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Topic - Tropisms

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TROPISMS

Tropism are bending section of cylindrical organs, such as petioles , stem , roots and flower stalks or pedicels in response to certain external stimuli. Tropisms are response in which the direction of the movement is determined by the direction from which the stimulus comes . Such movement are common throughout the plant kingdom; they occur in many fungi , in mosses and ferns and in all angiosperms and gymnosperm. They result from different in growth rates in different parts of organs , they are usually slow , requiring from one hour to several days or longer for their completion.

TYPE OF TROPISMS:

Geotropism

Phototropism

Hydrotropism

Thigmotropism

Chemotropism

Traumatotropism

NATURE OF STIMULUS :

Gravity

Light

Water

contact

Chemical substances

Injury



TROPISMS



PHOTOTROPISM:

The movement of plant organs due to influence of one – sided illumination is know as Phototropism. Since this response is due to the stimulation of light rather than to the direct rays of the sun . Most stem and flower stalks are positively Phototropism. They bends towards the source of light . But not all roots are negatively Phototropism. Lateral shoots are to some extent diaphototropic . Leaves are always positively Phototropism, arranging themselves so as to provide the maximum leaf surface to the light .

Observations: A potted plant placing in a room near an open window after a few hours, the stem will be seen bending towards the windows the later being the unilateral source of light . The roots in some plants also exhibit phototropic movements but they are negatively phototropic



GEOTROPISM:

The tropic movements which take place in response to the gravity stimulus are called as geotropic movements and this phenomenon as geotropism. When a seed sprout, the young root grows downward towards the earth and the young shoot upward towards the air. This happens whatever may be the original position of seed. If we turn the half-grown seedling upside down, the root and shoot will turn too. Until once more the root is growing downwards and the shoot upwards. Geotropism in primary roots and stems can easily be demonstrated by sowing certain maize seeds in the soil so the radicals lie in different directions. After a few days the radicals in all the seeds always go down while the coleoptiles always grow in upwards direction.

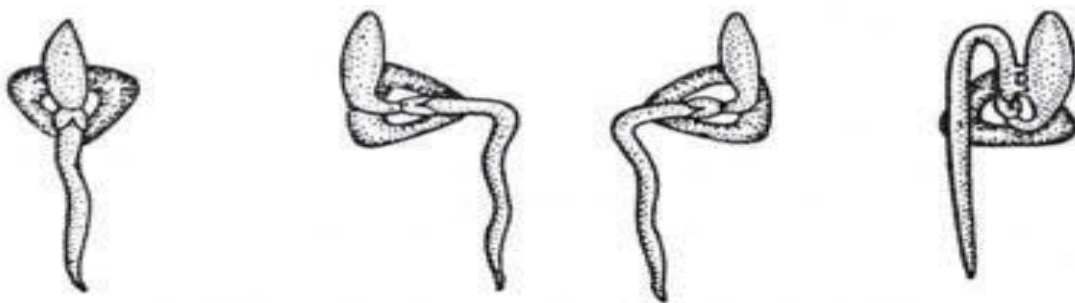


Figure: Geotropism in maize seedling

HYDROTROPISM:

It is one – sided response to one – sided water supply. Roots are positively hydrotropics . They grow towards parts of the soil where the water- content is high . Hydrotropism normally reinforces geotropism , but the responses can be made to oppose each other , when hydrotropism may win .

