NAAC –Re Accredited "A"
CGPA = 3.52

A

Project Work

Entitled

"Analysis of Honey"

Submitted to

DEPARTMENT OF CHEMISTRY

Vivekanand College, Kolhapur

For the partial fulfilment of practical course for

The Award of B.Sc. Degree In Chemistry

By

Miss. Shwetali Vijay Patil, Miss. Pallavi Bahubali Patil,
Mr.Rushikesh Ranjeet Pati, Mr.Rushikesh Pralhad Patil

Project Guide
Dr. K. A. Undale
Department of Chemistry
Vivekanand College, Kolhapur

2018-2019

विवेकानंद कॉलेज
कोल्हापूर

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DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that Miss. Shwetali Vijay Patil,

Miss.Pallavi Bahubali Patil, Mr.Rushikesh Ranjeet Pati ,
Mr.Rushikesh Pralhad Patil of the Class B. Sc. III has satisfactorily completed the project work on the title ***"Analysis of Honey"*** as a partial fulfilment of the practical course for the award of the B. Sc. Degree in Chemistry by Shivaji University, Kolhapur.

Place: Kolhapur

Date: 30/01/2019

Dr.K. A. Undale
(Project Guide)

Dr. D. B. Patil
Head
Dept. of Chemistry
Vivekanand College, Kolhapur

Examiners

DECLARATION

It is hereby declared that the work reported in the project entitled"**Analysis of Honey**" is completed and written by us and has not been copied from anywhere.

Place: Kolhapur

Date: 30/01/2019

Name	Roll No
Miss. Pallavi Bahubali Patil	8597
Mr. Rushikesh Pralhad Patil	8598
Mr. Rushikesh Ranjeet Patil	8599
Miss. Shwetali Vijay Patil	8600

ACKNOWLEDGEMENT

We wish to express my deep sense of gratitude towards Dr. K. A. Undale Assistant Professor, Department Of Chemistry, Vivekanand College,Kolhapurfor his valuable guidance to complete this project within time.

It is our proud privilege to expresssense of gratitude and sincere thanks to Principal Dr.S.Y.Honagekar&Dr.D.B.Patil, Head, Department of Chemistry, Vivekanand College, Kolhapur for providing all the available facilities of the college for completion of this project.

Our sincere thanks to all those who have directly or indirectly involved in this project work.

Name	Roll No
Miss. Pallavi Bahubali Patil	8597
Mr. Rushikesh Pralhad Patil	8598
Mr. Rushikesh Ranjeet Patil	8599
Miss. Shwetali Vijay Patil	8600

INTRODUCTION

History:

Honey is a sweet, viscous food substance produced by bees and some related insects.Bees produce honey from the sugarysecretions of plants (floral nectar) or other insects (aphid honeydew) through regurgitation, enzymatic activity, and water evaporation. Honey is stored in wax structures called honeycombs. The variety of honey produced by honey bees (the genus *Apis*) is the best-known, due to its worldwide commercial production and human consumption. Honey is collected from wild bee colonies, or fromhives of domesticated bees, a practice known as beekeeping.

Honey gets its sweetness from the mono-saccharides fructose and glucose, and has about the same relative sweetness as granulated sugar.It has attractive chemical properties for baking and a distinctive flavor when used as a sweetener.Most microorganismsdo not grow in honey, so sealed honey does not spoil, even after thousands of years.

Honey provides 64 calories in a serving of one tablespoon (15 ml) equivalent to 1272 kJ per 100 g.Honey is generally safe,but may have various, potentially adverse effects or interactions upon excessive consumption, existing disease conditions, or use ofprescription drugs.

Honey use and production have a long and varied history as an ancient activity, depicted in Valencia, Spain, by a cave painting of humans foraging for honey at least 8,000 years ago.

Honey is produced by bees collecting nectar for use as sugars consumed to support metabolism of muscle activity during foraging or to be stored as a long-term food supply.During foraging, bees access part of the nectar collected to support

metabolic activity of flight muscles, with the majority of collected nectar destined for regurgitation, digestion, and storage as honey.In cold weather or when other food sources are scarce, adult and larval bees use stored honey as food.

