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1. Study of osmosis by Potato Osmoscope

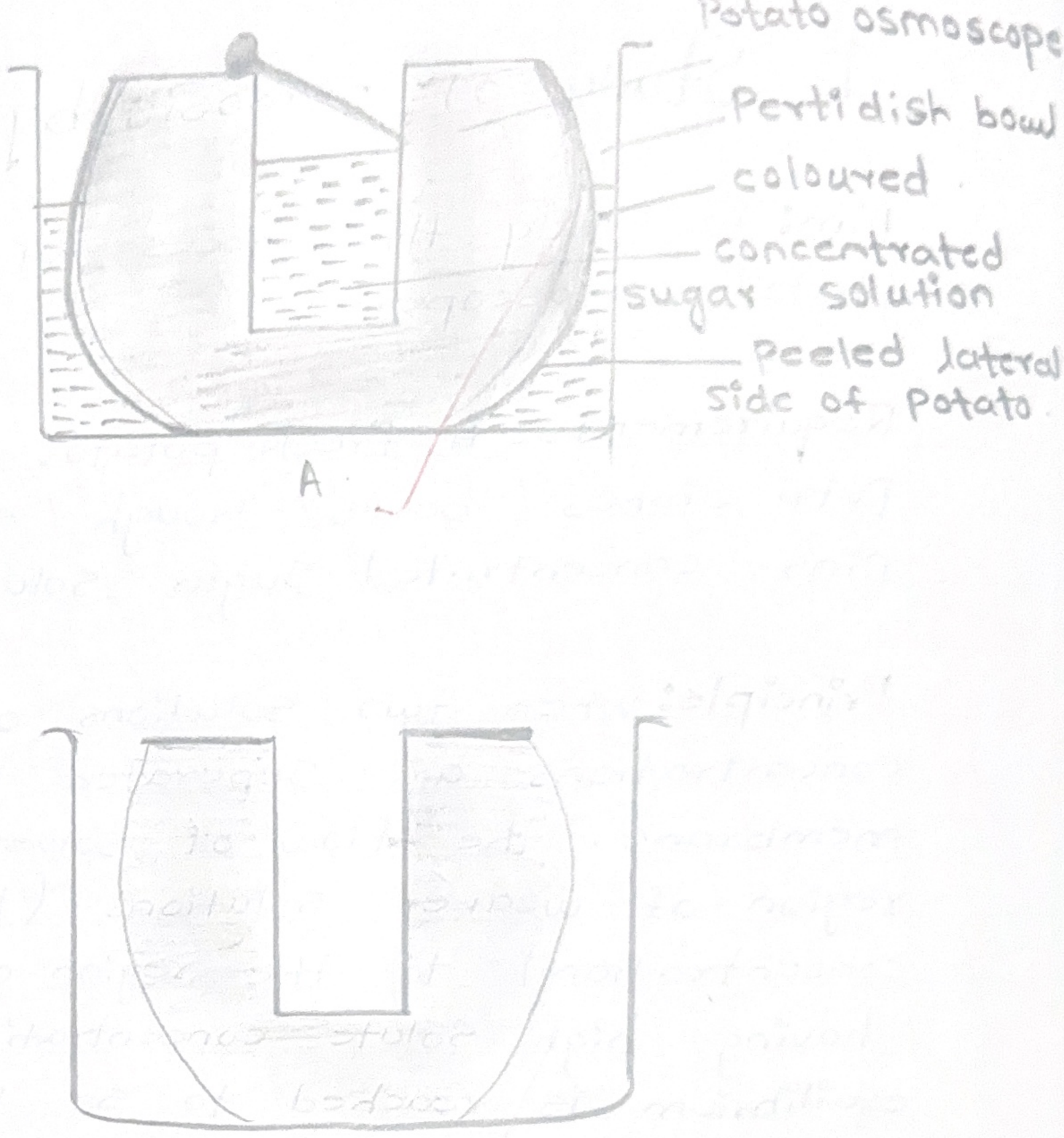
Aim: To study the process of osmosis using photo osmoscope.

Requirements: A fresh potato, peeler or scalpel, Petri dishes / bowls / trough / shallow glass beakers pins, concentrated sugar solution, coloured water etc

Principle: when two solutions of different concentrations are seperated by semipermeable membrane, the flow of solvent is from the region of weaker solutions (having low solute concentration) to the region of stronger solution (having high solute concentration) till the equilibrium is reached to so that the osmotic pressures are balanced.
osmosis is of two types viz. endosmosis and exosmosis.

Procedure:

1. Take a fresh potato tuber and peel off the skin with the help of scalpel.
2. Cut the potato from one side in such a way that it will make a flat base.
3. Scoop the peeled tuber properly so as to make a hollow block (well) in potato with thin intact base bottom and care should be taken that it will not rupture at base.


Potato osmoscope
Pertidish bowl
coloured
concentrated
sugar solution
Peeled lateral
side of potato
A
B

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4. Now add concentrated sugar solution in that cavity and mark its level by inserting a pin in the cavity wall.

5. Place this photo osmoscope in a petri dish / bowl or glass beaker, filled with coloured water.

6. Mark the initial levels with pin. After some time mark the level of sugar solution in the potato osmoscope.

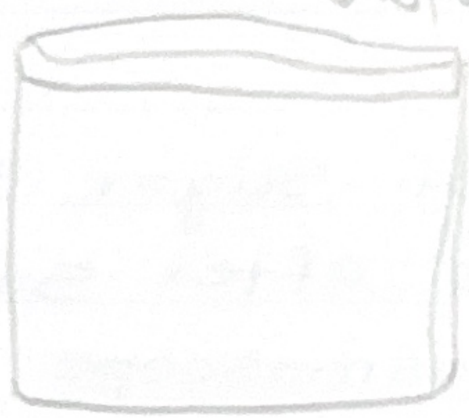
observations:

1. You can easily note that level of sugar solution in the potato osmoscope, rises after sometime. The solution in the cavity osmoscope also becomes coloured.

2. It can be inferred that coloured water from the petri dish / bowl has entered the cavity of the potato osmoscope.

A

cut



B

mash the peeled banana fruit well

Add liquid soap + salt + water

mix well.

f

floating DNA

mixture

Dish soap.

salt

C

E

IPA addition along the walls

filtrate

mixture

water

filter pape

Tea stained

filter

the Solution.

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2. Isolation of DNA from Given Example

Aim: To extract and isolate DNA from a fruit Sample.

