Stimulus – A detectable change in the internal external environment of an organism that trigger response. OR

Detectable change in the internal or external environment of an organism that can trigger a physical or behavioral change.

Response - the reaction of the living organism towards the stimulus induced by the change in external internal environment.

Coordination - the working of various organs of an organism together to produce a better response towards any stimulus.

Some key points

Phytoharmones - A chemical substance which is present in plant that is responsible for control and coordination in the plants .

Cell division- the process in which a cell divides into two or more than two daughter cells .

Cell enlargement - the process in which a cell increase their size.

Cell differentiation - the process in which a less specialized cells are converted into a more specialized cells by acquiring distinct characteristics and function .

Dormancy - The resting or inactive condition in which an organism almost stop their metabolism.

Breaking of Dormancy - the process by which a dormant organism (such as seeds and buds) resumes its growth at development after a period of inactivity.

CONTROL AND COORDINATION IN PLANTS

We all know about that phytoharmones are responsible for the control and coordination in plants.

There are four types of plant hormones:-

1 . Auxins :-

- It is responsible for cell **differentiation** and cell **enlargement** in plants.
- It is responsible for **phototropic** and **geotropic** response of plants.
- Auxin promotes the growth of a steam but its slow down the growth in roots.
- Auxin hormone always work in the shaded region.
- It also promotes the **growth of fruits** in plants.
- It is **synthesized** at the tip of a stems and root (means **Apical meristem** of plants)

2 . Gibberellins:-

- It promotes the cell **enlargement** and cell **differentiation** in the presence of Auxins.
- It is possible for **breaking** the **dormancy** in seeds and buds.
- It is responsible for **shoot extension** in plants.
- It also promotes the **growth of fruits.**
- It is **synthesized** in the **young leaves , stems and roots.**

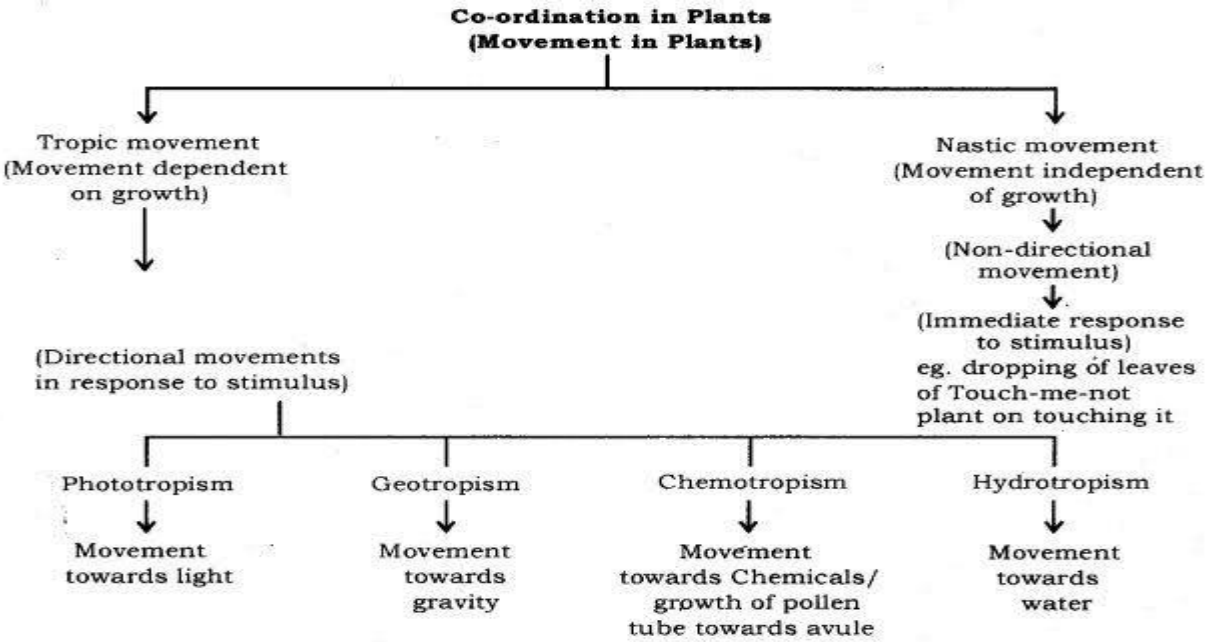
3 . Cytokinins :-

- It promotes the **cell division** in plant.
- It helps in **breaking of dormancy** of seeds and buds.
- It delay the **ageing** in leaves .
- It promotes the **opening** of **stomatal** pores .
- It promotes the **growth of fruits.**
- It is **synthesized** in the **roots and transported to all parts of plants .**

4 . Abscisic Acid :-

- It acts as a **growth inhibitor** in plants.
- It is also known as the stress hormone.
- It **promotes** the **dormancy** in seeds and buds .
- It promotes the **wilting** and **falling** of leaves (also called **abcission**)
- Responsible for **detachment** of **fruits** and **flowers** from the plants.
- **Synthesized** in **all parts of the plant** such as root steam fruit flowers.

