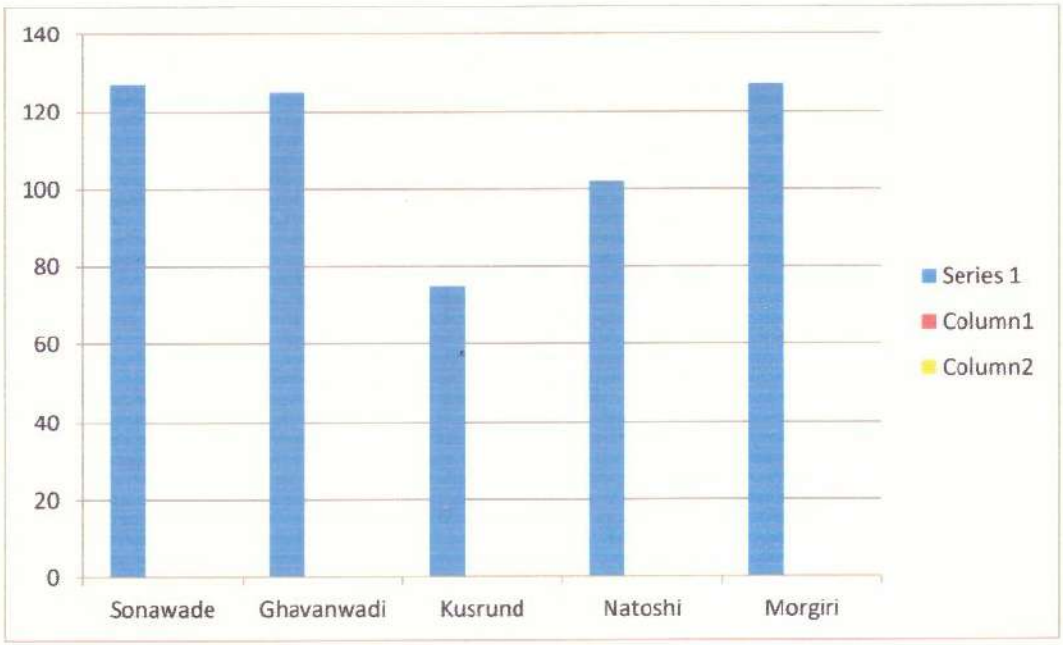
Name of the village	Sonawade	Ghavanwadi	Kusrund	Natoshi	Morgiri
OC	0.183	0.179	0.108	0.146	0.182
Remark	Very low	Very low	Very low	Very low	Very low



Available Nitrogen [N]:-

Nitrogen is an important factor affecting decomposition and this has confirmed. The availability of nitrogen is due to the regular addition of plant residues on the soil and decomposition. The organic compounds are converted in to 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 Tahsil were processed for estimating the available nitrogen content; the values being higher for Morana region [111kg/Ha].

Name of the Village	Sonawade	**Ghavanwadi**	**Kusrund**	**Natoshi**	**Morgiri**
N	127	125	75	102	127
Remark	Very low	Very low	Very low	Very low	Very low