Requirements: fleshy berry fruits like banana. zizyphus, grapes etc. can be used. fleshy fruits of banana, liquid soap, distilled water salt (NaCl), 1000 ml ice cold isopropyl alcohol. IPA [chill the alcohol (IPA) by placing the test tube in a beaker containing ice cubes and some water]. measuring Spoons, glass stirring Rod. test tubes, glass beakers, plastic cups, Strainer or coffee filter, funnel etc.

Principle: All plants DNA extraction protocols, comprise of the basic steps of distraption of cell wall, cell membrane and nuclear membrone to release the DNA into solutions followed by precipitation of DNA and ensuring removal of the contaminating biomolecules.

Procedure:

1. The cells in a fruit sample are seperated by physical means such as grinding, to form mash or blend.
2. Put 1/2 cup of distilled water and one banana blend in it. Then pour the mixture into the beaker.

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3. Mix 01 teaspon of liquid soap with $\frac{1}{4}$ teaspoon of salt in a plastic zip lock bag or cup Add 02 teaspoon of distilled water and stir gently until the soap and salt are dissolved.

4. Add 02 tablespoon of banana water and stir mash mixture to the cup containing salt and soap solution. Stir the mixture for 10-15 minutes by using glass rod.

5. After 15-20 minutes filter the fruit mixture through a fine sieve or coffee filter.

6. Take a test tube undisturbed for 5-6 minutes.

7. Place the test-tube A layer of alcohol floating on the top of the fruit mixture is now clearly visible.

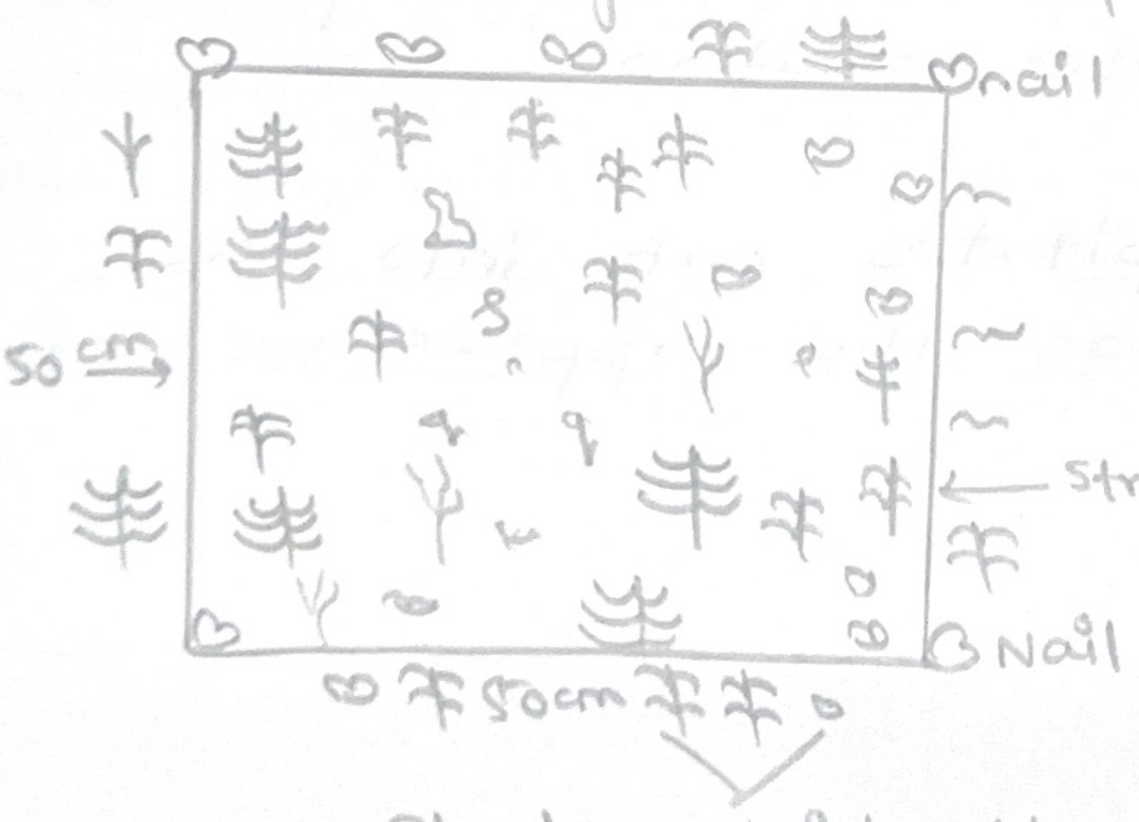
8. The white material becomes visible as a precipitat that marks the islolated DNA.

10. It can be spooled out the with help of hook or bent paperclip or glass rod. Slowly draw the DNA up out of the solution.

Observations: DNA precipitates out into the alcohol layer. DNA has the appearance of white stringy mucus.

		1	2	3	4	5

Diagrammatic representation of quadrant-I



Plants outside the quadrant.

Diagrammatic representation of quadrant-2

Plants outside the quadrant.

Diagrammatic representation of quadrant-3.

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3. Study of population density and frequency of different plant populations. by quadrant method.

Aim: To study population density and frequency of plant population by quadrant method.