Movements in Plants



Lead by – Ankit Sir

There are two types of movement in plants :-

1 . Tropic Movement (Tropism)

The growth movement of plants parts in respond to any stimulus, in which stimulus determines the direction of response. Or

Tropic Movement in plants are directional growth response to external stimuli. This movement can be either towards or away from the stimulus.

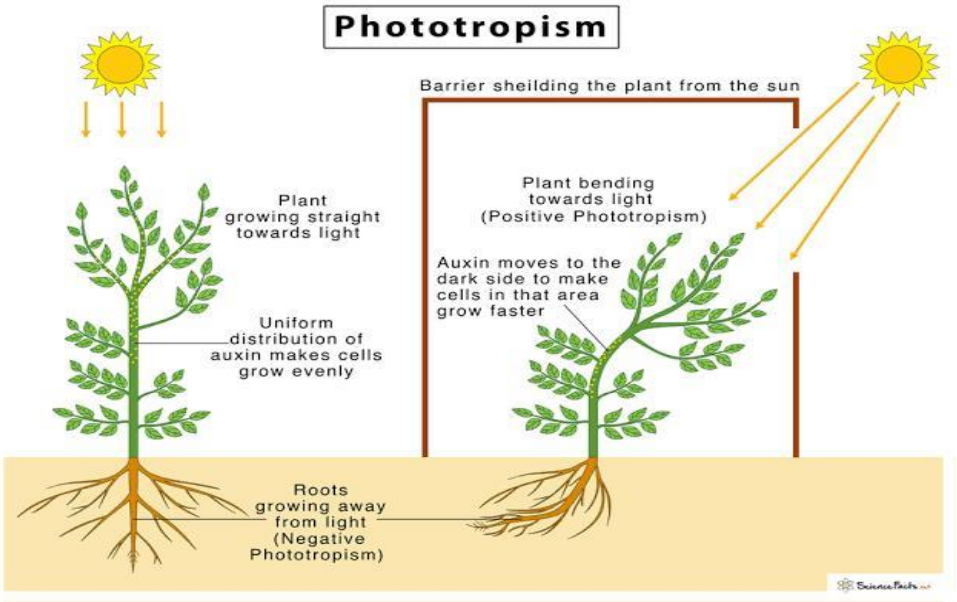
Positive Tropism – The growth movement of plants parts towards the stimulus.

Negative Tropism – The growth movement of plants parts away from stimulus.

Different types Of Tropic Movement.

(a) **Phototropic Movement (Phototropism) (Stimulus –** Light)
The movement growth of plants parts in **respond to light** , in which light determines the direction of response.
Positive Phototropism – The growth movement of plants parts **towards** the light.
Negative Phototropism – The growth movement of plants parts **away** from light.

Eg – The **stem** of the plant show the **positive Phototropism** and the **root** of the plants show the **negative Phototropism**.



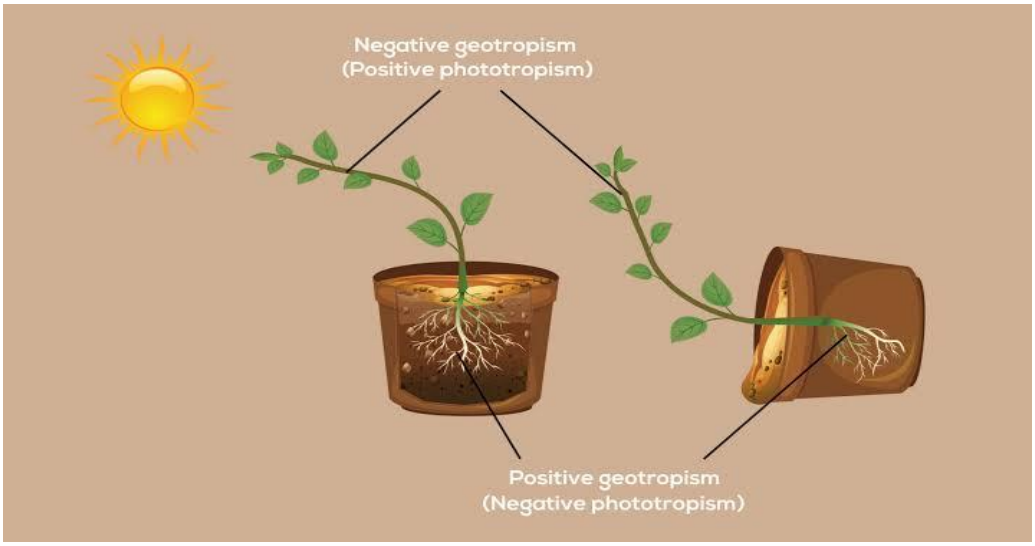
(b) **Geotropic movement (Geotropism) (Stimulus –** Gravity)

