Date 18-02-2025.

Expt. No. 01

Page No. 01

Experiment: 01

- Economic Botany and Microtechnique.

CEREALS [Wheat]

- **A flowering plant of wheat:-**

A flowering plant of wheat contains head and roots. The head region is the main flowering region of the plant. There are two types of root system seminal and crown root system.

- **L.S of wheat grain:-**

The fruit type of wheat grain is called caryopsis. in case of wheat, whole grain are the entire seeds of the plant then this type of seed is also called as "Kernel".

- **Microchemical test of Starch:-**

As the grain of wheat contains starch in the endosperm, wheat grain is crushed and flour is prepared.

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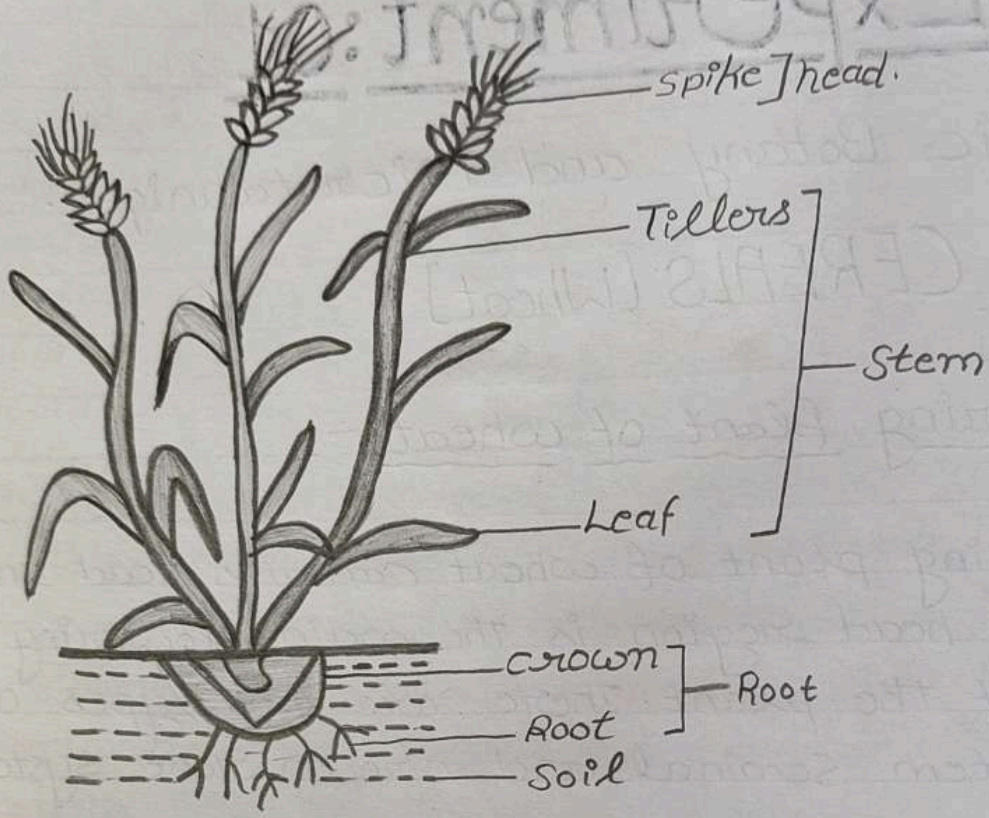

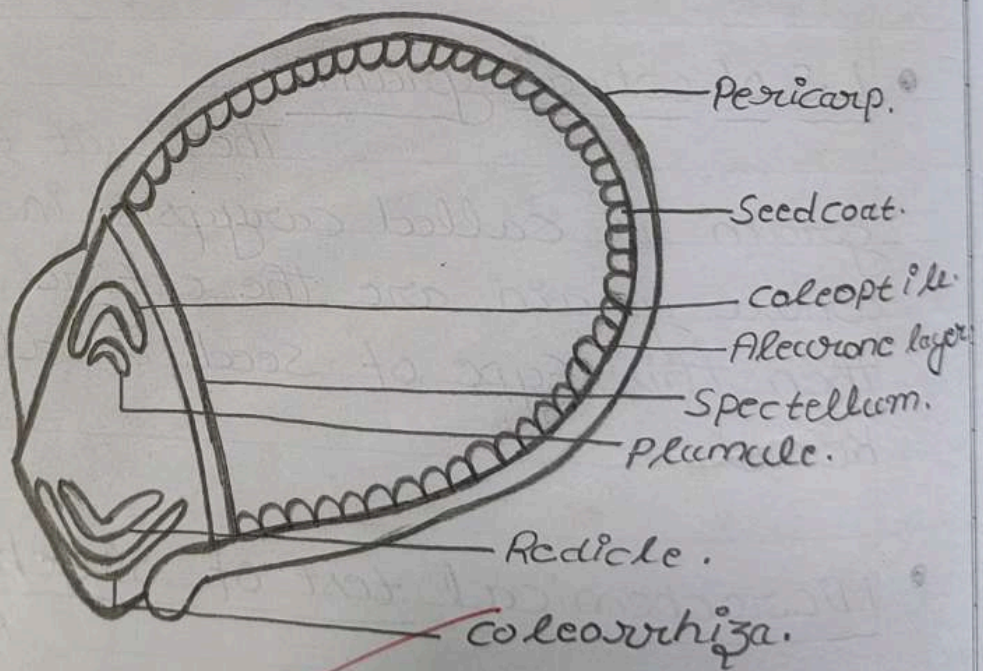

[L.S of Wheat grain].