Available Phosphorus [P]:-

Procedure:-

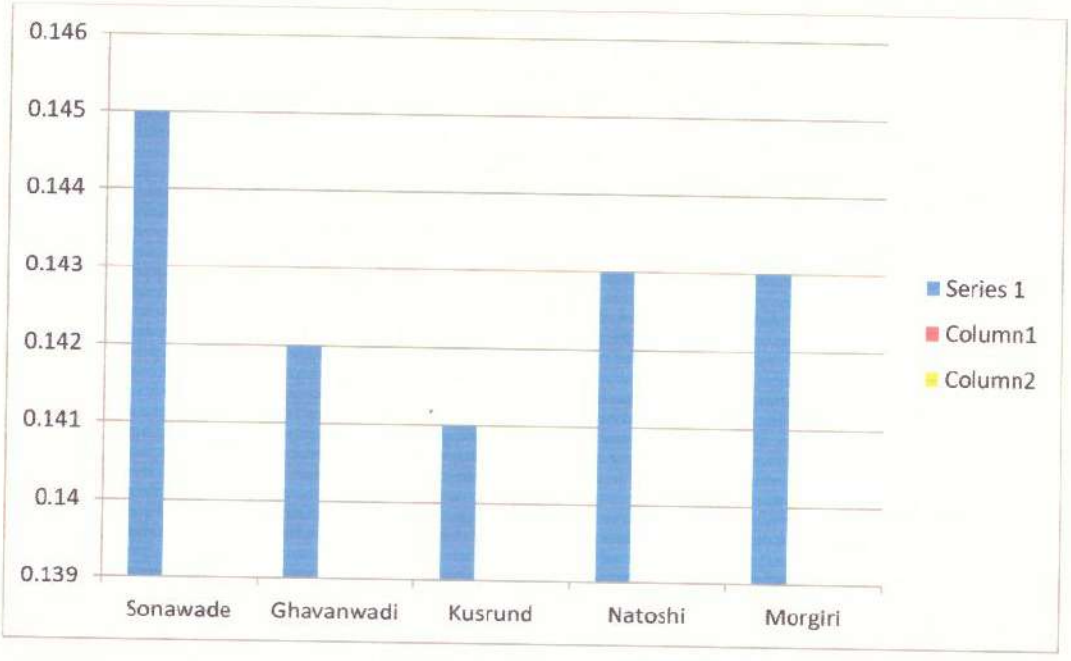
1) 2.5gm of soil sample and add one spoon charcoal powder and add 50ml $NaHCO_3$.
2) Then 30min shake and solution filter.
3) Then 10ml filtrate and add 10ml D/W then one drop of Nitro-phenol indicator.
4) Then add 2.5ml of H_2SO_4solution, then solution colourless then add 8.0ml of Marfi solution.
5) Then above solution is dilute to 50 ml of volumetric flask with distilled water.
6) After 15 min wait for blue colour and measure the absorbance using visible spectrophotometer at 565nm it is fixed wavelength.

Sample No.	1	2	3	4	Average
Village Name	10M Distance	50M Distance	100M Distance	200M Distance	
Sonawade	0.145	0.144	0.143	0.145	0.144
Ghavanwadi	0.142	0.141	0.140	0.142	0.141
Kusrund	0.140	0.139	0.138	0.140	0.139
Natoshi	0.143	0.142	0.143	0.140	0.142
Morgiri	0.143	0.142	0.140	0.143	0.142

Result 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. Phosphorus is absorbed by the plants as H_2PO_4 or PO_4 depending upon soil pH most of the total phosphorus is tied up chemically in compound of limited solubility. The available phosphorus content in the collected soils of selected regions of the Western Ghats of Maharashtra in Patan Tahsil showed by 0.5ppm.

Name of the Village	Sonawade	**Ghavanwadi**	**Kusrund**	**Natoshi**	**Morgiri**
P	0.145	0.142	0.141	0.143	0.143
Remark	Very low	Very low	Very low	Very low	Very low



Available Potassium [K]:-

Chemicals:-

A) 30gm. of PSX1 and add 10gm. of PSX2 dissolve in 200ml of distilled water.
B) This solution is known as PS solution.

Procedure:-

1) Take 5gm.soil sample in conical flask then add 15ml of PSX solution and 0.3gm. of charcoal Powder.

2) Then stir the mixture for 30 min .Then filter the solution using Whitman Filter Paper No.1.

3) Take 1ml of filtrate (For blank2 ml.)

4) Then add 1 tube PT1 solution.

5) Again add 11 drop PT2 solution.

6) Still wait for 3 min.

7) Add 3 drop of PT3 solution then wait for 1 min.

8) Measure the absorbance using S.T.F.R.T. instrument.

(Note –we have first measure the absorbance of blank solution.