The growth movement of plants parts in respond to gravity, in which gravity determines the direction of response.

Positive Geotropism – the growth movement of plants parts towards the gravity.

Negative Geotropism – The growth movement of plants parts away from gravity.

Eg -:The **stem** of the plants show the **negative** Geotropism and the **root of** the plants show the **positive** Geotropism

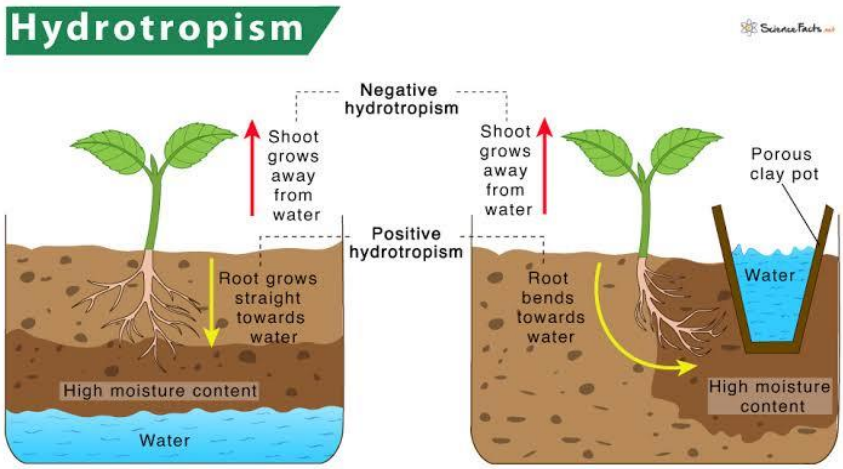


(c) **<u>Hydrotropic movement (Hydrotropism)</u> (Stimulus – Water)**

The growth movement of plants parts in respond to water, in which water determines the direction of response.

Positive Hydrotropism – The growth movement of plants parts towards the water.

Negative Hydrotropism – The growth movement of plants parts away from water.

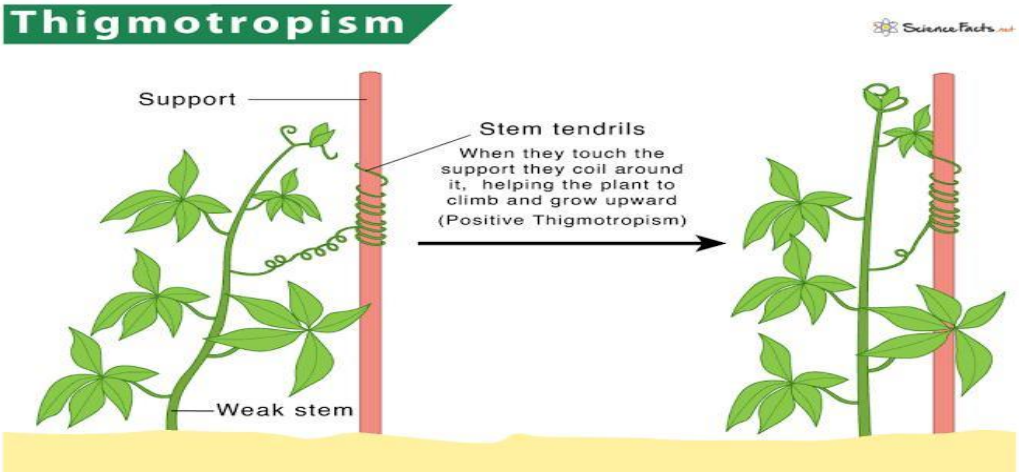


Eg – The **stem** of the plants show the **negative** Hydrotropism and the **root** of the plants show the **positive** Hydrotropism.

