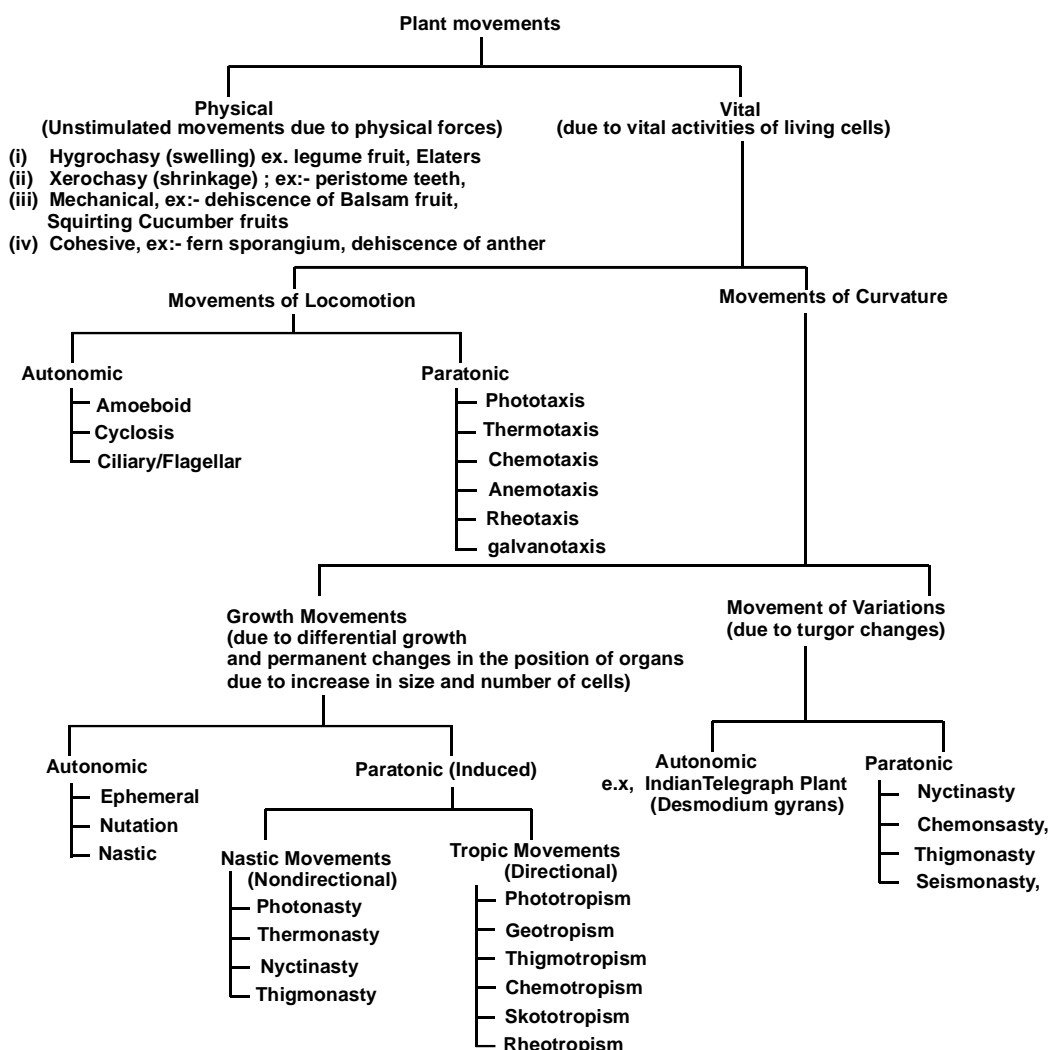


PLANT MOVEMENTS



- Any changes in external or internal environment which produce a response in the plant is called **stimulus**.
Reaction produces in a plant through stimulus is called **response**.
- The minimum time required for a stimulus to becomes effective is termed as **presentation time**.
- The duration between the application of stimulus and production of visible response is called **reaction time or latent time**.
- Living being show some change in their position either due to change in environment or due to some endogenous causes such changes are called movements.

Types of plant movements :

(I) Physical

(II) Vital

(II) Vital movements :

These occur due to vital activities of living cells. They are of two types

(1) Movement of Locomotion

(2) Movement of curvature

(1) Movement of Locomotion:

It is a type of movement in which whole plant body or organ moves from one place to another.

They are of two types.

(A) Autonomic movement: it occurs due to internal stimuli it is of following types.

- (i) Ciliary movement:** These movement are due to presence of cilia or flagella. **e.g. Zoospores of algae.**
- (ii) Amoeboid movement:** These movements are due to formation of pseudopodia. **e.g. Slime molds.**
- (iii) Cyclosis or Protoplasmic movement:** These are protoplasmic streaming movement and are of two types.

