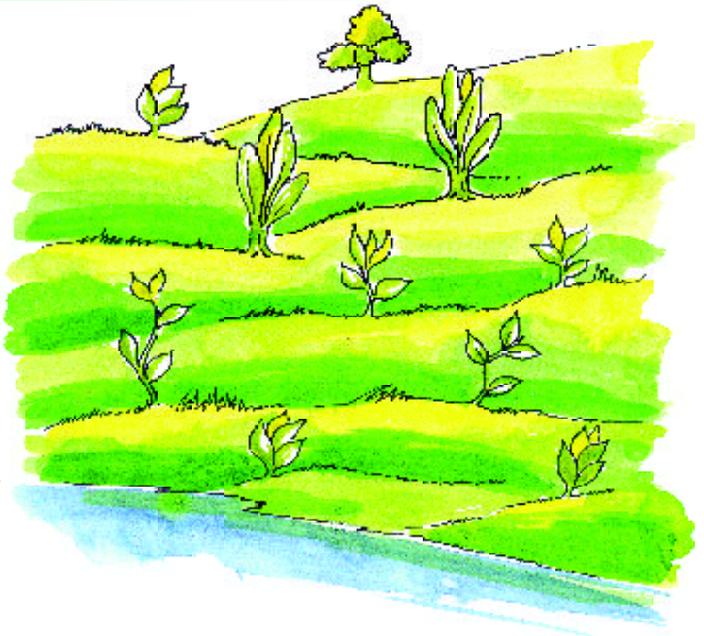


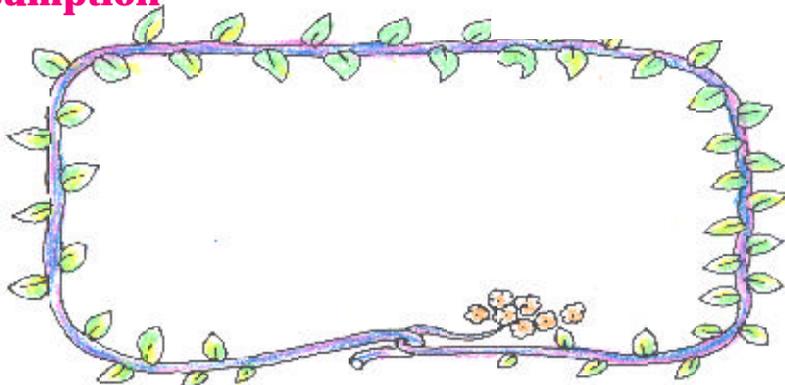
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HIDING IN THE HEART OF A SEED

Putting an end to the scorching summer, it rained heavily. The seeds which had been sleeping in the soil for long came sprouting out. An array of small plants filled the fields and courtyards. Where were these plants all these days? Why didn't the seeds that lay in the soil throughout summer, sprout out? What changes did the rains bring in the seeds?



My assumption



How can we find out the changes caused by water in the seeds? Examine a few dried bengal gram seeds through a hand lens.

What I have observed



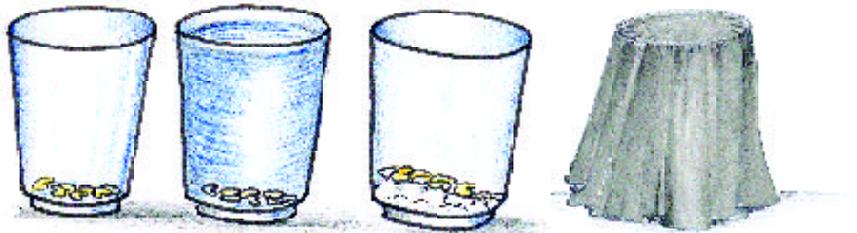
Put a few bengal gram seeds in water for three or four hours and then observe them again through a hand lens.

What changes do you observe?

For the seed to germinate

Aren't the seeds hidden in the soil germinate after getting wet by the summer rains. Is water alone needed for a seed to germinate? Are there any other factors needed for the germination of the seed? Try out the following experiment.