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- **Material Required:-**

Wheat flour, Statula, dropper slide, iodine solution, cover slip.

- **Procedure:-**

Take little amount of wheat flour on the clean and dried slide, add 2 to 3 drops of dilute - iodine solution observe the change colour.

- **Observation:-**

There will be a change in colour when iodine is added on wheat flour a blue-black colour is obtained.

- **Result:-**

A blue - black colour is obtained which shows the positive test. The starch is made up of amylase and amylopectin.

Wheat flour + iodine solution → Blue - Black Colours (starch).

Teacher's Signature :

Date 18-02-25

Expt. No. 02 Page No. 03

Experiment: 02

Microscopic preparation of Stem

- **Aim:-** To prepare a temporary slide of monocot and dicot stem.

- **Material Acquired:-**

Monocot and dicot stem, Sharp blade, slides, glycerin, watch glass, coverslip, safranin, brush.

- **Procedure:-**

(i). This sections of given material either monocot or dicot have been cut with the help of razor.

(ii). Tranfer the thin sections into the water present on the watch glass.

(iii). Choose 1 or 2 their sections and place it on the slide.

(iv). Staining is done by Safranin.

(v). After staining rinse again with wooder so as to wash off the excess stain.

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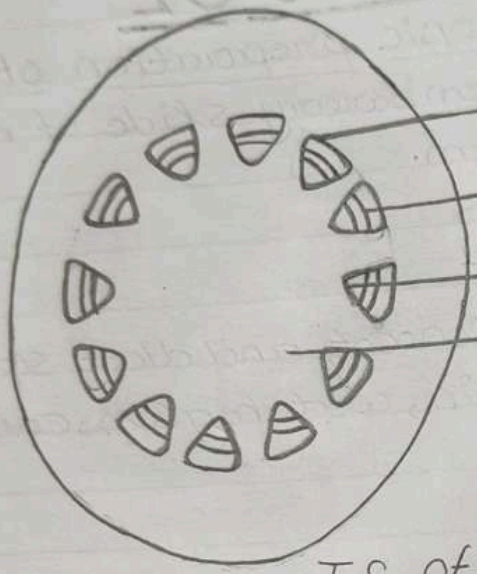
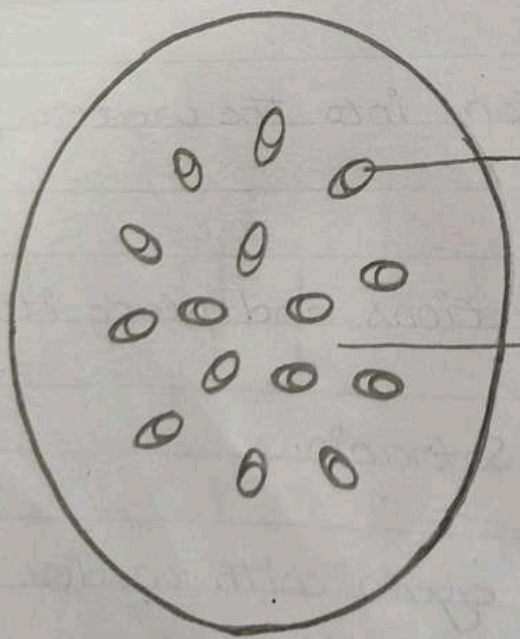
Experiment: 02



T.S of young Dicot stem.



T.S of young monocot stem.

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Expt. No. 02 Page No. 04

(vi). Put the stained section in the slide and mount it with glycerin.

(vii). Observe the slide under the microscope.

- Identification feature of dicot stem :-

(1). Epidermis has multicellular hair.

(2). Vascular bundles are arranged in a ring-like manner.

(3). Pith is found at the center.

- Identification feature of monocot stem:-

(i). Epidermis has no hairs or trichome.

(ii). Vascular bundles are scatted in the ground tissue.

(iii). Pith is usually absent in monocot stem.

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Expt. No. 03 Page No. 05

Experiment: 03

- Microscopic preparation of Root
- Aim:- To prepare a temporary slide of moncot and dicot root.
- Material Required:-

Monocot and dicot root, Sharp blade, slide, glycerin, watch glass coverslips, Satranin, Brush.

- Procedure:-

(i). Thin section of given material have been cut with the help of razor.

(ii). Transfer the thin sections into the water present on the watch glass.

(iii). Choose 1 or 2 thin sections and place it on the slide.

(iv). Staining is done by Satranin.