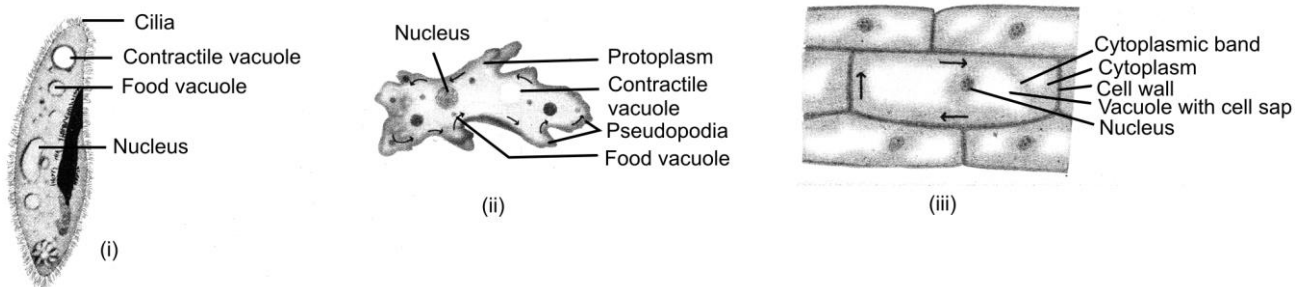


Fig : Protoplasmic movements (i) ciliary (ii) amoeboid (iii) cyclosis

- (a) Rotation:** Protoplasm moves around a single central vacuole either in clockwise or anticlockwise direction. **e.g. Hydrilla, Chara.**
- (b) Circulation:** Cytoplasm moves around a number of vacuoles present in the cell in various directions. **e.g. Staminal hairs in Tradescantia.**
- (iv) Excretory movement:** Apical part of blue green algae (**Oscillatoria**) moves like a pendulum to right left. It occurs due to excretory substances.
- (B) Induced movement of locomotion:** They occurs due to external stimuli they are of following types.
 - (i) Phototaxis:** It occurs due to light stimulus, **e.g.** some algae like **chlamydomonas** moves from darkness to light and show positive phototactic movement.
 - (ii) Thermotaxis:** It occurs due to temperature. **e.g. Thermal algae.**
 - (iii) Chemotaxis:** It occurs due to chemicals **e.g. Male gametes in Bryophytes and pteridophytes** are attracted towards mucilaginous substances present at mouth of archegonial neck and perform movement.
 - (iv) Rheotaxis:** It occurs in response to water currents. **e.g. Aquatic angiosperms.**
 - (v) Galvanotaxis:** It occurs in response to stimulus of electric current. **e.g. Some bacteria and some members of volvocales.**

(2) Movement of curvature:

In this type of movement organs of plants show curvature. They are of two types.

(I) Movement of growth

(II) Movement of turgor variations

- (I) Movement of growth:** They cause due to unequal growth in different parts of organs. They may be

(A) Autonomic movement of curvature: They occurs due to internal stimuli. They are of following types.

- (1) **Nutation movement:** Uneven growth on two surface hence coiling takes place usually cylindrical organs show nutation movement. **e.g. Stem climbers in Cucurbitaceae.**
- (2) **Circumnutation movement:** Stem of twiners coiled around object due to unequal growth. **e.g. Tendrils of lablab.**
- (3) **Epinasty movement:** When growth takes place more on upper surface the organ show curvature down wards. It is known as epinasty. **e.g. Opening of floral buds.**
- (4) **Hyponasty movement:** When growth takes place more on lower surface the organ bends up wards. It is called Hyponasty. **e.g. Uncoiling of leaf of fern.**

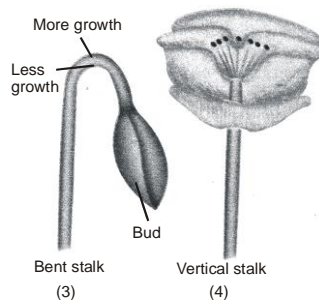


Fig : Nastic movements in plants (3) epinasty and (4)hyponasty

- (B) **Induced curvature movements:** They occur due to some external stimulus. These may be unidirectional or diffused.
- (1) **Phototropism:** Due to light stimulus, stem moves to wards light and is called as positive phototropic. Root moves away from light and is called negative phototropic.
 - (2) **Geotropism:** They occur in response to gravitational force main stem grows away from gravity and show negative geotropism. Roots grows towards the centre of earth in response of gravitational force and show positive geotropism. When the organ grows at an intermediate angle (between 0° to 90° or between 90° to 180°) it is said to be plagiotropic. **e.g. Lateral roots, leaves.** Clinostate is used to demonstrate the geotropic curvature.
 - (3) **Chemotropism:** These movements takes place due to stimulus of chemical substances. **e.g. fungal hyphae and pollen tube.**
 - (4) **Hydrotropism:** They occur due to stimulus of water. **e.g. Root are positive hydrotropic.** They always move towards water.
 - (5) **Thigmotropism:** Movement occur due to contact stimulus. **e.g. Tendrils & Weak climbers.**
- (II) **Movement of turgor variation:** They occur in response to diffused stimulus. They are of following types.
- (1) **Autonomic movement of variation:** It occurs in **Indian telegraph plant (*Desmodium gyrans*)** in which trifoliate leaves are found. During day time the two lateral leaflets move up and down due to variation in turgidity.
 - (2) **Paratonic movement of variation:** They are non directional movement in which response is determined by the structure of responsive organ. They are of following types:
 - (i) **Nyctinasty:** The diurnal movement of leaves and petals of flowers of some plants are called nyctinasty or sleep movements. When flowers and leaves open due to effect of light. It is called **photonasty**.
e.g. Acacia, Oxalis. Opening & Closing of flowers due to temperature is called **thermonasty**. **e.g. Tulip, Crocus.**
 - (ii) **Thigmonasty:** It occurs in response of the touch stimulus. **e.g. Drosera.**
 - (iii) **Seismonasty:** This movement is best exhibited by sensitive plant **Mimosa pudica (Touch me not plant)**. In this plant leaves are bipinnately compound with a swollen pulvinus at the base of