By contriving for bee swarms to nest in human-made hives, people have been able to semi-domesticate the insects and harvest excess honey. In the hive or in a wild nest, the three types of bees are:

- a single female queen bee
- a seasonally variable number of male drone bees to fertilize new queens
- 20,000 to 40,000 female worker bees

Leaving the hive, foraging bees collect sugar-rich flower nectar and return to the hive where they use their "honey stomachs" to ingest and regurgitate the nectar repeatedly until it is partially digested.Bee digestive enzymes –invertase, amylase, and diastase – along with gastric acid hydrolyze sucrose to a mixture of glucose and fructose.The bees work together as a group with the regurgitation and digestion for as long as 20 minutes until the product reaches storage quality. It is then placed in honeycomb cells left unsealed while still high in water content (about 20%) and natural yeasts, which, unchecked, would cause the sugars in the newly formed honey to ferment.

The process continues as hive bees flutter their wings constantly to circulate air andevaporate water from the honey to content around 18%, raising the sugar concentration, and preventing fermentation.The bees then cap the cells with wax to seal them.As removed from the hive by a beekeeper, honey has a long shelf life and will not ferment if properly sealed.

Another source of honey is from a number of wasp species, such as the wasps *Brachygastralecheguana* and *Brachygastramellifica*, which are found in South and Central America. These species are known to feed on nectar and produce honey.

Some wasps, such as the *Polistesversicolor*, even consume honey themselves, switching from feeding on pollen in the middle of their lifecycles to feeding on honey, which can better provide for their energy needs.

Contents of Honey

Nutritional value per 100 g (3.5 oz)	
Energy	1,272 kJ (304 kcal)
Carbohydrates	82.4 g
Sugars	82.12 g
Dietary fiber	0.2 g
Fat	0 g
Protein	0.3 g
Vitamins	
Riboflavin (B2)	(3%) 0.038 mg
Niacin (B3)	(1%) 0.121 mg
Pantothenic acid (B5)	(1%) 0.068 mg
Vitamin B6	(2%) 0.024 mg
Folate (B9)	(1%) 2 µg
Vitamin C	(1%) 0.5 mg
Minerals	
Calcium	(1%) 6 mg
Iron	(3%) 0.42 mg
Magnesium	(1%) 2 mg
Phosphorus	(1%) 4 mg
Potassium	(1%) 52 mg
Sodium	(0%) 4 mg
Zinc	(2%) 0.22 mg
Other constituents	
Water	17.10 g

Abstract:

Aim: To analyze the available honey for presence of different minerals and carbohydrates. Honey, thick, sweet, super saturated sugar solution manufactured by bees to feed their larvae and for the subsistence during winter. Bee honey is composed of fructose, glucose and water, in varying proportions. It also contains several enzymesand oils.The color & flavor depends on the age of the honey and the sources of the nectar. It colored honeys are usually of higher quality than dark coloured honeys. Other high grade honeys are made by bee.

Apparatus:

Test tubes, Test tube stand, Burner, Water Bath.

Chemicals:-

Fehling solution A, Fehling solution B, Ammonium chloride solution, Ammonium oxalate solution, Ammonium phosphate, Conc. Nitric acid, Potassium sulphocyanide solution.

Procedure:

1.Test for Potassium:-

2ml of honey is taken in a test tube and picric acid solution is added. Yellow precipitate indicates the presence of K+.

2. Test for Calcium:-

2ml of honey is taken in a test tube and NH4Cl solution and NH4OH solution are added to it. The solution is filtered and to the filtrate 2ml of ammonium oxalate solution is added. White ppt. or milkiness indicates the presence of Ca2+ ions.

Test For Carbohydrates

1.Fehling`s test

2mL of honey is taken in a test tube and 1mL each of Fehling's solution A and Fehling`s solution B are added to it and boiled. Red precipitate indicates the presence of reducing sugars.

2. Tollen`s test:

2-3 mL of aqueous solution of honey is taken in a test tube. 2-3mL of Tollen's reagent is added. The test tube is kept in a boiling water bath for about ten minutes. A shining silver mirror indicates the presence of reducing carbohydrates.

By using above procedures four (4) samples are analyzed. The results for tests are summarized in following tables.