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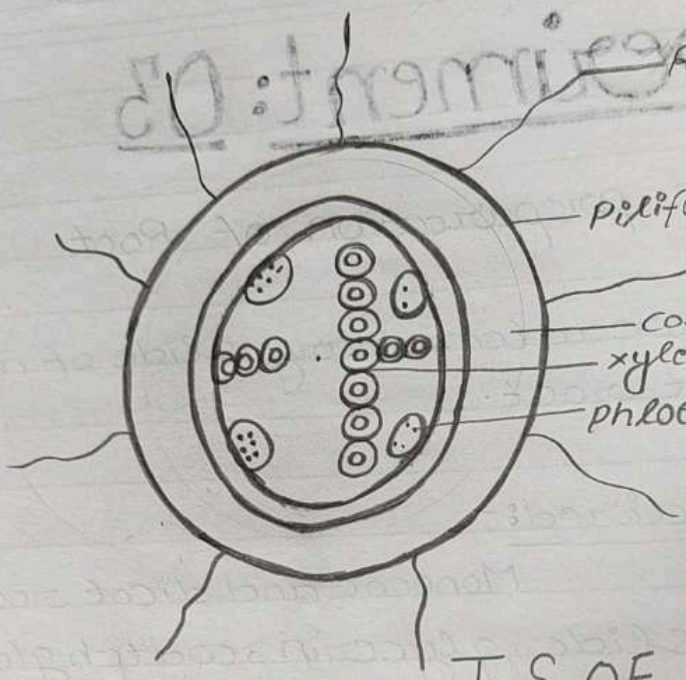
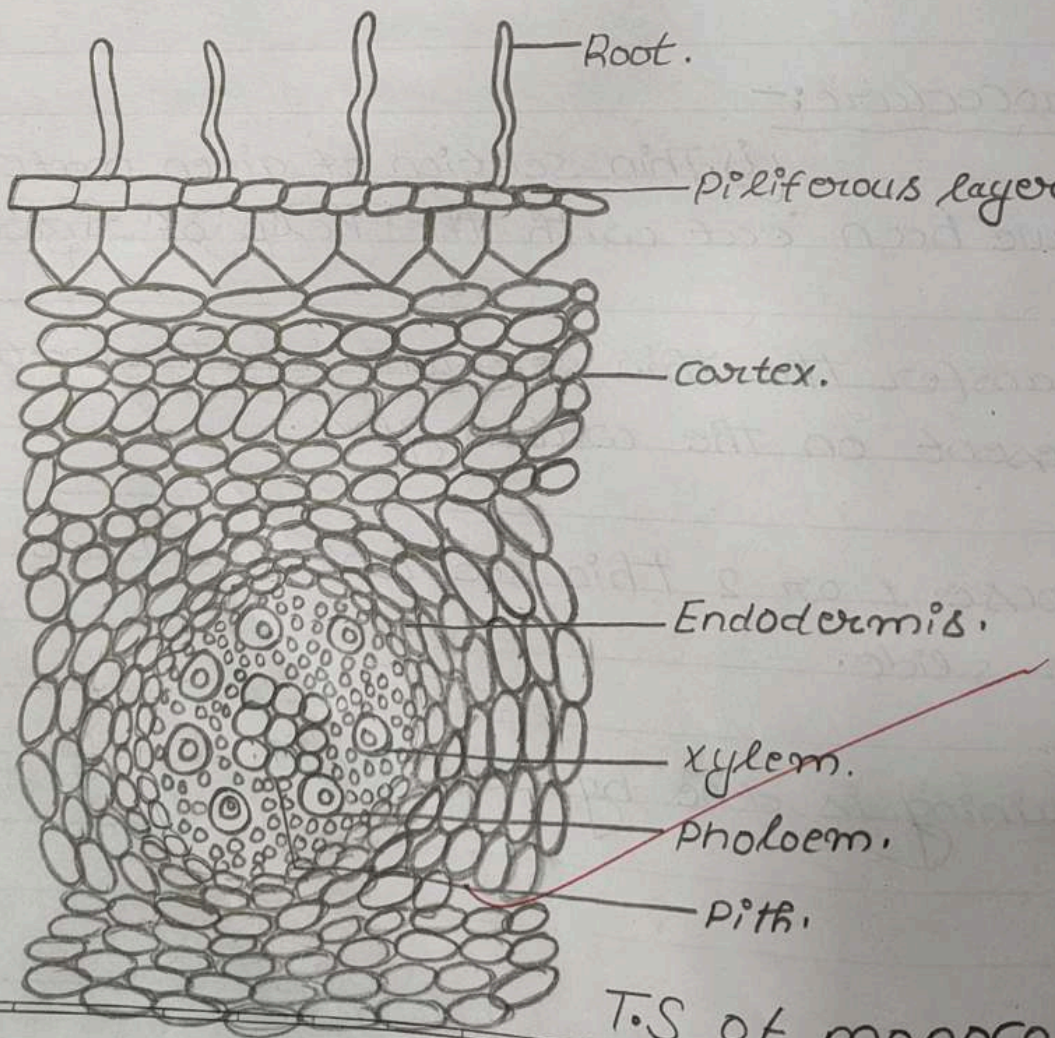


T.S OF Dicot root.



T.S of monocot root.

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(v). After staining rinse again with water so as to wash off the excess stain.

(vi). Put the stained section on the slide and mount it with glycerin.

(vii). Observe the slide under the microscope.

- Indentification feature of dicot Root:-

(i) Epiblema is single layered and made up to compactly arranged cells.

(ii). 2-4 alternate bundles of xylem and phloem.

(iii). Pith is small.

- Identification feature of monocot Root:-

(i). Epiblema is single layered made up of compactly arranged cells.

(ii). 8 or more alternate vascular bundles are present pith is large.