Take four glasses of the same size and shape. Put an equal number of pea seeds in all of them. Leave the first glass as it is. The glass and the pea seeds should be dry. Fill the second glass with water. Place a piece of wet cotton and put the seeds above it in the third and fourth glasses. Cover the fourth glass with black paper so as to prevent light from entering into it.



Which are the factors viz. water, air, sunlight received by the seeds in each glass? Indicate using the symbols 'x' or '✓'.

Glass	Air	Water	Sunlight
1			
2			
3			
4			

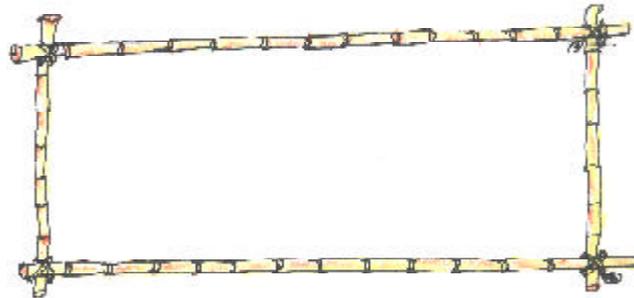
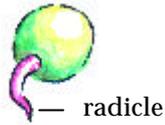
Examine the seeds closely for four consecutive days and record your observations.

Glass	1 st day	2 nd day	3 rd day	4 th day
1				
2				
3				
4				

In which of the glasses do we find the germinated seeds? Why did the seeds in the other glasses not germinate? Which of these factors; air, water and sunlight, do you think, are needed for the seeds to germinate?



Analyse the table and note down your findings on the germination of a seed.



Germination of seed

The process by which a small plant sprouts out from the embryo of a seed on favourable conditions is termed as germination of seed. The seed absorbs water and gets swelled. The seedcoat gets broken. The rate of respiration increases and this in turn raises the intake of air. The food stored in the seed gets ready to be absorbed by the seedling. When the seed germinates the radicle comes out first. The radicle then grows as roots and the plumule grows as the stem.

Will the seed planted deep in the soil germinate? Why?

What are the things to be borne in mind while choosing and planting a seed?

Terminator Seed

By making slight changes in the micro structure of a seed, the fertility of a seed can be terminated. The farmers would then have to depend on the companies every time to procure seeds. This technology was formulated in USA during 1990. There was wide-spread protest from among the public and farmers against the terminator seeds. The United Nations Organisation has banned further scientific researches in this field. By now, India and Brazil have passed laws prohibiting this technology.



After germination

Don't you have a vegetable garden in your school?

Do you have one at home?

What all are the plants that you have in your vegetable garden?

- -----
- -----
- -----
- -----

Do we provide the same facilities for the growth of various plants?
What different facilities should be provided for growing bitter gourd and cucumber?

Which are the plants for which we have to provide support?

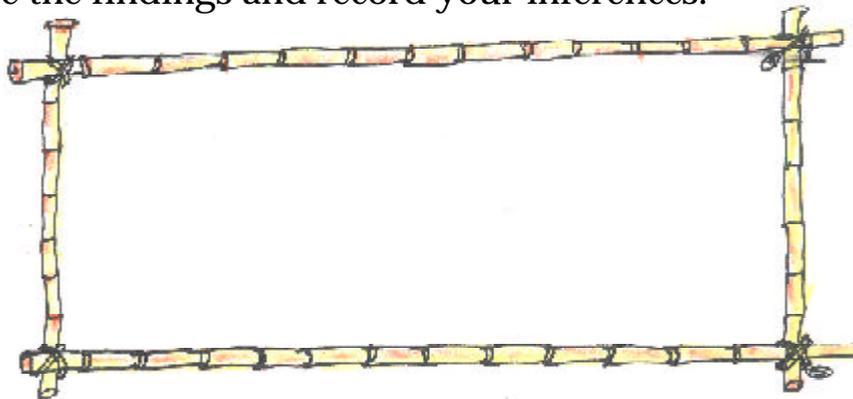
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Observe other plants in your surroundings. What types of plants depend on a support?