Sample I : Lion Honey

Observation Table:

Test	Observations	Inference
Test for Potassium: 2mi of honey + picric acid	Yellow ppt.	Potassium Present.
Test for Calcium: 2ml of honey + NH_4CI + NH_4OH + 2ml ammonium sulphate solution.	No white ppt.	Calcium Present.
Test for Carbohydrates: Fehling's solution: 2ml of honey + 1ml fehling's solution A + 1ml fehling's solution B + boil.	No Red ppt	Reducing suger Absent.
Tollen's Test: 2-3ml aqueous solution of honey +2-3 ml tollen'sreagant.+ kept in boiling water bath for about 10 min	A skining silver mirror observed.	Reducing carbohydrates present.

Sample 2:Natural honey.

ObservationTable :

Test	Observations	Inference
Test for Potassium: 2mi of honey + picric acid	Yellow ppt.	Potassium present.
Test for Calcium: 2ml of honey + NH_4CI + NH_4OH + 2ml ammonium sulphate solution.	No white ppt.	Calcium absent.
Test for Carbohydrates: Fehling's solution: 2ml of honey + 1ml fehling's solution A + 1ml fehling's solution B + boil.	Red ppt.	Reducing sugar present.
Tollen's Test: 2-3ml aqueous solution of honey +2-3 ml tollen'sreagant.+kept in boiling water bath for about 10 min	A skining silver mirror observed.	Reducing carbohydrates present.

Sample3 :Patanjali honey.

ObservationTable :

Test	Observations	Inference
Test for Potassium: 2mi of honey + picric acid	Yellow ppt.	Potassium present.
Test for Calcium: 2ml of honey + NH_4CI + NH_4OH + 2ml ammonium sulphate solution.	No white ppt.	Calcium absent.
Test for Carbohydrates: Fehling's solution: 2ml of honey + 1ml fehling's solution A + 1ml fehling's solution B + boil.	Red ppt.	Reducing sugar present.
Tollen's Test: 2-3ml aqueous solution of honey +2-3 ml tollen'sreagant.+kept in boiling water bath for about 10 min	A skining silver mirror observed.	Reducing carbohydrates present.

Sample 4 : Dabur Honey

ObservationTable :

Test	Observations	Inference
Test for Potassium: 2mi of honey + picric acid	Yellow ppt.	Potassium present.
Test for Calcium: 2ml of honey + NH_4CI + NH_4OH + 2ml ammonium sulphate solution.	No white ppt.	Calcium absent.
Test for Carbohydrates: Fehling's solution: 2ml of honey + 1ml fehling's solution A + 1ml fehling's solution B + boil.	Red ppt.	Reducing sugar present.
Tollen's Test: 2-3ml aqueous solution of honey +2-3 ml tollen'sreagant.+kept in boiling water bath for about 10 min.	No skining silver mirror observed.	Reducing carbohydrates absent.

Result:

Tests:	Lion honey	Natural honey	Patanjali honey	Dabur honey
Potassium	Present	Present	Present	Present
Calcium	Present	Absent	Absent	Absent
Fehling's test (Reducing sugar test)	Present	Present	Present	Absent
Tollen's reagent test (Reducing Carbohydrate test)	Absent	Present	Present	Present

Conclusion:

From above analysis of honey samples it is clear that all the samples contain Potassium,

Project days…..with mates

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Project Work

Entitled

"Analysis of Soil"

Submitted to

DEPARTMENT OF CHEMISTRY

Vivekanand College(Autonomous), Kolhapur

For the partial fulfilment of practical course for

The Award of B.Sc. Degree In Chemistry

By

Mr. Udaysinh S. Powar

Project Guide
Mr. S. S. Kadam
Department of Chemistry
Vivekanand College, Kolhapur

2018-2019

NAAC –Re Accredited "A"
CGPA = 3.52

DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that **Ms. Udaysinh sarjerao powar** of the Class B. Sc. III has satisfactorily completed the project work on the title ***"Analysis of Soil"*** as a partial fulfilment of the practical course for the award of the B. Sc. Degree in Chemistry by Shivaji University, Kolhapur.

Place: Kolhapur

Date: 25/01/2019

Mr. S. S. Kadam
Project Guide

Dr. D. B. Patil
Head
Dept. of Chemistry
Vivekanand College, Kolhapur

Examiners

DECLARATION

It is hereby declared that the work reported in the project entitled **"Analysis of Soil"** is completed and written by me and has not been copied from anywhere.