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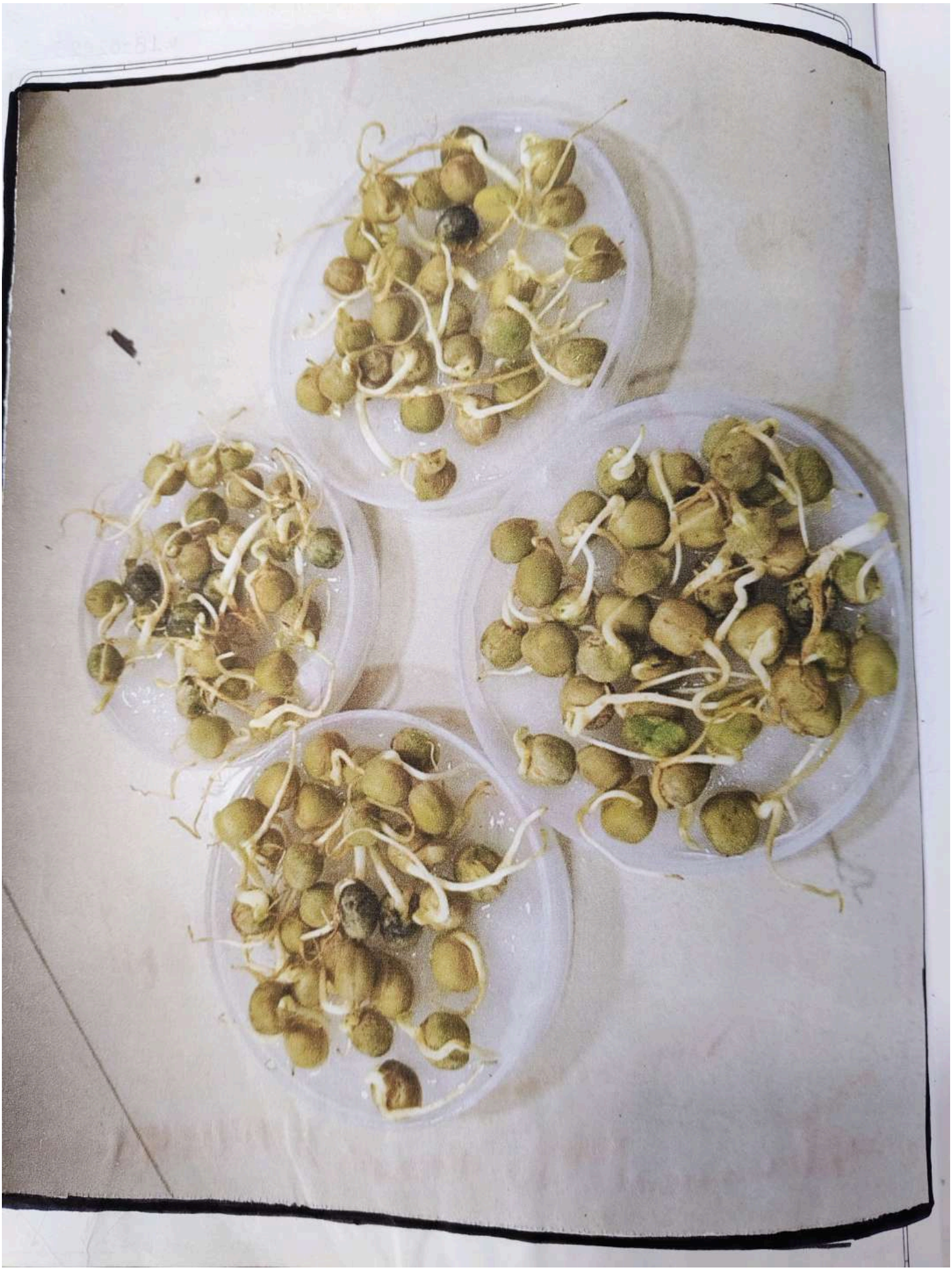

Date 03/03/25

Expt. No. 04 Page No. 07

Experiment: 04

Hydroponics and Commercial Green house Cultivation

Field visit of greenhouse for understarding Floriculture and vegetables production.

Greenhouse are those which has a framed structure and are covered with a transparent material. In this a large number of flowers and vegetables are grown without season under controlled environmental conditions.

- Types of Greenhouses :→

There are different types of greenhouses.

[1]. Green houses type basedon shape :→

According to shape the green house may be saw tooth type ridge and furrow type. uneven

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Shan type: even span type interlocking ridges greenhouse.

② Green house type based on construction:→

There are two types of construction material one made up of woden framed structures and those other is pipe framed structures.

- Green house based on covering materials:→

The covering material of the green-house should be glass and plastic.

- Green house type based on ventilation:→

The temperature, humidity and carbon dioxide gas can be maintained by natural ventilation depending on the crops.

- Advantages of Green house:→

① Off-Season production of vegetable and fruit crops.

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② Water requirment is very limited and easy to control.

③ This types of greenhouse cultivation is suitable for disease-free.

④ Use of chemicals, pesticide is limited.

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Expt. No. 05 Page No. 10

Experiment: 05

→ Microchemical Tests PROTEINS.

→ Object:- To perform colour tests of proteins.

→ What are proteins:-

Proteins are the substances made of one or more polypeptides, which themselves are made of amino acids. There are many different kinds of proteins, each with its own sequence of amino acids. An amino acids. is a class of organic compounds with a carboxyl group (-COOH) an amino group (NH_2) and a side group all attached to a central Carbon atom. About 20 different amino acids are found in proteins.

①. Xanthoproteic Test:-

→ Principle:- It is based on the fact that heating a protein with nitric acid produces a yellow colour that turns orange on addition of alkali.

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Expt. No. 05 Page No. 11

+ Requirments:- Protein solution (or gram flour legumes so soyabean seeds or flour), test tube, HNO_3, Spirit lamp.

+ Method:-

(1). Take 2-3 ml of protein solution in a test tube and add 1 ml of conc. nitric acid HNO_3 A white precipitate is formed. (In case of legumes or soyabean, make their suspension in water and follow the same procedure.).

(2). Heat the test tube on a spirit lamp. white precipitate changes into yellow and ultimately the solution becomes yellow coloured.

(3). This yellow colour turns orange on addition of alkali (40% NaOH).