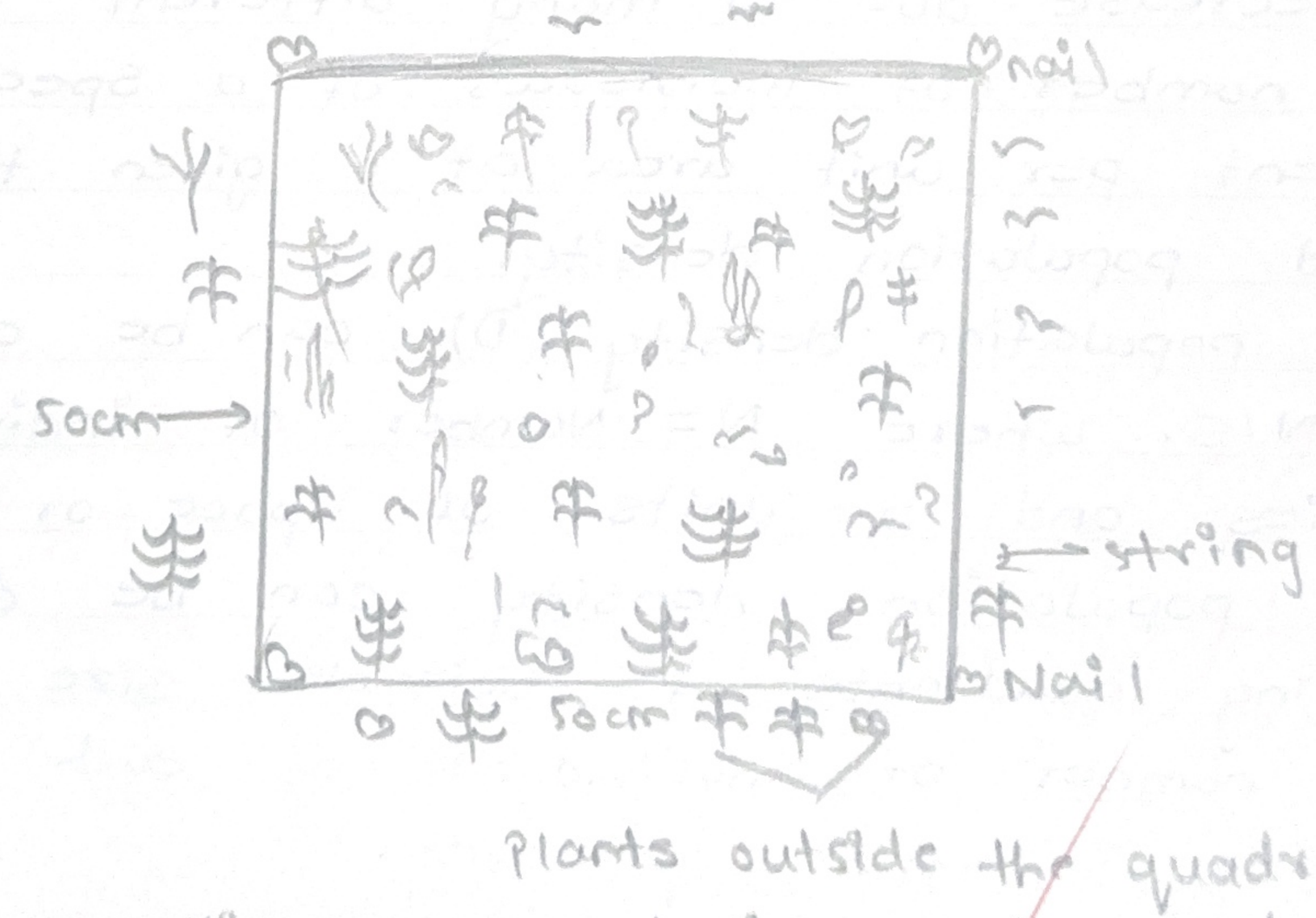
Principle:

1. All the different types of individual plants growing at a particular space or geographical area at a particular time, forms (constitutes) plant population of that area.
2. It changes from time to time and may increase or decrease due to many different factors.
3. The number of individuals of a species spent or present per unit area at a given time is called population density.
4. The population density (D) can be calculated as D = N/S. where N = Number of individuals of a species and S = units of space or area.
5. The population density can be determined by marking quadrants of suitable size and recording the number of invdividuals of each species occuring in the quadrant.
6. Population density =

$$\frac{\text{Total number of individuals of a species in all the quadrants studied (N)}}{\text{Total number of quadrants Studied (S).}}$$

Plants outside the quadrant

Diagrammatic representation of quadrant -4.



Plants outside the quadrant

Diagrammatic representation of quadrant-5

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7. Percentage frequency (f) =

$$\frac{\text{Total no of quadronts in which species occured}}{\text{Total no of quadronts studied}} \times 100$$

8. Abudance (A) = $\frac{\text{Total no of individuals of Species}}{\text{No of quadrant in which species occured.}}$

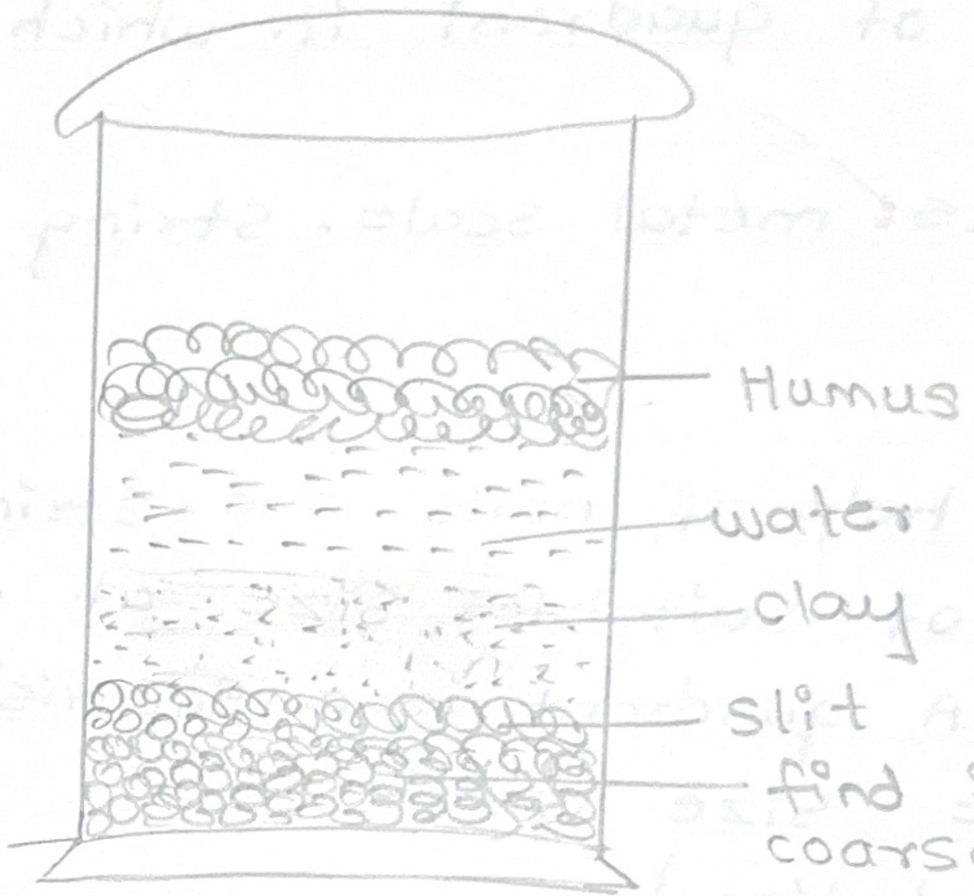
Requirements: metal scale, string, nails, paper, pencil.

