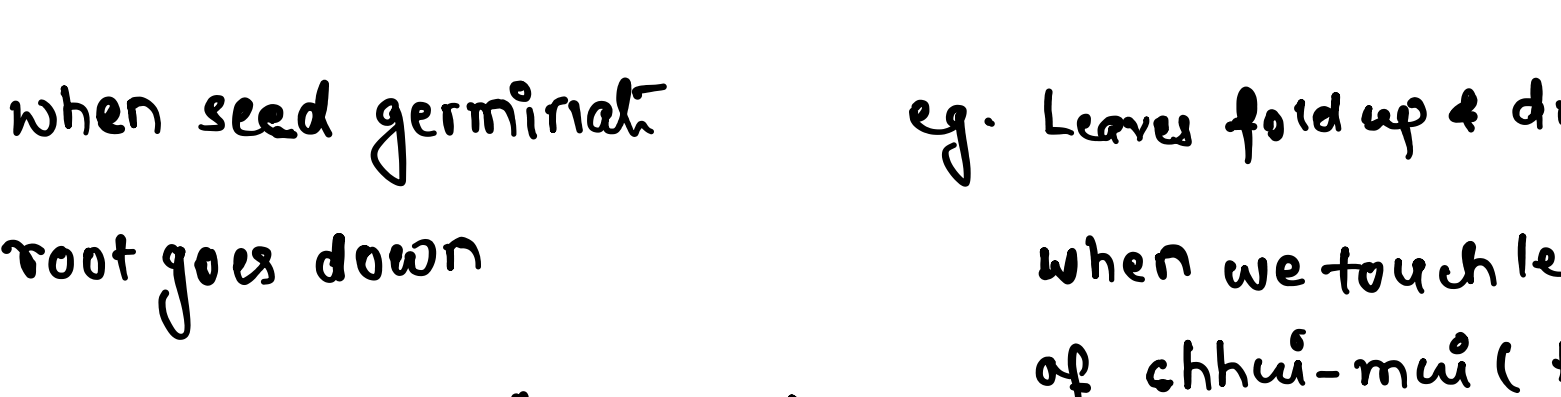


Coordination in Plants

→ Animals have nervous system for controlling and coordinating the activities of the body.

But plants have neither a nervous system nor muscles.

→ Plant shows two type of movements



eg. when seed germinate

- root goes down
- stems comes up into the air

eg. Leaves fold up & droop

when we touch leaves of chhui-mui (the sensitive or touch-me-not plant of Mimosa family. ↓
They move very quickly in response to stimulus.

• Immediate response to stimulus :-

- what happens when leaves of touch me not plant is touched.
- when leaves are touched, the movement happens at a point different from the point of touch. So, information that a touch has occurred must be communicated. The plant also used electrical-chemical means to convey this information from cell to cell, but unlike in animals there is no specialised tissue in plant for conduction of information. Plant cell provide response by changing the amount of water in them, resulting in swelling or shrinking, and therefore in changing shapes.

Nastic movement - The response to stimulus, independent of direction, is called nastic movement.

eg. leaves of Mimosa pudica droop down on touching.

• Movement due to growth :-

- some plants like the pea plant climb up other plants or fences by means of tendrils. These tendrils are sensitive to touch.
- when they come in contact with any support, the part of the tendril in contact with object does not grow as rapidly as the part of the tendril away from the object. This causes the tendril to circle around the object and thus cling to it.
- More commonly, plants respond to stimuli slowly by growing in a particular direction. Because this growth is directional, it appears as if the plant is moving.
- The plants are fixed in the soil so they cannot avoid various stimuli by moving away. There is no-brain like structure in plants to adapt themselves according to the changes in their surrounding. Still plant shows positive or negative responses to light, water, gravity, touch.
- Movement of plant due various stimuli light or gravity in particular direction either toward or away from stimulus due to growth is called directional or tropic movement.

for eg. Phototropic movement = responds to light

- shoots respond to light by bending towards light = +ve phototropic movement
- roots respond to light by bending away from light = -ve phototropic movement

eg. Geotropic movement = responds to gravity

- root grow downwards in the earth = +ve geotropic
- shoots usually grow upward and away from the earth = -ve geotropic

- movement of pollen tube (growth movement) towards ovule = chemotropism.

- The movement of the sensitive plant in response to touch is very quick - This response to stimulus is independent of direction, is called nastic movement.

- The movement of sunflowers in response to day or night is quite slow. Growth related movement of plants will be even slower.

Limitations of Electrical impulse :-

1. They will reach only those cells that are connected by nervous tissue, not each and every cell in animal body.
2. Once electrical impulse is generated in a cell and transmitted, the cell will take sometime to reset its mechanisms before it can generate and transmit a new impulse. In other words, cells cannot continuously create and transmit a new impulses.

∴ Most multicellular organisms use another means of communication between cells, namely chemical communication.

Chemical coordination :-

- Here stimulated cells release chemical compound, this compound would diffuse all around the original cell.
- If other cell around have the means to detect to this compound using special molecules on their surfaces (receptors) then they would be able to recognise information, and even transmit it.
- This will be slower, but it can potentially reach all cells of the body, regardless of nervous connection, and it can be done steadily and persistently.
- These compounds, or hormones used by multicellular organisms for control and coordination show a great diversity.

Plant Growth Regulators (PGRs) = Plant hormones

- The growth regulators are the important chemical affecting growth
- Phytohormones are the natural growth substances which are produced in any part of the plant and are transferred to another part and there they influences the growth of plant.
- The growth regulators are consists of auxins, gibberellins, cytokinins, ethylene and abscisic acid. Except abscisic acid, ethylene the three are growth promoter and ethylene and abscisic acid are growth inhibitor.
- Activity 2.6
When growing plants detect light, a hormone called auxin, synthesized at the shoot tip, helps the cell to grow longer. When light is coming from one side of plant, auxin diffuses towards the shady side of the shoot. This concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from light. Thus plant appears to bend towards light.
- Gibberellins help in the growth of the stem.
- Cytokinins promote cell division, and it is natural then that they are present in greater concentration in areas of rapid cell division, such as in fruits and seeds.
- Abscisic acid inhibits growth. Its effect include wilting leaves.