(Presence of benzene ring is responsible for the yellow colour in the test. Aromatic amino acids especially tryptophan and tryosine are responsible for this test).

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Expt. No. 05

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2. Biuret test:—

→ **Principle:**—This is based on the fact that the violet colour appears when a protein or Peptide is treated with sodium hydroxide and dilute copper sulphate.

→ **Requirment:**—Test tube, protein solution (or gram flour, legumes or Soyabean) Biuret reagent.

→ **Method:**—

① Take about 1.5 ml of a solution containing 0.25 - 20 mg of protein in a test tube. (In case of legumes or soyabeans make their suspension in water).

② Add 1.5 ml of Biuret reagnt and keep the test tube in the test tube stand for about 30 minutes at room temperature. Violet colour is produced.

(The violet colour is due to the formation of a complex of cupric ions with one or two peptide bonds and of many other kinds of structures

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This name of the test is given due to the formation of colour similar to that formed between copper and Biuret, i.e. $-H_2NCONHCONH_2$.)

3. **Millon's Test :-**

→ **Principle :-** This test is based on the fact that many phenols yield red colour or red precipitate when treated with an acid solution of mercuric, nitrous and nitrate ions. proteins show this reaction due to normal presence of tryosine.

→ **Requirment :-** Protein solution (or gram flour or legumes or soyabean), test tube, Millon's reagent.

→ **Method :-**

(1). Take 5 ml of protein solution or the suspension of gram flour. legumes or soyabean in water in a test tube.

(2). Add to 2 to 3 drops of Millon's reagent (10% mercuric sulphate in 10% sulphuric acid, called first solution; or mercury, conc. nitric

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Table 1

Experiment	Observations	Inference
1. Xanthoprotete Tests:		
1. In 2-3 ml protein Solution add 1 ml of HNO_3 (Conc).	White Precipitate.	
2. Heat the precipitate.	Precipitate turns yellow	
3. Add excess of alkali	Precipitate turns orange.	Protein Confirmed.
2. Biuret test: In 2-3 ml of protein Solution add equal amount of Biuret reagent.	Violet colour is produced after about 30 minutes.	Protein Confirmed.
3. Millon's Test:		
1. In 5 ml of proteins add 2-3 drops of Millon's reagent 'a' Boil it.	Precipitate is formed.	
2. Heat it further.	It turns reddish	Protein Confirmed
1. Take fresh 5 ml protein Solution and 2-3 drops of Millon's reagent 'b'	A clump of proteins is formed.	
2. Heat it further.	It turns red.	Protein Confirmed.

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acid and water in the proportion of 1:2:4, called second solution).

(3). Heat the mixture. If the first solution is used in the preparation of Millon's reagent, a clump of proteins is formed. It may also turn reddish on further heating. If the second solution is used, a precipitate is formed which may turn reddish on further heating.

(Proteins show this reaction due to the normal presence of tryosine).

+ **Observation:-** Tabulate your observations and results in the from of following Table 1:

+ **Result:-** The given solution contains proteins.

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Expt. No. 06 Page No. 15

Experiment: 06

- **Carbohydrates (Reducing Sugars).**

→ **Object:** To perform colour tests for carbohydrates (reducing sugars).

→ **What are Carbohydrates (Reducing Sugar):**

Carbohydrates are organic compounds containing carbon, hydrogen and oxygen in a ratio of 1:2:1. All sugars (e.g. glucose, sucrose etc.) and starches are carbohydrates.

Monosaccharides can be oxidized by hot alkaline solution of certain metallic ions. Metallic ions are reduced in this process. Since the sugars are the reducing agents they are known as reducing sugars. For Fehling's and Benedict's test following is the equation:

Glucose + Cu^{2+} → Oxidized glucose + Cu^{+}
(Blue) (Yellow-red)

1. **Fehling Test For Carbohydrates:**

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Experiment: 06

Table 2

Experiment	observation	Inference
Fehling's Test: Warm 2-3 ml of Fehling's Solution, add few drops of glucose solution and boil it.	Brownish red precipitate forms.	Carbohydrate (reducing sugar) Confirmed.
Benedict's Test Add 2 ml. of glucose solution in 5 ml. of Benedict's Solution Boil it.	Solution turns green or yellowish-red	Carbohydrate (reducing sugar) Confirmed.

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+ **Principle:-** It is based on the fact that the complex of cupric ions in alkaline tartrate is reduced to insoluble cuprous oxide.

+ **Requirment:-** Fehling solution, test tubes, sprit lamp, glucose solution.

+ **Method:-**

1. Take 2-3 ml of fehling's solution in a test tube and warm it on a sprit lamp.
2. Add a few drops of glucose solution.
3. Boil it for a few minutes. The result is the formation of brownish red precipitate.

+ **Observation:-** These tests can be tabulated as follows in table 2.

+ **Result:-** The given solution is a carbohydrate (reducing sugars).

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Expt. No. 07 Page No. 17

Experiment: 07

- Carbohydrates (Non-reducing Sugars)

→ **Object:-** To perform colour test for carbohydrates (non-reducing sugars).

→ **Carbohydrates (Non-reducing Sugars).**

This test should be carried out by first hydrolyzing the carbohydrates (non-reducing sugars) and then for reducing sugars to hydrolyze them, mix the equal volumes of starch or sucrose solution and conc. HCl Boil it for five minutes and neutralize it with Sodium bicarbonate. Now test the solution for reducing sugars by fehling test or Benedict's test as above-mentioned in exercise No. 2.

→ **Requirments:-** Sucrose or Starch, Conc. HCl, Sodium bicarbonate or Sodium Carbonate, Fehling solution, Benedict solution.