Procedure:

1) With the help of nails and string prepare four quadronts of suitable size at number of places randomly. (A quadrant is a squarish geographical area of suitable size used as a unit for study ov f vegetation).

2) count the number of each plant species prensent in every quadrant.

3) Record data in the observation table and calculate population density and percentage frequency of different species by using formula given above.



composition of soil

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5. Study of Soil Samples at least from two different localities / sites with respect to their texture and PH and correlate plant found therof.

Aim: To study different soil samples from different localities for their physical propertics.

Principle: The soil is uppermost hayer of the earth which has humus and numerous living organisms along with their dead remains that sustains the life of plants.

A productive soil generally has approximately 40% minerals, 10% organic matter (derived from dead remains of the organisms), 25% water and air 25%.

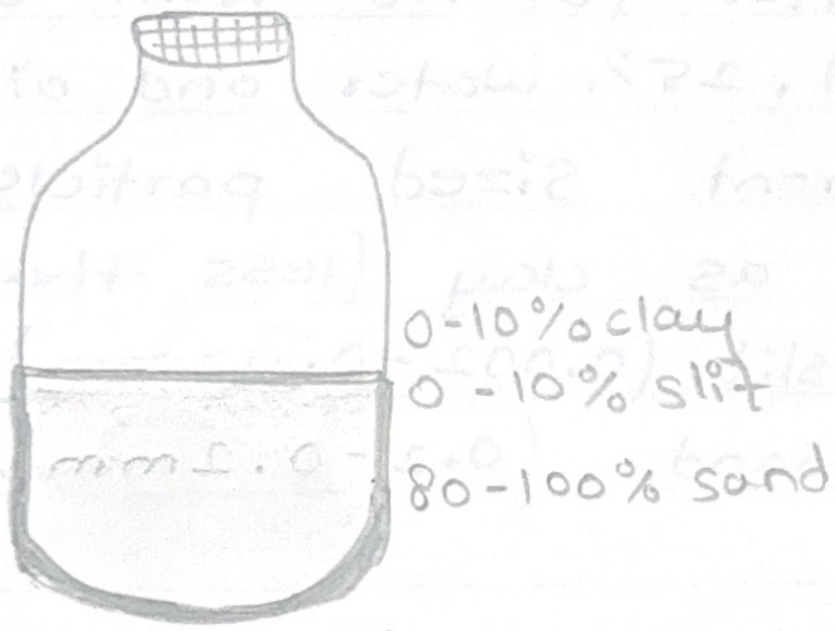
The soil may have different sized particles which can be calassified as clay (less than 0.002mm in diameter), slit (0.002-0.02mm), finc and (0.02-0.2mm), course sand (0.2-0.2mm) granovd (more than 2mm).

The soil may be sandy, sandy loam, loam, slity loam clayey. most of the soils contain mixture of sand, slit and clay in different proportions.

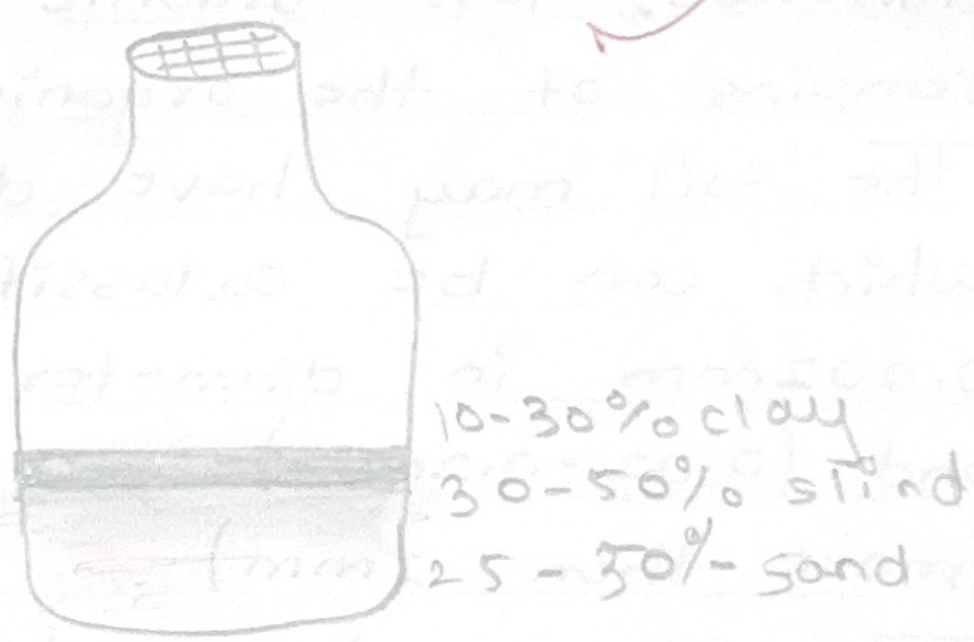
Study of soil texture / type: Soil texture in the grain of soil depending upon the same nature and composition of a particular matter. Beside texture there are other parametres of study of soil as moisture, porosity water holding capacity PH, soil microflora, humus etc. Study of soil texture is one of the important parameters

*observation table:

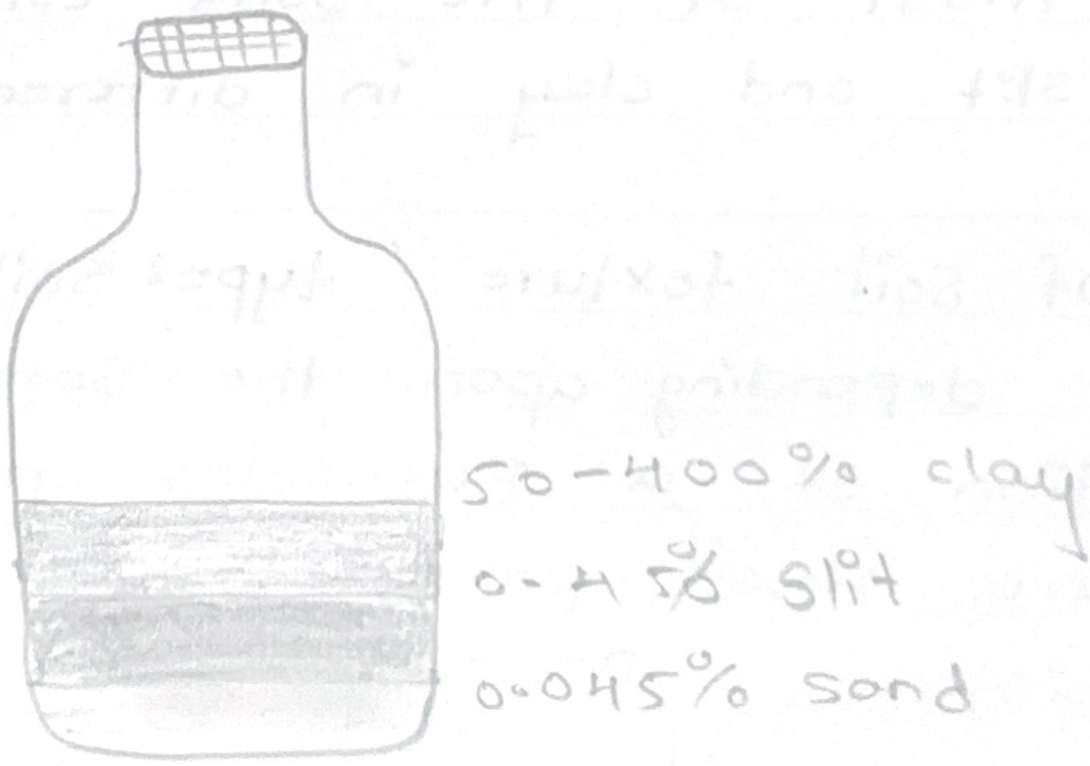
NO	Types of soil	location	composition.
1	Sandy of soil	Near the mountain foot -hills along rivers, stream and certain costal areas.	80-100% sand 0-10% silt. 0-10% clay.
2.	Loam soil.	valleys & flat areas (foodplains) surrounding rivers and streams	25-50% sand 30-50% silt 10-30% clay.
3.	clay soil	very common in certain areas, particularly around urban.	0-45% sand 0-45% silt 50-100% clay



a) sandy soil



b) loam soil.



c) clay soil.

composition of different types of soil.

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for various purposes. e.g agriculture, construction. mining etc.

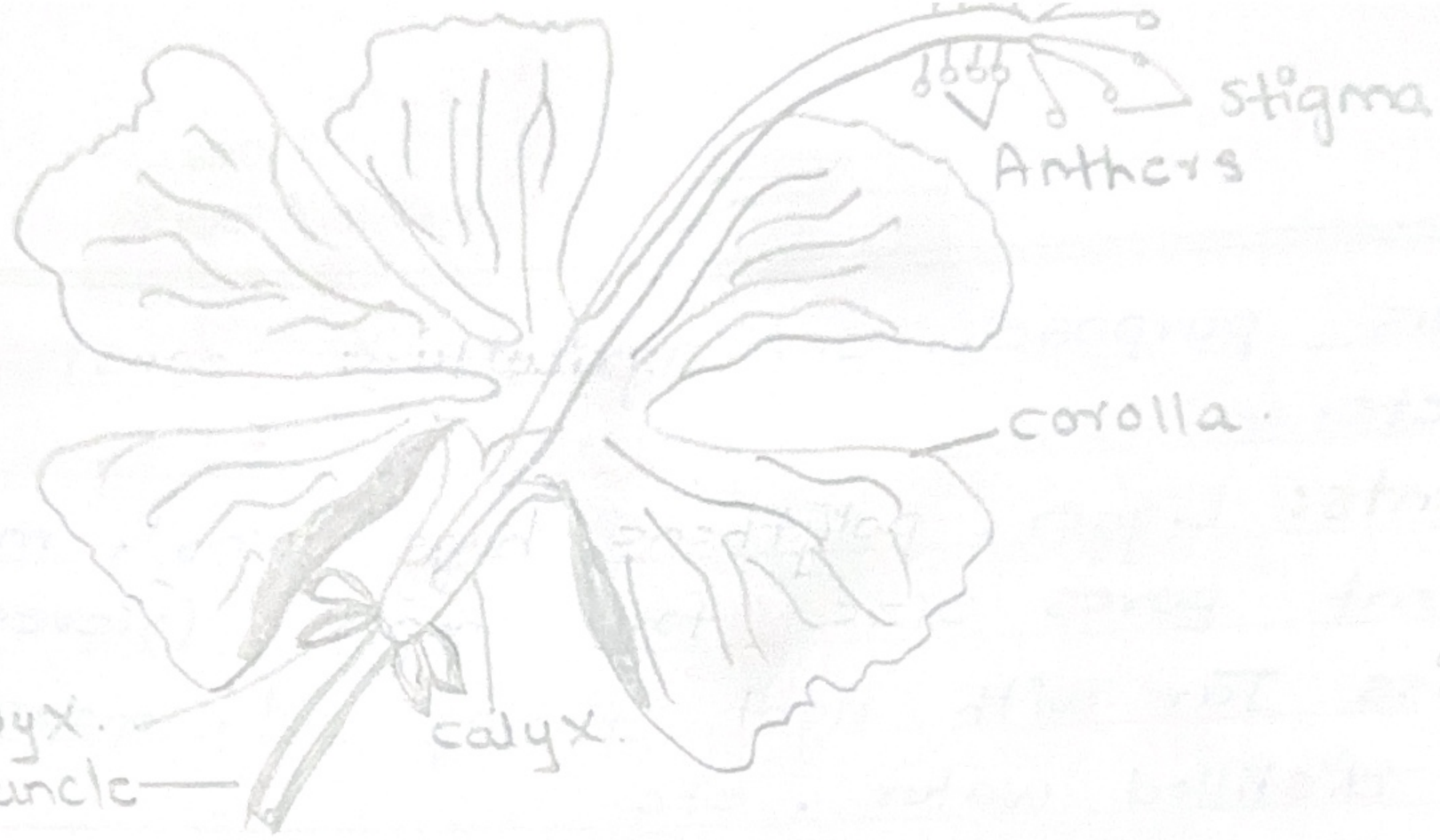
Requirements: Digger, polythene bags, lens, meshes, of different pores size for samples (sieves), clean glass Jar with tight fitting lid, measuring cylinder, distilled water, etc.

Procedure: collect the soil samples from different sites and bring them to the laboratory. with the help of hand lens examine the soil samples. shif the soil sample on the meshes of different sizes and record the different sizes of the particle found. now take a measuring cylinder of 250 ml. fill it with 200 ml of water and add about 50g of soil sample in it cap it and shake the glass Jar vigorously.