Plant	Features of the stem
Bitter gourd	weak stem, hollow within, grow as creepers

Analyse the findings and record your inferences.

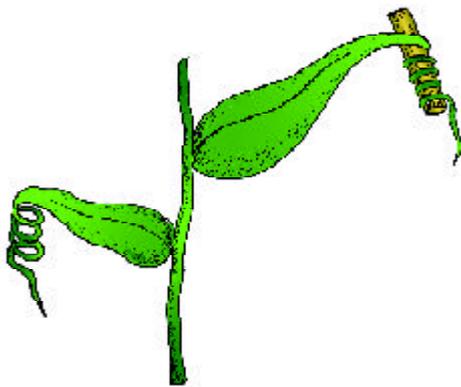


Climbers

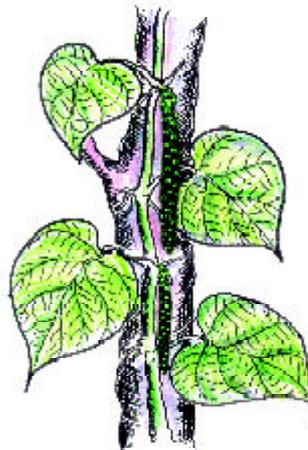
Plants having weak stem that climb over the support are climbers. They have some special structures that help in climbing the supports. These features are known as adaptations. Small roots that help to climb, spring like structures (tendrils) etc. are some of the adaptations.

Find more examples of climbers.

To climb up



Gloriosa



Pepper



Grape vine

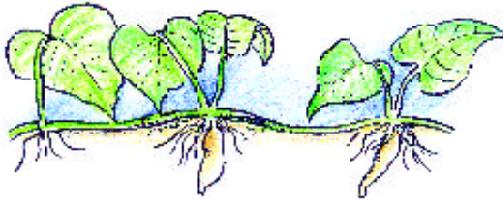
Observe the pictures. How do these climbers climb up the supports? What are the adaptations that they have?

Plant	Features that help to climb the support
Grape vine	climb the support using tendrils

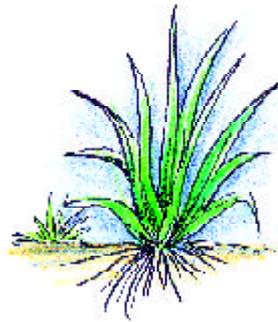


Observe some other climbers and write down their features in your science diary.





Sweet potato



Grass



Pumpkin

Haven't you seen the sweet potato plant?
Is it a climber?

Observe plants of pumpkin, hydrocotyle (*kodangal*) and sweet potato.

Examine their growth pattern and other features.

Write down your observations in the table.



Hydrocotyle (*Kodangal*)

Plant	characteristics of the stem	mode of growth	adaptation
Pumpkin			
Hydrocotyle			
Sweet potato			



Creepers

The weak stemmed plants that grow creeping on the ground are called creepers. The roots from the nodes (the part where the leaves get attached to the stem) and the tendrils help the leaves grow towards sunlight.

A Support for the Shade

Do weak stemmed plants alone need support?
Haven't you seen a banyan tree? How is it different from other trees?
Where else are its roots seen? What might be its uses?

Things I observed





Single Tree Forest

This is the picture of 'The Great Banyan Tree' in Kolkotha. It is more than 250 years old. The tree has 2880 supporting roots which is spread more like a forest. The top of the tree is spread over an area of almost one kilometre. The tallest branch has a height of 24.5 metres.

Look at the pictures of Mangrove and Pandanus.



Mangrove



Pandanus

Based on the surroundings what are the adaptations these plants have?

Plant	Adaptations
Pandanus	
Mangrove	

Guards of the Land

There are roots which support the stem in Banyan tree, Pandanus and in some types of Mangroves. These roots which grow down from the branches as in a Banyan tree are called prop roots and those that grow down from the main stem as in Pandanus and Mangrove plants are called stilt roots. Both these roots help the plant to absorb water and minerals from the soil.

Mangroves are special kind of plants which are seen mostly in marshy areas having salt water as well as in coastal areas. The stilt roots which spread out help not only to prevent eroding of the sides of the water bodies but to form new lands by the settling of silt.