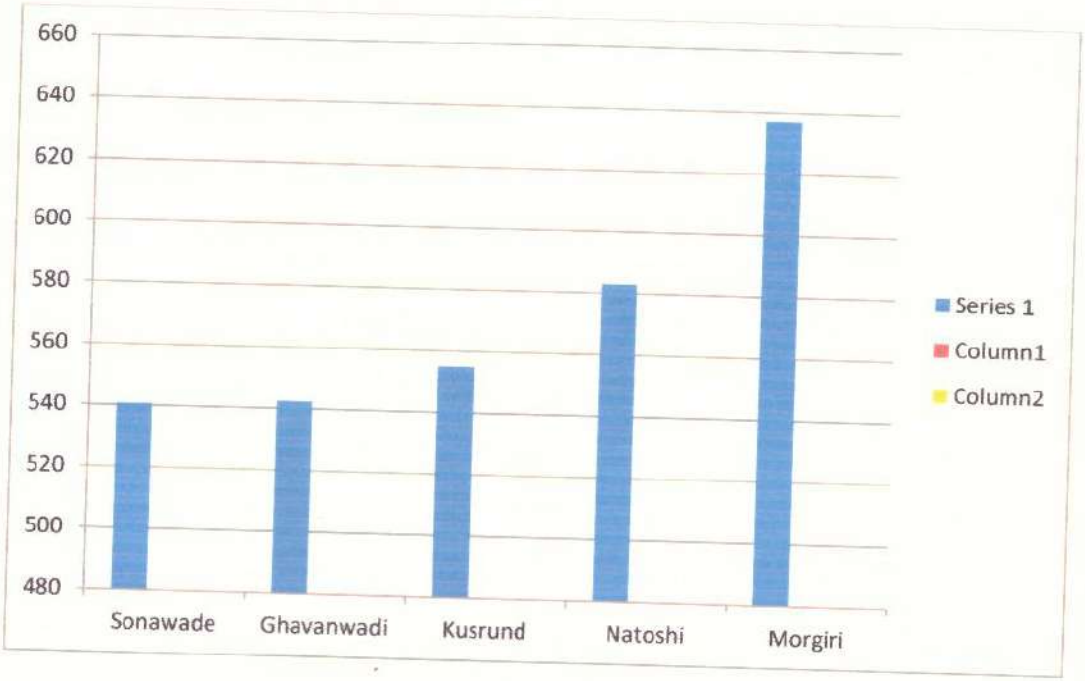
Observation Table:-

Sample no.	1	2	3	4	Average
Village name	10M Distance	50M Distance	100M Distance	200M Distance	
Sonawade	540.7	540.5	540.3	540.6	540.5
Ghavanwadi	542.4	542.3	542.2	542.1	542.2
Kusrund	555.1	555.0	555.1	555.1	555.0
Natoshi	583.0	582.0	582.1	583.0	582.2
Morgiri	637.7	637.1	637.0	637.2	637.1

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 Patan [571.7].

Name of the Village	Sonawade	Ghavanwadi	Kusrund	Natoshi	Morgiri
K	540.7	542.4	555.1	583.0	637.2
Remark	Very High	Very High	Very High	Very High	Very High



Available Calcium:-

Procedure:-

1) Take 2.5 gm of soil sample
2) Then add 25 ml water and 0.5 N dilute HCl
3) Then 30 minute shake in the machine solution and filter
4) Then 2 ml of filtrate solution and add 25 ml distilled water
5) The 2 to 4 drop of Phenolphthalein indicator and 0.25 N NaOH stir the solution
6) The end point is pink in colour then record the burette reading.