(d) <u>Thigmotropic movement (Thigmotropis)</u> (Stimulus – Touch)

The growth movement of plants parts in respond to any touch or support, in which touch determines the direction of response.

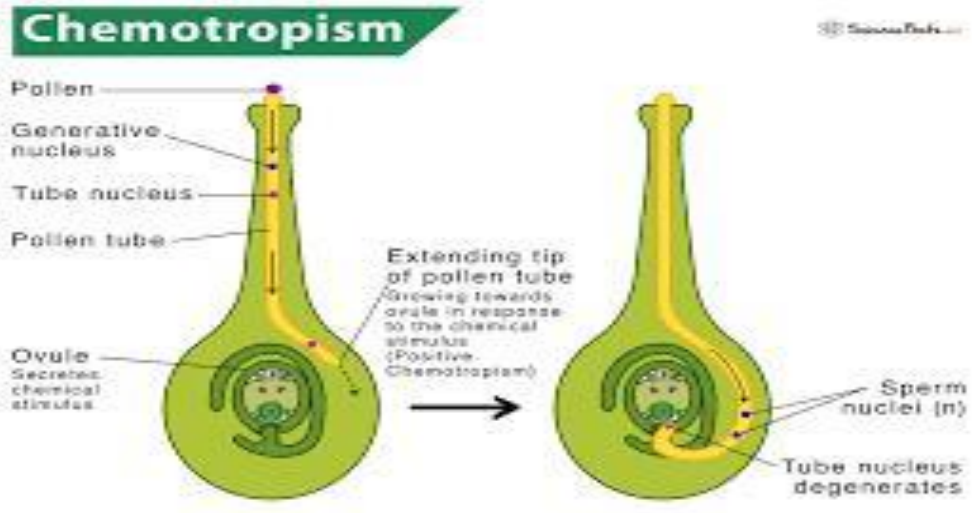
Eg – The growth of tendrils towards any support in climbers and creepers plants



(e) <u>Chemotropic Movement (Chemotropism) (Stimulus</u> – Chemicals)

The growth movement of plants parts in respond to chemical substances , in which chemical substances determines the direction of response.

Eg – The growth of pollen tube towards the ovule of ovary in respond to a sugary substance during the fertilization in flowers .



2. Nastic Movement (Nastism)

The movement of plants parts in respond to any stimulus but Stimulus not determines the direction of response.

Eg – The folding of leaves of *chhui – Muii* plants in response to touch .

The opening and closing of petals of moon flower in response to light.

Types of Nastic Movement

(a) Photonastic Movement (Photonasty) (Stimulus – Light)

The movement of plants parts in respond to light, in which light not determines the direction of response.

Eg – The opening of petals of dendalion flowers at bright light closing at shaded light.

The opening of petals of moon flower at night time and closing of petals of moon flower at day time .

(b) Thigmonastic Movement (Thigmonasty) (Stimulus – touch)

The movement of plants parts in respond to Touch in which the touch not determines the direction of response.

Eg :- The folding of leaves of the Mimosa pudica plants in response to touch.

Some Important questions:-

1 . Name of plant hormone responsible for bending of shoot of a plant when it is exposed to unidirectional light. how does it promotes phototropism ?

Ans- auxin hormone is responsible for bending of a steam of a plant when it is exposed to unidirectional light.

When stem of a plant is exposed to unidirectional light then the Auxi hormone migrate towards the shaded region of a stem .The presence of high concentration Auxin on the shaded region , it stimulates the cells in that region to elongate the stem more rapidly in compared to the lighted region of plant.

the differential growth rate causes the stem of plants bends towards light

2. How do Auxin hormones promote the growth of a tendril around a support ?

Ans- when a tendils come in contact with any support then the part of tendril in contact with the object does not grow more rapidly due to action of Auxin harmones . Less auxin present on the side of contact as compared to the free side . As a result , Auxin promotes the growth of the free side and the tendrils coils around the support.

3. State one example of chemotropism.

Ans- growth of pollen tube towards the ovule due to chemical stimulus (sugary substance) during the process of fertilization in flower..

4 . How is movement of leaves of sensitive plant different from movement of shoot towards light?

Ans -

Movement of leaves of sensitive plant	Movement of shoot towards light
This is caused due to Nastic Movement	This is caused due to tropic Movement
In this movement, Stimulus is Touch	In this movement Stimulus is Light
It is not a growth movement	It is a growth movement
It is caused due to sudden loss of water from pulvini to base of leaves	It is caused due to unequal growth of the two sides of stem .