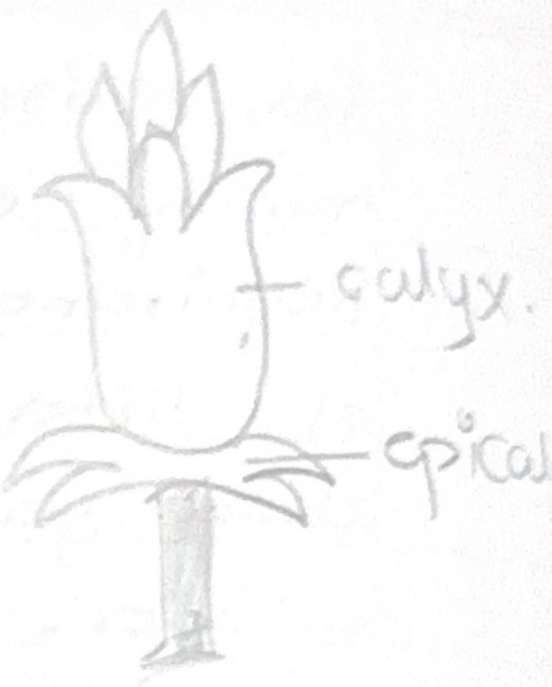
1. Take distilled water in a the clean dry Jar (A) mix soil samples in seperate Jars (B, C, D etc) Shake it vigorously. Allow it to stand for 10-15 minutes.

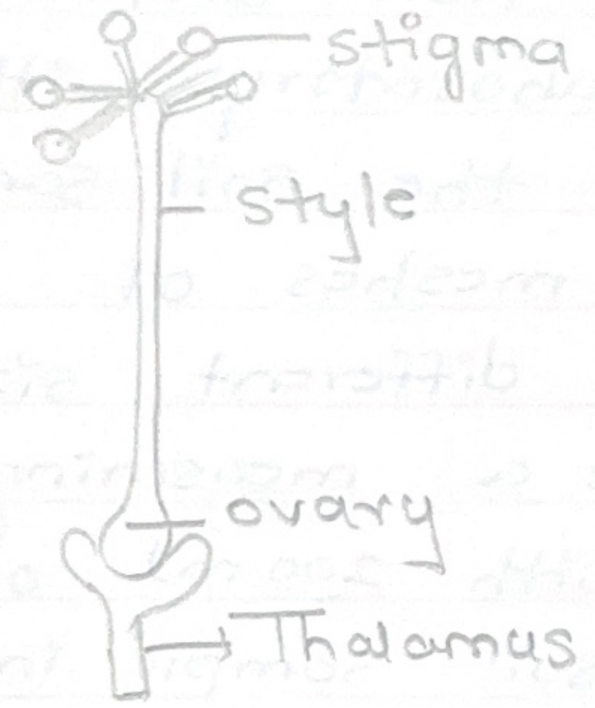
observation:- Measure the thickness of different layers according to different sized soil particles. from bottom to the top. we can observe the layer of coarse sand. fine Sadnd, slit, clay then water and floating humus of the surface. calculate approximate percentage of each type.

1. observe and note the comparative thickness of layers formed in each Jar. and classify the soil as per guidelines given ahead.



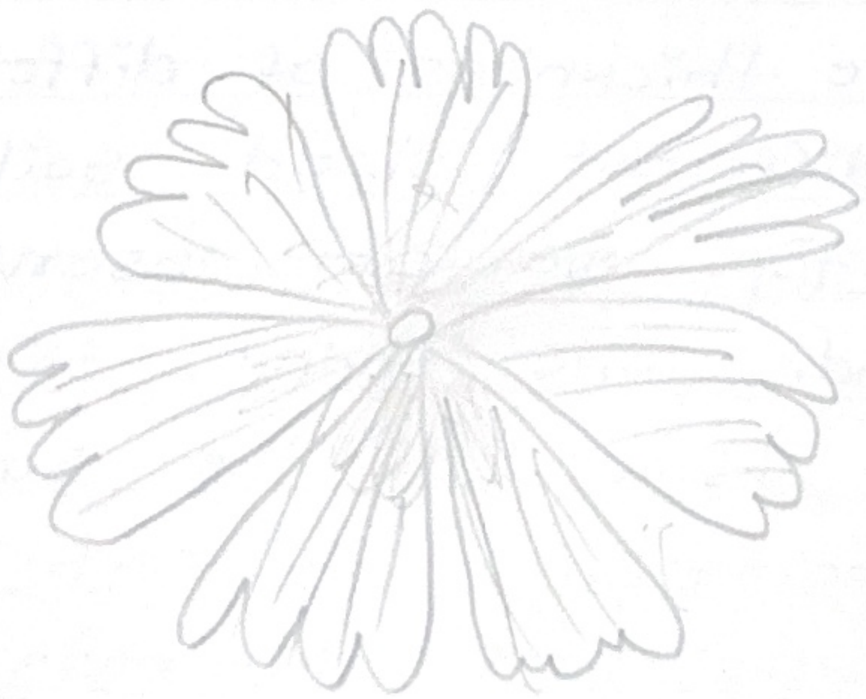
complete flower





L.S of flower

Stamen.



corolla.