Place: Kolhapur

Date: 25/01/2019

Name	Roll No
Mr. Udaysinh S. Powar	8604

ACKNOWLEDGEMENT

I wish to express my deep sense of gratitude towards Mr. S. S. Kadam, Assistant Professor, Department Of Chemistry, Vivekanand College, Kolhapur for his valuable guidance to complete this project within time.

It is my proud privilege to express my sense of gratitude and sincere thanks to Principal Dr. S. Y. Honagekar & Dr. D. B. Patil, Head, Department of Chemistry, Vivekanand College, Kolhapur for providing all the available facilities of the college for completion of this project.

My sincere thanks to all those who have directly or indirectly involved in this project work.

Mr. Udaysinh S. Powar

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Introduction

The idea behind balance plant nutrition is to apply the nutrients that cannot be adequately supplied by the soil. We therefore need to use soil analysis to determine how much of our crop. Soil often contain high amount of nutrients, but the majority are in solid forms.

Soil analysis is a set of various chemicals processes that determine the amount of available plant nutrients in the soil, but also the chemicals Physical & biological soil properties important for plant nutrition or soil health.

The upper layer of earth in which plant grow, a black or dark brown material typically consisting of a mixture of organic remains, clay& rock particles. Soil is a mixture of organic matter, minerals, gases, liquids & organisms that together support life .Earth body of soil is the pedosphere, which has four important function. It is a mean of water storage, supply & purification, it is a modifier of Earth's atmosphere; it is a habitat for organisms all of which, in turn modify the soil.

A typical soil is about 50% solids (45% mineral & 5% organic matter)& 50 % voids or pores of which half is occupied by water & half by gas. In the soil there are 25% water, 25% gas, 18%sand, 18% silt, 9%clay, 5%organic matter is in loam soil.