Basic Science VI

Each plant has its own peculiar features to grow according to their surroundings. Complete the table based on your findings.

Plants	Conditions in which they grow	Adaptations
Climbers • Bitter gourd • •		
Creepers • Pumpkin • •		
Others • Banyan tree • •		

For Better Growth

We provide necessary facilities to ensure better growth of plants we cultivate. What are the other things we should take care of for a better yield?

- -----
- -----

Attack of Brown Plant Hopper: Farmers in dilemma

Palakkad: The brown plant hopper attack is a threat to paddy cultivation. The paddies have all dried up. The department of agriculture has taken necessary steps to control the spread of the brown plant hopper.

Collect details about the pests that affect the crops in your locality.

Crops	Pests	
• Coconut	• Rhinoceros beetle	•
• Paddy	•	•

What are the small creatures that we generally see in agriculture fields? Do these creatures badly affect our crops?

Name the creatures which are helpful to the plants?
How are they helpful?

Biological Control

Biological control is the process by which pests are controlled using enemy pests. Birds, snakes, frogs, chameleon etc. are creatures that feed on pests. It can be seen in the ancient records of China that ant nests were sold in markets to control pests that attacked the lemon plants. To kill locusts in Mauritius, 'mainas' were taken from India. The ladybird beetle was also used as biological control to kill scale insects that attacked the vegetables.

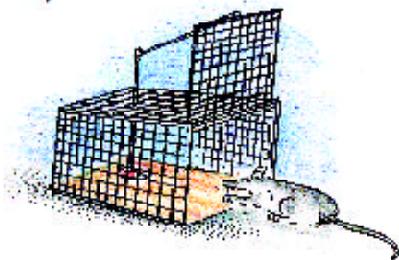
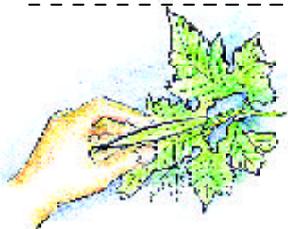
Micro organisms like Trichoderma, Psuedomonas etc. are also used for pest control.



Ladybird beetle

Pest control

Various methods have been adopted to control and destroy the pests that cause crop destruction. Write down the methods you are familiar with.



Basic Science VI

Classify the methods you have found out.

Mechanical control	Biological control	Chemical control
placing traps	destroying scale insects using rice bug	spraying Bordeaux mixture
.....
.....
.....

Which method is most widely used to control pests nowadays?

And this will be
your end.

Don't be so arrogant.
It won't be my end alone
but your and your future
generation's too.

Does the use of pesticides
harmfully affect the pest alone?
Does it affect anything else?
Note them down.



Thought of as a Boon... But...

The invention of DDT (Dichloro Diphenyl Trichloro Ethane) was a big leap in the application of pesticides. It was invented by Paul Herman Muller, a Switzerland scientist. When it was identified that DDT could destroy mosquitoes, fleas, houseflies, bugs etc., Muller was awarded Nobel Prize in 1948. People all over the world started using it when it was realised that DDT could destroy pests that affect agriculture. But these pesticides adversely affect man, animals and environment. Therefore the use of DDT has been strictly restricted in many countries including India. Endosulphan, Dichophol, BHC, Lindane etc. are some of the widely used chemical pesticides.

Chemical pesticides seriously affect man and environment. But there are pesticides that can be locally made which do not have adverse effects on man and environment.

Do you know how to prepare any of these bio-pesticides which are locally prevalent?

Mode of preparation

Shouldn't we propagate these ways of pest control? Conduct a seminar on 'Health and Environmental problems created by Chemical Pesticides'. Interview with an agricultural officer, information from the agriculture magazines and discussion with farmers will help you in data collection.



Tobacco decoction

Tobacco decoction is very effective for controlling pests in vegetables. Soak pieces of tobacco (1 kg) in 15 litres of water. Filter this solution and dissolve 100g of washing soap pieces in it. This solution can be diluted according to the severity of pest attack.