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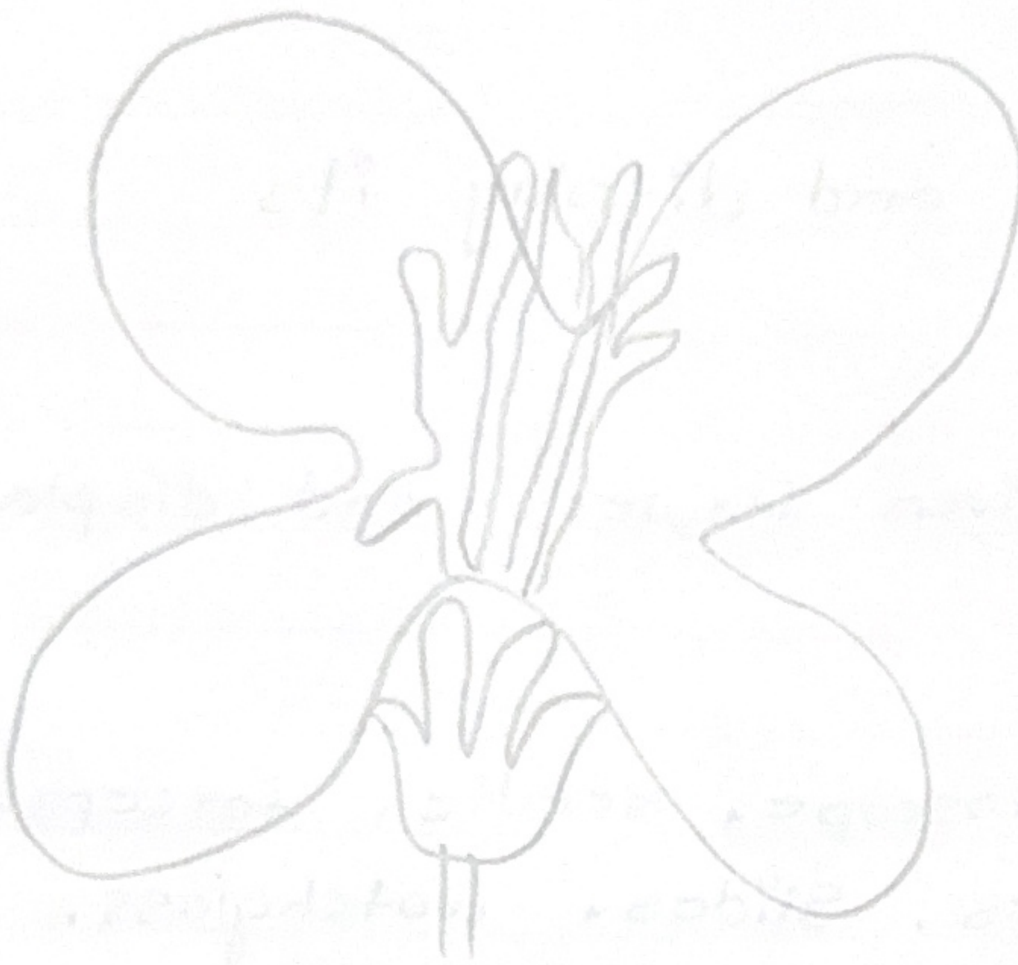
Dissect the given flower and display its different whorls :=

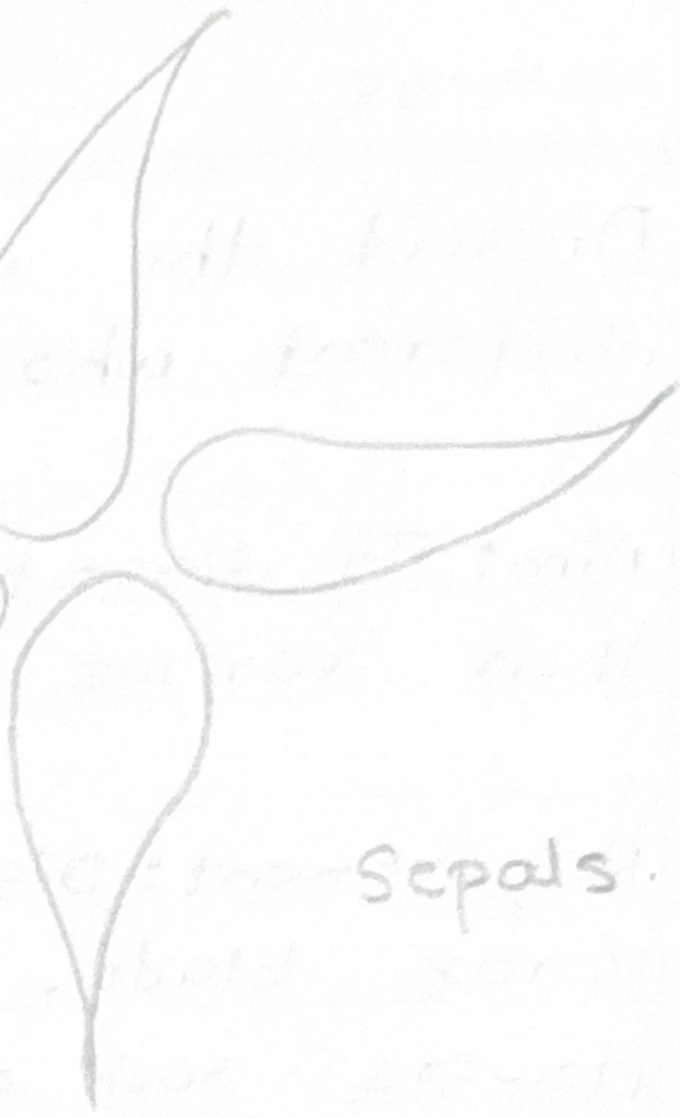
Aim: To dissect out the given flowers and display their various part.

Requirement: Dissecting microscope, Needle, forceps, razor blade, two needles, Slides, watchglass, flowers such as hibiscus, Brassica or cartharon.

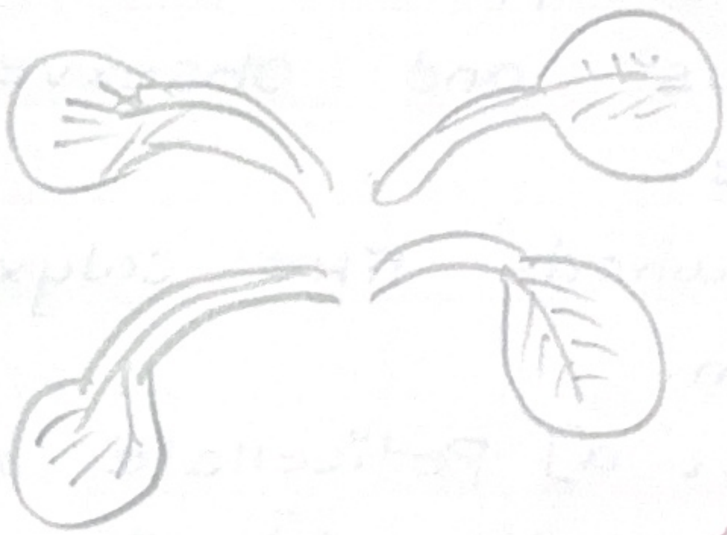
Procedure: 1) obtain the fresh flower of Hibiscus Brassia, or catharanthus and observe their colour shape and size.
2) Identify various floral whorls like calyx, corola, androecium, and gyenocium.
3) Note whether the flower a] Pedicellate or Sessile. b] Actinomorphic or zygomorphic. c] unisexual.
4) Remove the sepals, remove, petals and stamens and arrange them in separate watch.
5) Similar to sepals, remove, petals and stamens, and arrange them in separate watchglass.
6) count the number of sepals petals and stamen.
7) Note whether the Sepals and petals are free or united Note their aestivation.
8) Remove the gynoecium and place in it a watch glass.
9) observe and note any other Special features of the flowers.
10) Draw labelled diagram of different whorls.
11) Note down your observation as -



Complete flower.