→ **Method:-**

Hydrolize the Sucrose or Starch

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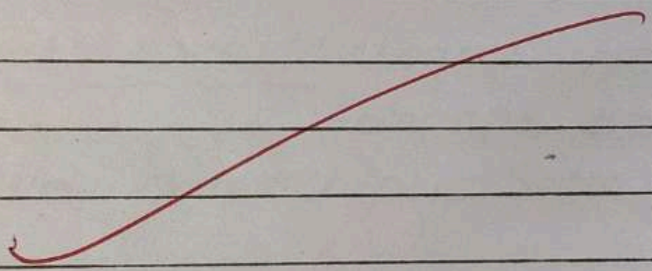
Solution by boling it with sodium bicarbonate or Sodium carbonate. Test this solution now by Fehling or Benedict's test for reducing sugars.



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Expt. No. 08 Page No. 19

Experiment: 08

Stomatal Index Exercise.

+ **Object:+** To peel off the epidermis of the given material and to stain and mount it. Identify the stomatal type and calculate the stomatal index.

+ **Requirements:-** Leaves from given material forceps, brush, razor, blade Slide, coverslip, Safranin and glycerin.

+ **Method:-** For peeling off the epidermis of given leaf. to break one surface and pull the other surface. put the piece of such peels on the slide, stain them 1% aq. sol^{n} of Safranin, mount in 50% glycerin and study under low and high power of microscope. In the same ways, remove the epidermis peel of the other surface of leaf, stain and mount them also in the same as discussed above, in the process.

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Observation and result :→ The epidermis both the surface of leaf compare the stomata and find out the type of to which belong and draw diagram in general, the stomata in dicotyledonsis plant remain scattered irregularly where as monocotyledons they remain in parallel rows.

The number of stomata and number of epidermis all per unit area calculate the stomatal index by formula-

$$\text{Stomatal Index (SI)} = \frac{S}{E+S} \times 100$$

Where 'S' represents the number of stomata per unit area 'E' Represent the number of epidermis cell per unit area.

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Experiment:- 09

Cultivation of Medicinal and Aromatic Plant

NEEM

→ **Cultivation** :- Neem can easily be grown in soil with up to pH 10. It provide natural pesticidal properties. Neem tree is native to India but can also grow in other tropical areas. leaves are opposite pinnate 20-40 cm long. the The fruit is smooth olive like drupe which varies in shape from elongate to oval to nearly. The fruit from elongate to oval to nearly. The fruit skin is thin and the bitter sweet pulp is yellow.

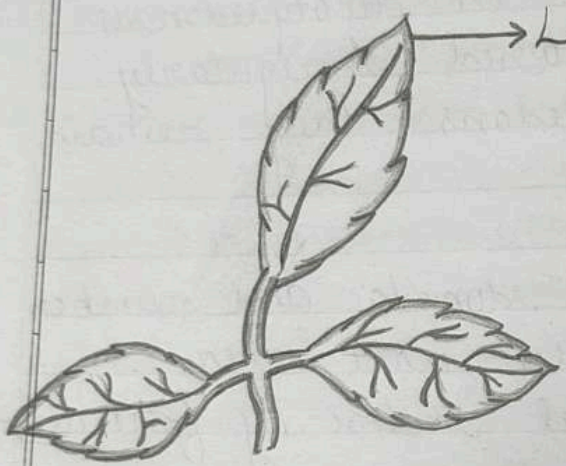
→ **Essential oil Extraction method Neem**

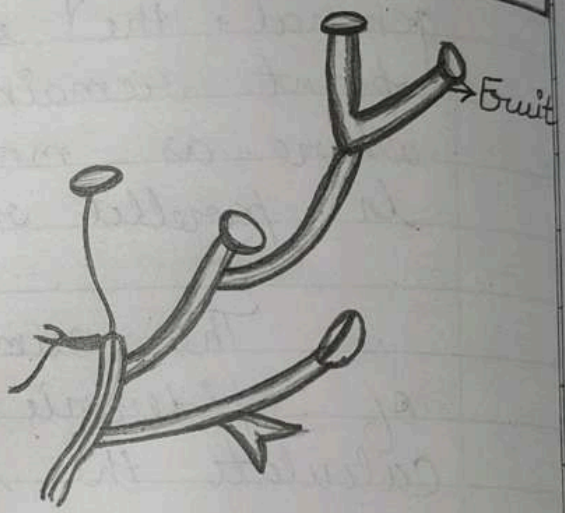
(1). Neem oil is obtained from the fruit and seed of neem tree.

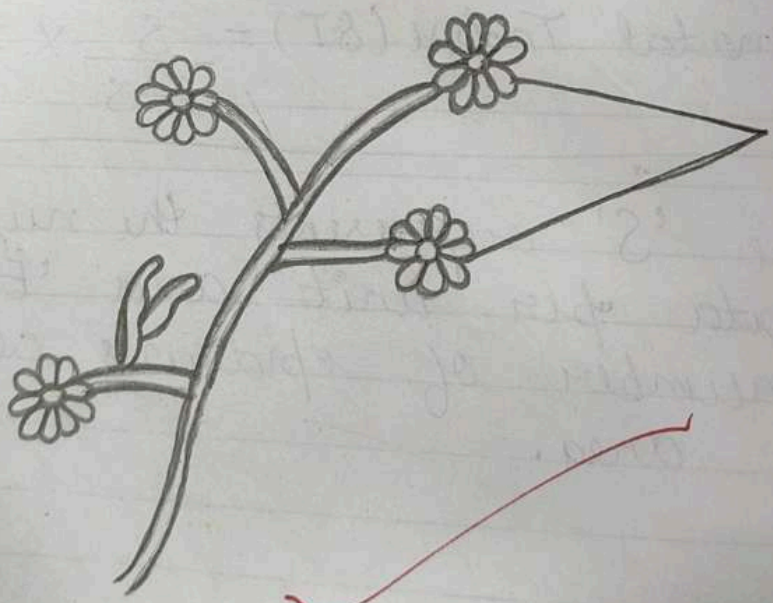
(2). 40gm of seed were weight and put into the timble of the soxblet extraction.