leaf and pulvinules at base of pinnae or leaflets. If terminal pinnae or leaflet is touched a shock or touch, stimulus passes down ward in the form of hormone. It resulted in to loss of turgor of the cells of lower half of pulvinus. So leaf becomes drooping. When the effect of hormone is lost. The cells of lower half of pulvinus become turgid and leaf attains its normal position.

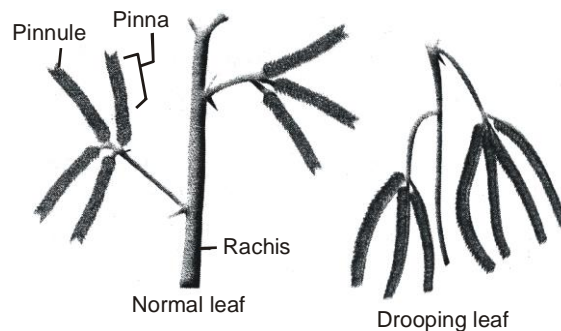


Fig : (iii) Seismonasty

Test your Resonance with concept

- If the stem grows towards sunlight & root grows just opposite to it, the stem movement is called
 - Negative phototropic movement
 - Phototropic movement
 - Positive phototropic movement
 - None of these
- Opening of floral buds into flowers, is a type of
 - Autonomic movement of locomotion
 - Autonomic movement of variation
 - Paratonic movement of growth
 - Autonomic movement of growth
- Protoplasmic streaming in movements referred as
 - Autonomic movements of locomotion
 - Thigmonasty
 - Photonasty
 - Movements of curvature
- Movements of tentacles in *Drosera* are
 - Photonastic
 - Thermonastic
 - Thigmonastic
 - Seismonastic
- Jerky lateral movements of *Desmodium gyrans* are
 - Negative geotropic movements
 - Positive geotropic movements
 - Hydrotropic movements
 - None of the above
- On touching the leaves of *Mimosa pudica* droop down because of
 - Seismonasty
 - Hydrotropism
 - Chemonasty
 - Thigmotropism
- Bulliform cells in grass leaves show
 - Growth movements
 - Tropic movements
 - Nastic movements
 - Turgour movements
- Grasses fold their leaves due to
 - Bulliform cells
 - Stomata
 - Hydathodes
 - Transfusion tissue
- Some flowers open during the day time and close at night. It is called
 - Phototaxy
 - Photoperiodism
 - Phototropism
 - Photonasty

10. The movement of hairs of *Drosera* is an example of
 (1) Chemotropism (2) Thigmonasty (3) Thigmotropism (4) Thermotropism
11. Movement of pollen tube towards micropyle of ovule depend on
 (1) Thigmotropism (2) Chemotropism (3) Thermotropism (4) Hydrotropism
12. Plant show Tropic movement in response to light is called
 (1) Photosynthesis (2) Photolysis (3) Phototropism (4) Phototaxis
13. Plant movement in diffused light is
 (1) Photosynthesis (2) Photolysis (3) Phototropism (4) Phototaxis
14. Which type of geotropic effect is exhibited by secondary roots?
 (1) Orthogeotropism (2) Plagio geotropism (3) Dia geotropism (4) All the above
15. Turning of sunflower head towards sun is
 (1) Photonastic movement (2) Phototactic movement
 (3) Phototropic movement (4) None of the above
16. In what form, the stimulus flows during seismonasty
 (1) In the form of auxin (2) In the form of gibberellin
 (3) In the form of cytokinin (4) In the form of ABA
17. Chemonasty is found in
 (1) *Drosera* (2) *Dionea* (3) *Nepenthes* (4) All the above
18. Pneumatophores show
 (1) Positive geotropism (2) Negative geotropism (ageotropism)
 (3) Thigmotropism (4) Negative phototropism

Answers

- | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. | (3) | 2. | (4) | 3. | (1) | 4. | (3) | 5. | (4) | 6. | (1) |
| 7. | (4) | 8. | (1) | 9. | (4) | 10. | (2) | 11. | (2) | 12. | (3) |
| 13. | (4) | 14. | (2) | 15. | (3) | 16. | (1) | 17. | (4) | 18. | (2) |