Observation Table:

Sample no.	1	2	3	4	Average
Village name	10M Distance	50M Distance	100M Distance	200M Distance	
Sonawade	2.9	2.7	2.8	2.5	2.7
Ghavanwadi	2.5	2.3	2.2	2.4	2.3
Kusrund	3.0	2.9	2.8	2.7	2.8
Natoshi	3.2	3.1	2.9	3.0	3.0
Morgiri	3.3	3.2	3.1	3.0	3.1

Result and Discussion:-

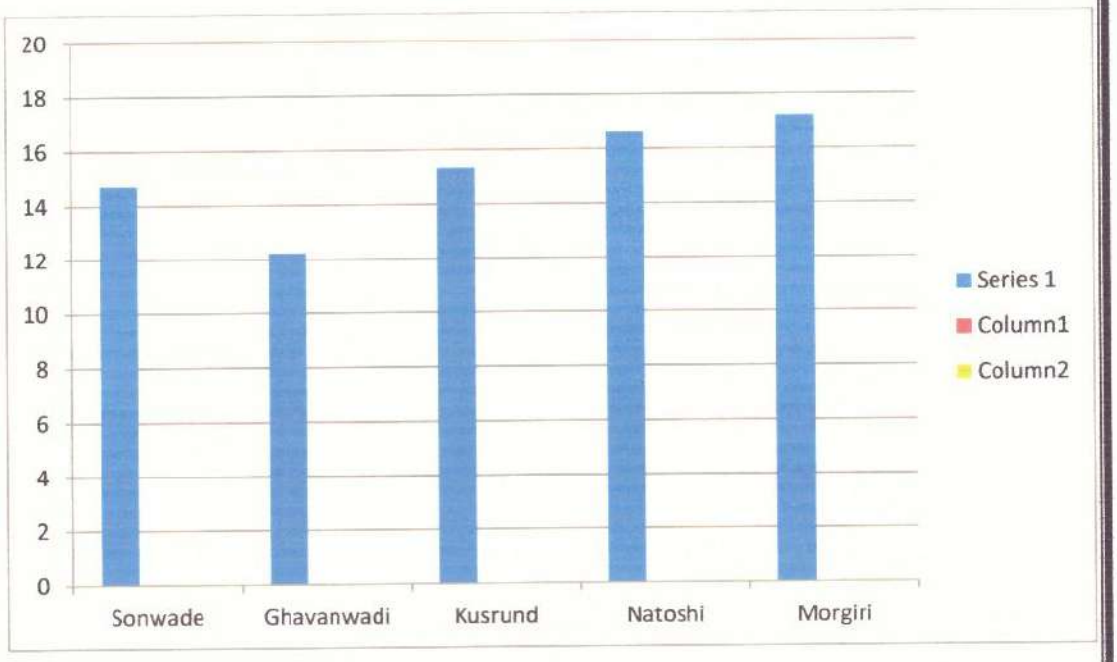
Calcium carbonate is useful for crops. Calcium helps in early growth of roots and crops. Calcium increases the absorption of nitrogen, iron, zinc, copper, boron and manganese in crops. Calcium stabilizes crop chromosomes calcium helps in better conduction of sugars in crops. Calcium improves seed production.

Crops turn yellow due to high calcium content in the soil, Plants took dark green but new foliage lacks green matter, New shoots, fruits, or twinges stunted growth. Uses of urea, poultry waste manure and superphosphate fertilizers should be avoided due to high calcium content.

The average soil calcium content in the morana region is 15.22 which is higher than the general average, hence fertilizers like DAP, 10:26:26, Ammonium Sulphate, Calcium Nitrate should be used to ensure proper soil calcium.

CaCO3 = [Blank-reading]*3.4

Name of the Village	Sonawade	Ghavanwadi	Kusrund	Natoshi	Morgiri
CaCO3	14.72	12.22	15.35	16.60	17.22
Remark	Very High	Very High	Very High	Very High	Very High


20
18
16
14
12
10
8
6
4
2
0
Sonwade
Ghavanwadi
Kusrund
Natoshi
Morgiri
Series 1
Column1
Column2

Mean values of chemical properties of soils Parameters.