Sepals.



petals

Stamens.

Carpel

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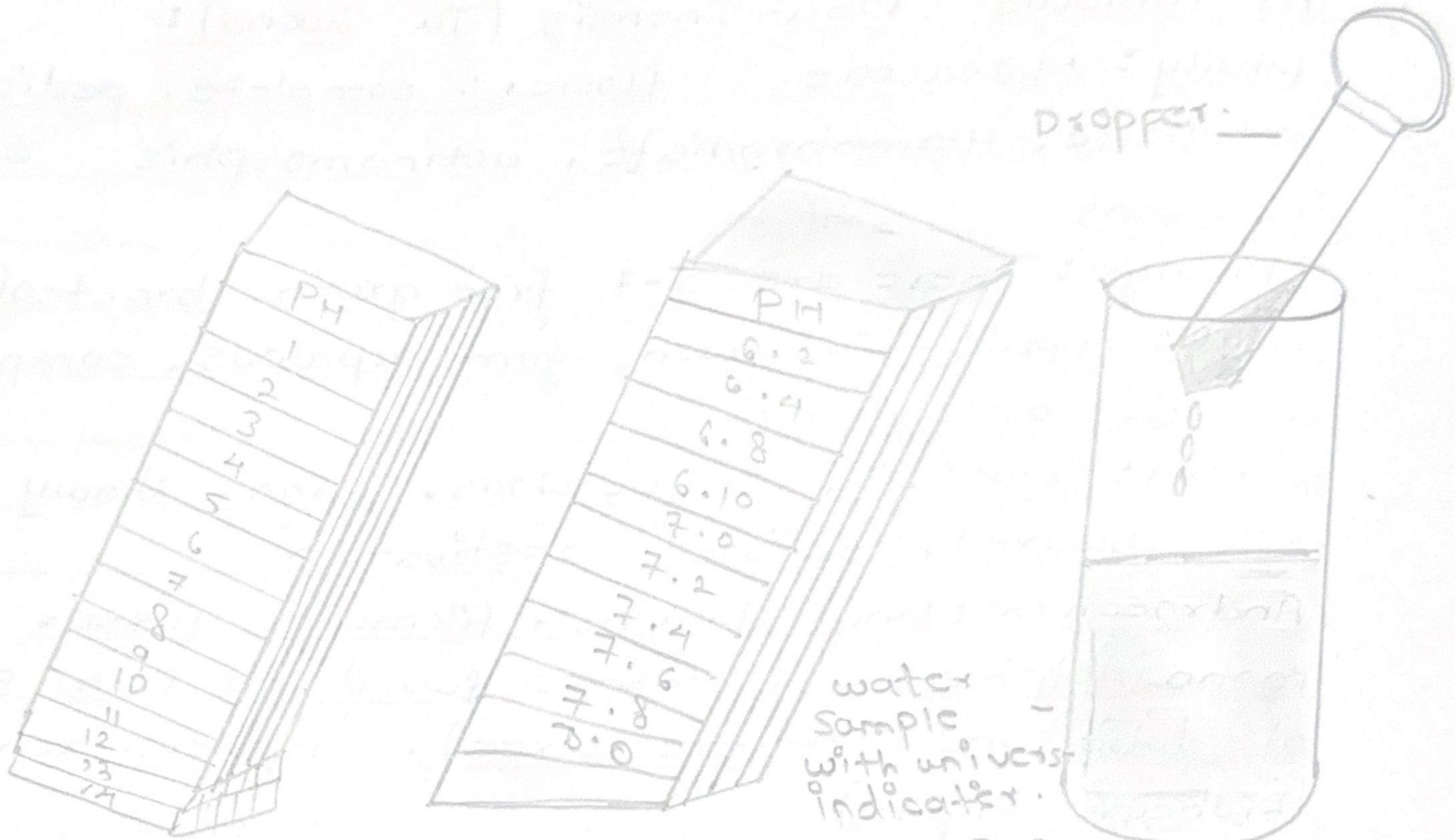
observations: following features can be seen in the given flowers.

1) A} Hibiscus rosa-sinensis (Ja swand) :-
family :- Malvaceae. flower :- complete, pedicellate, bracteate, Hermphrodiate, actinomorphic and hypogens.
Epicalyx :- There are 5-7 free green bracteoles.
calyx: Sepals - 5, green, gamosepalous, companwate, valvate aestivation.
corolla: Petals - 5, polypetalous, large, showy and red coloured, twisted aestivation.
Androecium: Many stamens, filaments fused, monoadelphus, (filaments fused to form staminal tube and anthers free), anthers reniform (kidney shaped)
Gynoecium:- Pentacarpellary syncarpous (5-carpels fused) style passes through staminal tube, stigma - 5 free capitate.

2) B} Brassica Juncea (Mustard):
family: Brassicaceae.
flower: complete, pendicellate, ebractate, herma-phrodite, actinomorphic, tetramerous, petaloid, green.
calyx: sepals - 4, polysepalous, petaloid, green.
corolla: Petals - 4, polypetalous, cruciform, valvate, aestivation.
Androecium: Stamens - 6 in two whorls (2+4) polyandrous, tetradynamous, 2 - outer short and 4 inner long dithecous.
Gynoecium: Bicarpellary, syncarpous, style, short, stigma, bilobed.



wide range PH paper [A] narrow range PH paper [B]

fig: Study of PH of soil.

A] PH papers B] water sample with universal indicator

Expt. No. : 06 .

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Study of Water Sample for its PH :-

Aim: To study PH of various water sample.

Requirements: Universal indicator or PH paper, water samples. from pond, river, lake well etc, in separate beakers, testtube.

Procedure: 1) Take 10ml of water sample in a test tube and put 5 drops of universal indicator in it or deep PH Paper in it.

2) observe the color change and match it with the PH colour chart.

3) Record the observation.

4) Repeat the experiment with all other water samples given.

5) Alternatively PH paper strips can be used & the color change can be matched against the color chart as follows.

i) Dip a small piece of broad range PH paper in each of the water sample solution.

ii) Match the colour of PH paper with the colour scale given on the PH paper booklet. this gives approximate PH.

iii) for more accurate value, take a piece of narrow range PH paper of the value indicate by broad range PH paper & dip them separately in the soil solution.

iv) Match the colour of the paper with the PH scale given on the PH paper booklet. this will give the correct value of the PH of the water samples.