Teacher's Signature : _____

Systematic position
order:- Sapindales
Family:- Meliaceae.
Genus:- Azadirachta
Species:- A. india.







NEEM

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③. Then add 30 ml of ethanol with measuring clinder and mixture was pored into the pot of Soxhlete extraction.

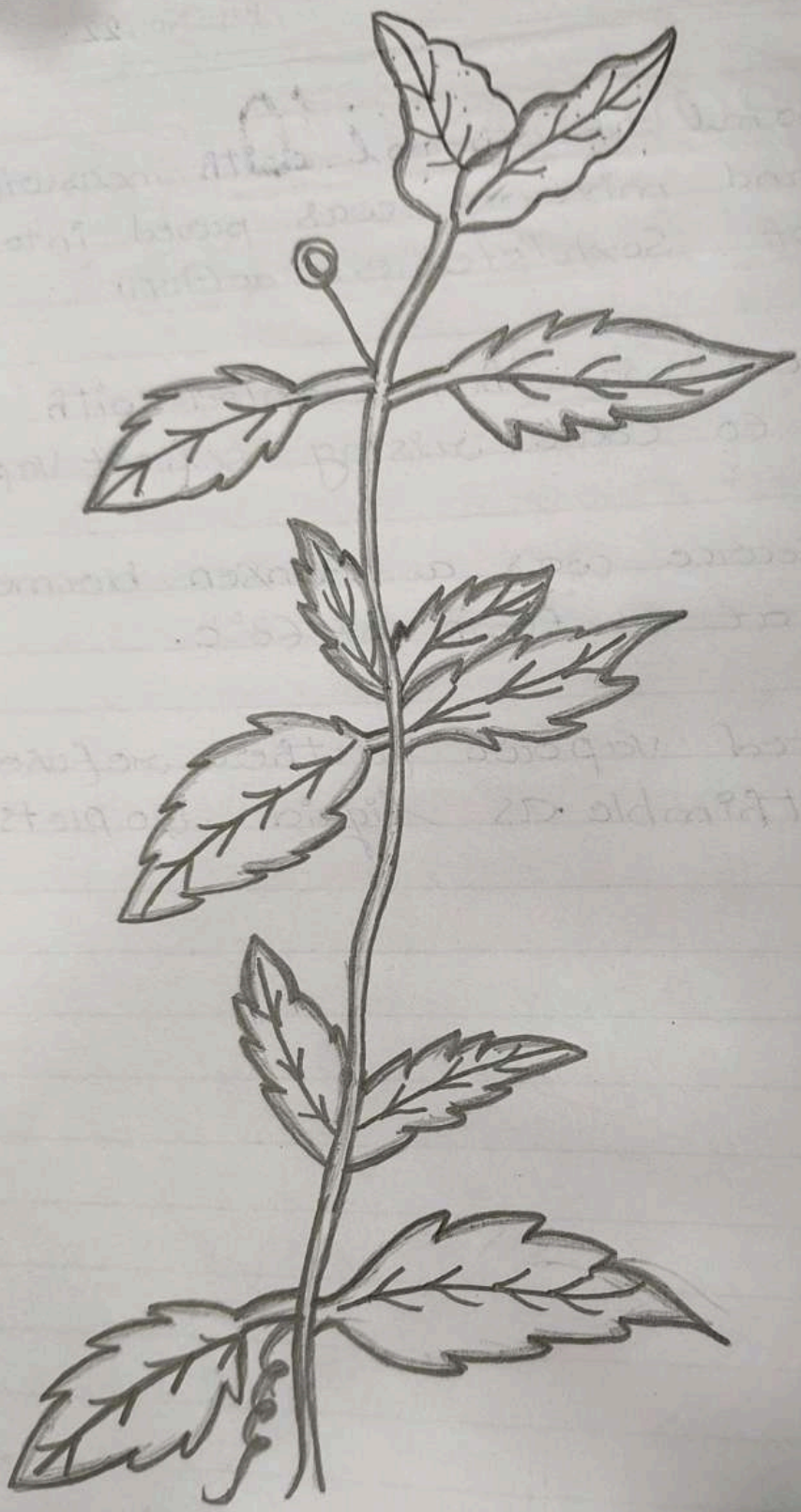
④. The apparatus was them coupled with condensor to cool rising solvent vapors.

⑤. The heat source was a Bunsen burner operating at a temp of 68°C.

⑥. The condensed vapour further refused to the thimble as liquid droplets.

Teacher's Signature :

Systematic Position
Order - Lamiales
Family - Lamiaceae
Sub Family - Nepetoideae



MINT

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Experiment: 10

→ Cultivation of Medicine and Aromatic plant

MINT

→ Cultivation:— Mint oil is obtained from the leave of perppermint plant. It is found in Tropical regions having wet climate. It is cultivated in Kerala, Karnataka, Assam, SIKKIM Mint oil was extraction process. The extraction of oil is basically divided into two parts.