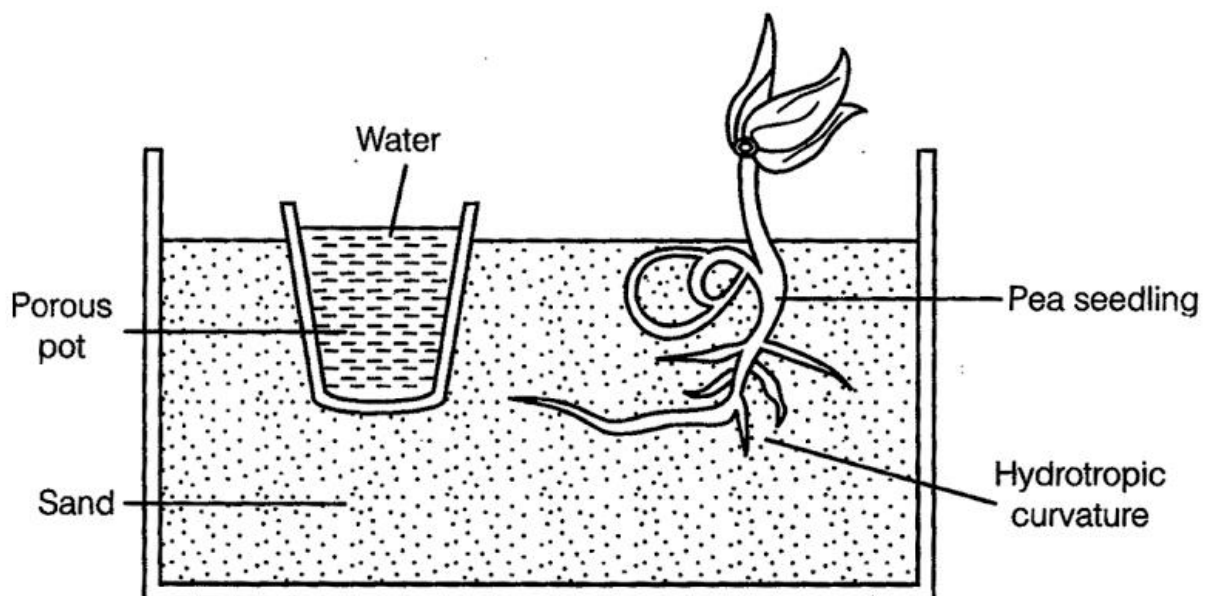


Figure: Demonstrating hydrotropism of roots .

Plant pea seeds near the edge of a box full of soil . Water the soil of the box till roots have appeared . Then cease watering and sink a porous – earthen pot or funnel containing water on the other side of the box. The soil near the edge of the box becomes dry , but the soil round the pot is kept moist by diffusion of

water from the pot .after few days it us found that their roots have grown towards the centre of the box where the soil is moist .

CHEMOTROPISM:

The influence which chemical substances exert on the direction of movement of plant – organ is called chemotropism. The growth of pollen tubes down the style is due to chemical substances derived from it. Similarly the movement of the tentacular hairs on the sundew leaf is in response to the presence of nitrogenous compounds .

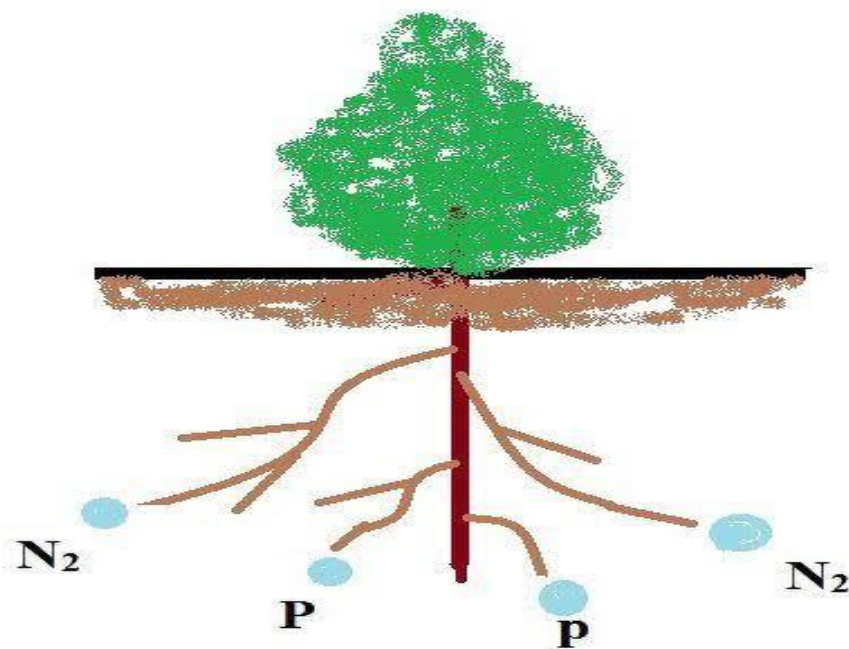


Diagram to show Chemotropism.

THIGMOTROPISM:

The response of plants to the stimulus of contact with a solid foreign body is known as thigmotropism or thigmotaxis. Twiners and different kinds of tendrils of the climbers grow round the surface of contact. The cells on the side nearest the point of contact slightly shorten while those on the opposite side elongate, and thus due to unequal growth on the two opposite sides, the curvature of the tips of the tendril, stem or petiole takes place. As a result of this curvature new part of it comes into touch with the support and thus receives a fresh stimulus, moreover the resulting curvature is not confined to the part actually in contact but also affects adjacent parts of the tendril.



Figure: Thigmotropism

TRAUMATOTROPISM:

The response of plants to the stimulus provided by wounding is known as traumatotropism. The wounding may be due to a cut or due to chemical substances. It is believed that this kind of movement is due to the redistribution of hormone in the mutilated organ. When one side of an organ is wounded, there is a reduction of growth of substance in that area and hence growth continues more rapidly elsewhere causing a curvature to take place in the direction of the wound. After some time hormone or auxins again appear in the region of the wound and thus the organ may be able to straighten itself.



Figure: Traumatotropism