Name of the village	pH	EC [mmhos]	OC [%]	N [Kg/ha]	P [PPM]	K [Kg/ ha]	CaCO3
Sonwade	7.052	0.129	0.183	127	0.145	540.7	14.72
Gavhanwadi	7.020	0.347	0.179	125	0.142	542.4	12.22
Kusrund	6.116	0.204	0.108	75	0.140	555.1	15.35
Natoshi	6.332	0.255	0.146	102	0.143	583.0	16.60
Morgiri	6.820	0.162	0.182	127	0.143	637.2	17.22

CONCLUSION:-

The result of the study revealed that, the potassium content is medium; for the fertility of the soil for cane land required more percentage of potassium. Nitrogen percentage is also medium which give good parametric value for cane. Use of urea, poultry waste mannure, and superphosphate fertilizers should be avoided due to high calcium content. Fertilizers like DAP, 10:26:26, Ammonium Sulphate, Calcium Nitrate should be used to ensure proper soil calcium.

In general the dose required for cane is 400:170:170.

Uses:-

Soil is used in agriculture, where it's serves as the anchor and primary nutrients base for plants. However, demonstrated by hydroponic it is not essential to plant growth. If soil contained nutrient could be dissolved in solution. The types of soil and available moisture determine the species of plants than can be cultivated.

Soil materials are a critical component in the mining and construction industries. Soil serves as a foundation for the most construction project. The moment of massive volume of soil can be involved in surface mining, road building and dam's construction. Earth sheltering is the architectural practice of using soil for external thermal mass against building walls.

Soil resources are critical to environment, as well as to food and fibre production. Soil provides minerals and water to plants. Soil cleans the water as it percolates through it. Soil is the habitat for many organisms for major part of known and unknown biodiversity in soil, in the form invertebrates.

The biological component of soil is any extremely important carbon sink since about 57% of the biotic content is carbon. Even desert crusts, cyanobacteria lichens and mosses capture and sequester a significant amount of carbon by

photosynthesis. Poor farming and grazing methods have degraded soil and released much of this sequestered carbon to the atmosphere. Restoring the worlds soil could offset some of the huge increases in greenhouse gases causing global warming while improving crop yield and reducing water needs.

Summary:-

1) A soil test measure the relative soil fertility level of field or are within a field.
2) Soil test are very useful diagnostics tools and that is just is what they are tools. To consider as soil test bas an infallible predictor of optimum nutrients is to misuse it.
3) For soil testing to be even helpful and reliable in high yield agriculture, there must be more long term calibration research at high yield level where the optimum fertility level for the soil profile can be defined.
4) Generally in fertilizer recommendation development, the goal is to maintain plant nutrients at level where the supply will not be a limiting factor at any stage of plant growth form germination to maturity.
5) Soil test interpretation and recommendation development should be done on a site specific long term basis where the characteristics of both the site and the farmer are considered.

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LITERATURE REVIEW :-

Many scientists have applied their knowledge on the work of soil fertility. Their success has brought into high light concept of fertility status of soil.

The theories according to which plant obtain there ash food from stimulate much work on chemical analysis and study of chemical properties of soil. The attention of investigation was focus on the composition of the element of ash food in plant and in soil so that the important the nutrition of the plant was over estimation.

The growing demand for agriculture produces lead to the mechanization of soil cultivation and stimulates the study of the chemical physical properties of soil.

The top layer of the earth to the depth, which reaches the main mass of plant roots. The accumulation in soil of organic substance may depends on plant roots at depth of mass distribution of roots in the soil does indeed as a rule corresponds to depth of the humus horizon and to the gradual decreases of humus content as depth increases.

According to Geordie (1872) the absorbing power of soil was a great contribution to award the understanding of chemical properties of soil. It helped great deals in study of soil formation process and rising of the fertility of soil.

The organic substances of soil made it possible zero determine the interdependence between the chemical of soil and there chemical properties. Thus was broadened the field of possible active influence on soil in order to change its physical and chemical properties with a view to raising productivity.