1. Extraction of oil from leave into Solvent.
2. Seperation of oil and Solvent.

→ Stem distillation:—

1. 60gm of leaves were weight and then 250 ml of distilled water is added add plack in 500ml round bottom flask.

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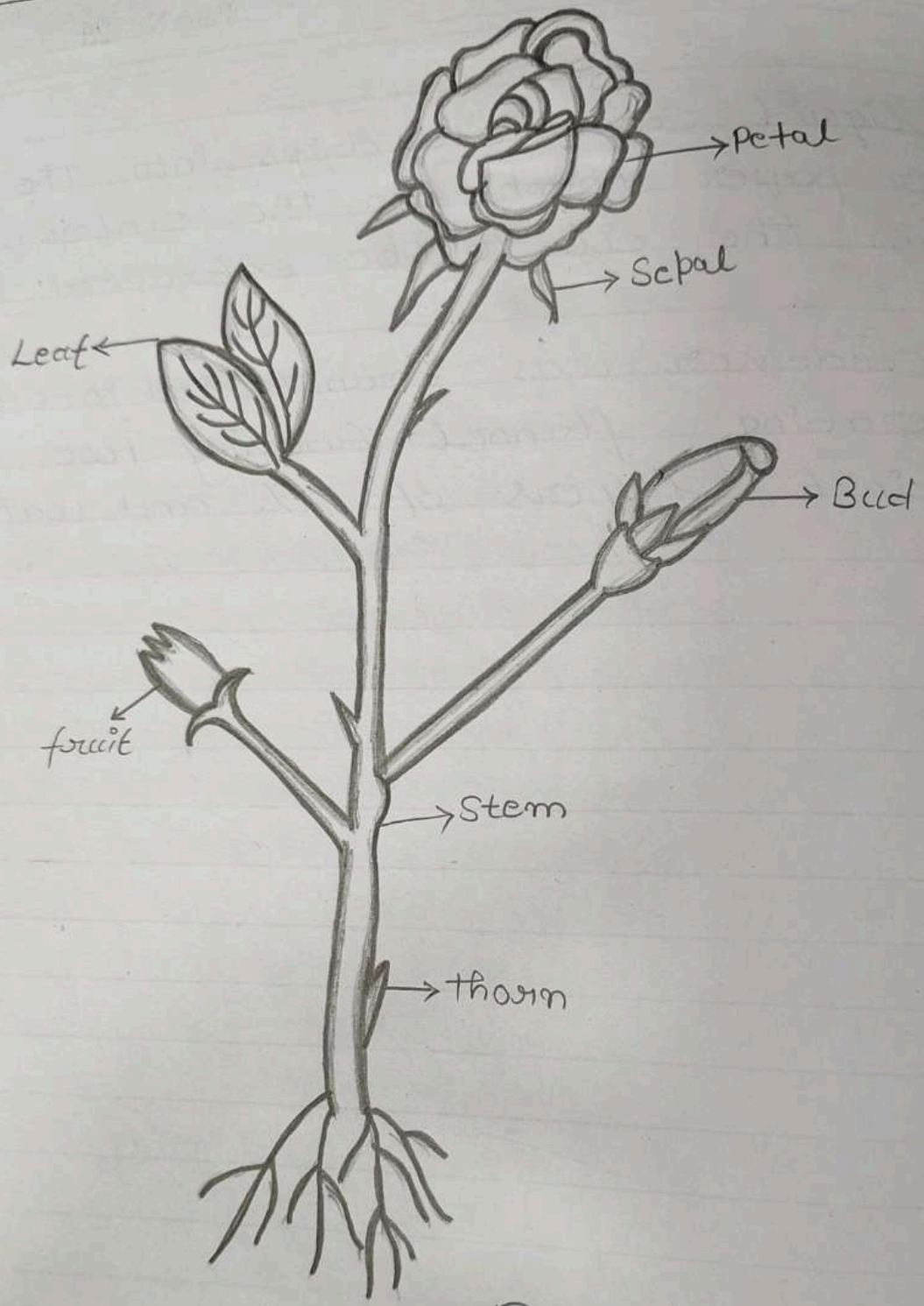
The liquid condensate drips into the filter paper thimble in the conter which contain the oil to be extracted.

The condensor was transferred into a seperating flannel forming two distinct layers of oil and water.



Rose

ROSE PLANT

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Experiment: 11

→ Rose

* Cultivation:-

Rose oil is obtained from the petals of rose flower. It is found in temperate regions and same in sub tropical region it is cultivated in uttar pradesh, Madhya Pradesh, Rajsthan, Maharasthra, west Bengal. extraction process. The extraction of oil is basically divided into two parts.

1. Extraction of oil from petals into the solvent.
2. Separation of oil and solvent.

* Petal Distillation:-

(i) 60gm petals were weighted and then 250 ml of distilled water is added and placed in 500 ml round bottom flask.

(ii) The liquid condensate drips into the filter paper thimble in the center which contains the oil to be extracted. The condenser was tranferred into a Separating

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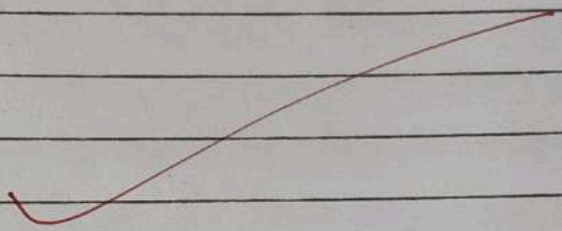
funnal forming two distent layers of oil and water.



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