❖ **There are six main soil types –**

1) Clay

2) Sandy

3) Silty

4) Peaty

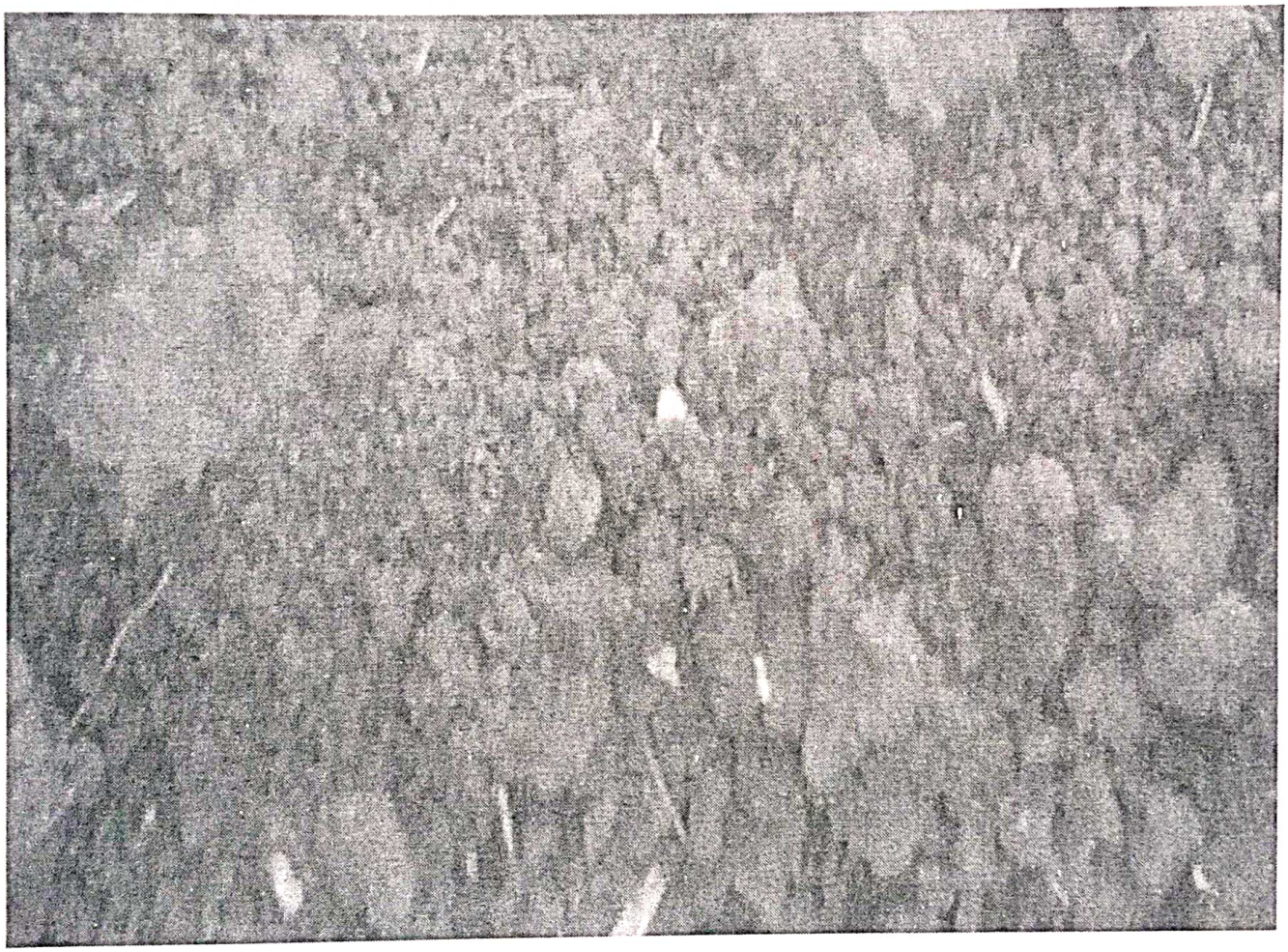
5) Chalky

6) Loamy

The percent soil mineral & organic content can be treated as a constant (in the short term) while the percent soil water & gas content is considered highly variable where by a rise in one is simultaneously balanced by a reduction in the other .

Soil provides a reservoir of nutrients required by crops & also there four for animals but not necessarily at optimum levels of immediate availability to plant. The purpose of soil analysis to plant. The purpose of soil analysis is to assess the adequacy surplus or deficiency of available nutrients for crop growth &to monitor change brought about farming practices. This information needed for optimum production ,to avoid transferring undesirable levels of some nutrients into the environments & to ensure a suitable nutrients content in crop products farm assurance schemes, buyers protocols & codes of organic practices are increasingly

demanding more accurate fertiliser recommendations which must depend on the nutrients supplying capacity of soil . Regular soil analysis, every 3-5 years, should be undertaken as a vital parts of good management practice.



Procedure

- **FOR PH –**

Aim-To determine soil pH

Principle -

PH is nothing but negative logarithm of hydrogen ion concentration in a solution. Soil pH is considered as a master variable because it affects the relative availability of soil nutrients .Soil pH is a measure of the acidity or basicity of soil. Soil pH range normally from 3 to 9. Determination of pH of soil essential while cultivation of different plant species in different areas. If the pH of soil is not within an acceptable range, growth will be retarded. Mathematically pH is represented as,

pH= - log (H+)

pH of soil <3.0 = strongly acid

pH of soil <5.5 = moderately acid

pH of soil<6.0 = slightly acid

pH of soil < 6.5-7.5= neutral (best range for crops)

pH of soil < 7.5- 8.5= moderately alkaline

pH of soil > 8.5= strongly alkaline

Determination of pH-

Requirements-

Balance, beakers, glass rod, test tube, funnel, filterpaper, distilledwater, pH paper stripe, soil sample etc.

Procedure-

A) Preparation of soil solution –

- Take 20 g of dried soil sample in a beaker &add 100 ml distilled water.
- Stir the solution well, by using glass rod & allow the soil particles to settle down
- Filteritintowhatman's filter paper for determination of pH

B) Measurement of pH form pH paper method –

- Take 5-10 ml of filtrate in clean test tube & dip pH paper strip into it.
- pH paper strip is allow to dry &develop thecolour.
- Observe the colour change in pH paper. & compare with colour bands on pH paper booklet &record the pH value.
- Take pH reading &record the observation table

Observation Table –

Sr No.	Soil Sample	pH with pH paper	Nature
1.	A	7.0	Neutral

Result-

Nature of Sample 'A' - Neutral

Conclusion –

Nature of soil samples 'A' - Neutral

WATER HOLDING CAPACITY OF SOIL-

Aim -To determine water holding capacity of different soil

Sample

Principle–

Soil is the top cover of the Earth in which plants penetrate their roots absorb the water from soil & rain is main source of water to the soil. There are some different types of soil with different water holding capacity.

