

Biology - Plant Hormones

Plants Respond to Stimuli:

- Plants respond to stimuli (a change in the surrounding environment) which helps them increase their chance of survival.
- Compared to human responses, plants generally take more time to respond (can take minutes or even hours).
- Examples of responses include:
 - Some plants have a sense of touch and find things to climb to reach the sunlight.
 - Plants grow towards the light to maximize light absorption for photosynthesis.
 - Some plants can produce toxins to avoid being eaten by predators (White clovers and cattle)
 - Plants can respond to abiotic stress (non-living harmful things) - Carrots produce antifreeze proteins at low temp. Which bind to ice crystals and lower the temperature that water freezes at. This stops ice crystals from forming.

Tropisms:

- Positive Tropisms: When plants grow towards the stimulus.
- Negative Tropisms: When plants grow away from the stimulus.

Geotropic Responses:

- Geotropisms/Gravitropisms are responses to gravity as the stimulus.
- Positive geotropism/gravitropism is when the plant roots grow downwards towards the direction of gravity pull.
 - This allows roots to gain access to water and mineral ions needed for plant nutrition and anchors the plant to the ground.
- Negative geotropism/gravitropism is when the plant shoot grows upwards, away from the direction of gravity pull.
 - This allows for the plant to reach light, which is needed for plant growth (photosynthesis)

Phototropic Responses:

- Phototropisms are responses to light as the stimulus.
- Positive phototropism is when the stems grow towards the light source which exposes the plant and leaves to more light.
- Negative phototropism is when the roots grow away from the light source down into the soil.

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Auxins:

- Plant growth responses (phototropism, gravitropism) occur as a result of the distribution of plant growth regulators/plant hormones. One example includes auxin(s).
- Plants detect stimuli from receptors which are generally located at the tip of roots and shoots.
- These receptors control the distribution of auxins, which are produced at the tip of the plant and diffuse downwards.
- The concentration of auxin in an area determines how much the cells will grow:
- In a plant shoot, the more concentrated they are, the longer the cells will grow. Therefore, meaning that less auxin leads to less cell growth.
- If one side of the plant has a high concentration of auxin, that side will grow longer than the other, causing the shoots to curve towards the opposite side of where auxins are concentrated.
- In plant roots, the auxins inhibit the growth of plant cells.
 - If one side of the plant has a high concentration of auxin, that side will grow less than the other, causing the shoot to curve towards the side in which the auxins are concentrated.

Auxins in Geotropic Responses:

- During Geotropism, auxins tend to gather up on the lower side of the plant.
- Hence in shoots, the auxin encourages the lower side to grow longer (elongate), but in roots, the auxin inhibits the growth of cells, and the roots grow downwards.

Auxins in Phototropic Responses:

- During phototropism, auxins tend to gather up on the shaded side of the plant.
- Hence In shoots, the auxin encourages the shaded side to grow longer (elongate), but in roots, the auxin inhibits the growth of cells towards the light, and the roots grow downwards.