Water holding capacity is measure of the amount of water hold by a fully saturated soil. Water holding capacity or field capacity generally depends on the nature of soil particles, porosity, temperature& presence of humus content in the soil.

Requirements-

Funnel, filter paper, beakers, tripod stand, measuring cylinder, pipettes, balance, soil sample etc.

Procedure-

- Take 20 g oven dried soil sample.
- Place a clean filter paper in funnel & pour few ml distilled water with the help of pipette till the entire filter paper becomes wet.
- Place this funnel on the tripod stand & put a beaker below the funnel to collect excess water.
- Put the soil sample in funnel containing wet filter paper.
- Take 100 ml distilled water & record it as 'A'.
- Pour 100 ml distilled water carefully on the soil in the funnel.
- Allow the soil sample to soak, collect the excess drained out water in this beaker measure it is volume& record it's 'B'.
- Calculate the difference between 'A'&'B', which indicates the amount of water retained in the soil sample.
- Repeat the same procedure for another soil sample.
- 10) Calculate the water holding capacity of different soils by using following formula.

$$\text{WHC (\%)} = \frac{\text{Amount of water retained by the soil sample(C)}}{\text{Weight of soil sample (W)}} \times 100$$

Observation Table –

Sr No.	Type of Soil sample	Weight of soil(g) (W)	Total water taken(ml) (A)	Water collected in the beaker (ml) (B)	Water retained by soil C =A - B	Water holding capacity %=C/W*100
1.	A	20	100	84	40	80%

Result –

1. Water holding capacity of 'A' soil is- 80%

Conclusion –

Water holding capacity in case of 'A'.

➢ CONDUCTIVITY -

Definition –

"Capacity to transfer electric current through water solute form it we can measure soluble salt from soil which can helps to structure /nature of crop. Conductivity can be measured by conductivity cell in ms/cm or ds /m."

Apparatus-

Conductivity bridge, conductivity cell (calibrate 0.01N Kcl sol^{n}).

Procedure –

- Std. potassium chloride (0.01) – 0.7456 g KCL
    - (A.R. Grad) + distilled at 25^{0} – 141 ms/cm conductivity.
    - Before every reading conductivity cell should be calibrate.
- Take 20g sample of soil in 100ml beaker. Add 50ml distilled water mean the composition of solid and water take as 1: 2.5 then using glass rod stir the solution for minimum one hour then after one hour deep electrode in the beaker at which clear solution is obtained.

Observation –

Sample (A) = conductivity - 0.35×10^{-3}

Conclusion –

Conductivity of good sample is A

➢ ORGANIC CARBON –

Chemicals –

1N potassium dichromate, distilled water, strong sulphuric acid.

Procedure –

Take 1g of dried soil from given sample in 100ml volumetric flask. Then added 10ml potassium dichromate and 20ml strong sulphuric acid and stir it. Then that mixture put on asbestos sheet for cooling. After cooling add 100ml distilled water and shake well. Then it stable for one night before 1 day. Take readings of optical density on spectro-photometer of wavelength 660nm. And then wavelength adjust at 0nm then give readings for blank set.

Observation –

Sr No.	Soil Sample	Organic Carbon
1	A	1.70%

Conclusion –

Organic carbon% containing sample A

Conclusion

The soil is not suitable for plantation as the % moisture is higher. In soil analysis there are six process viz - soil sampling technique, determination of texture of soil, determination of organic carbon, determination of soil pH, determination of water content.

In current study we have studied following four methods-

1) Soil sampling

2) Water holding capacity

3) pH

4) Organic carbon

1) Soil sample – Soil sample collected from
farms by using standard sampling method and taking proper precautions.

2) Determination of water holding capacity -
Sample 'A' has moderate water holding capacity.

3) Determination of pH - The obtained pH values for sample has follow - 'a' - Neutral

4) Determination of organic carbon % in sample 'A'.

Reference

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http://en.m.wikipedia:org>wiki>soiltest

Books - 1. Soil analysis testing

2. Methods of soil analysis