

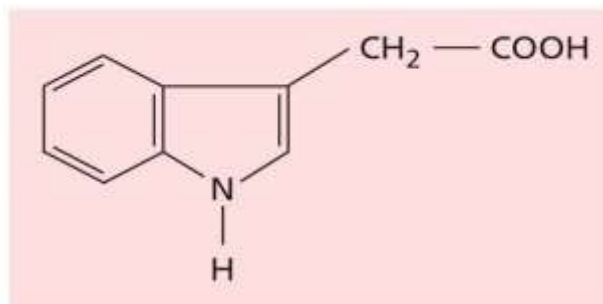
Plant Growth Regulators

Hormone = A compound produced by one part of an organism that is transported to other parts where it binds to a specific receptor and triggers a response in target cells and tissues. There are 5 primary classes of plant hormones:

- (1) Auxin (such as IAA).
- (2) Cytokinins (such as zeatin).
- (3) Gibberellins (such as GA3).
- (4) Abscisic acid.
- (5) Ethylene.

Auxins

Auxin is a Greek word derived from *auxein*, which means “to increase.” It is a term for chemicals that typically stimulate cell elongation, but auxins also influence a wide range of growth and development response. Natural auxin named indoleacetic acid (IAA). There are many purely synthetic compounds that have physiological actions similar to that of IAA. They are chemically diverse but can be classified in five major categories: indole acids, naphthalene acids, chlorophenoxy acids, benzoic acid, and picolinic acid derivatives.



**Indole-3-acetic acid
(IAA)**

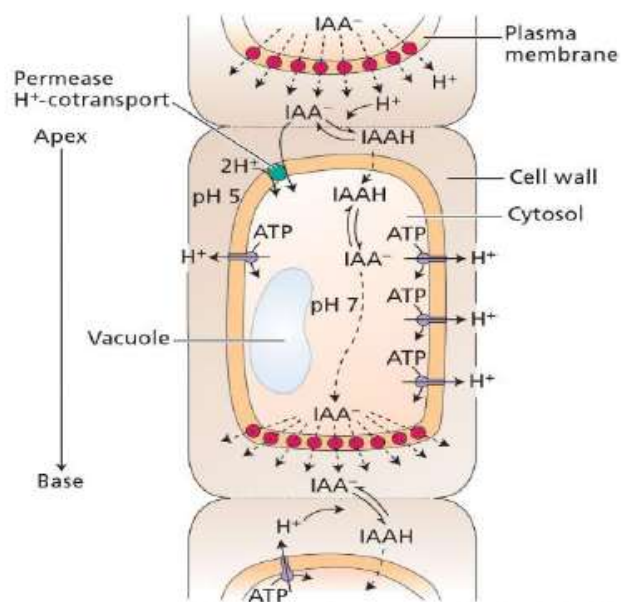
Auxin Transport: Moves from apex to the zone of cell elongation at 10 mm per hour: faster than diffusion and slower than phloem translocation. Polar auxin transport- unidirectional transport.

- a. Basipetal: away from tip
- b. Apoplastic: outside cells
- c. Symplastic: through cells and plasmodesmata

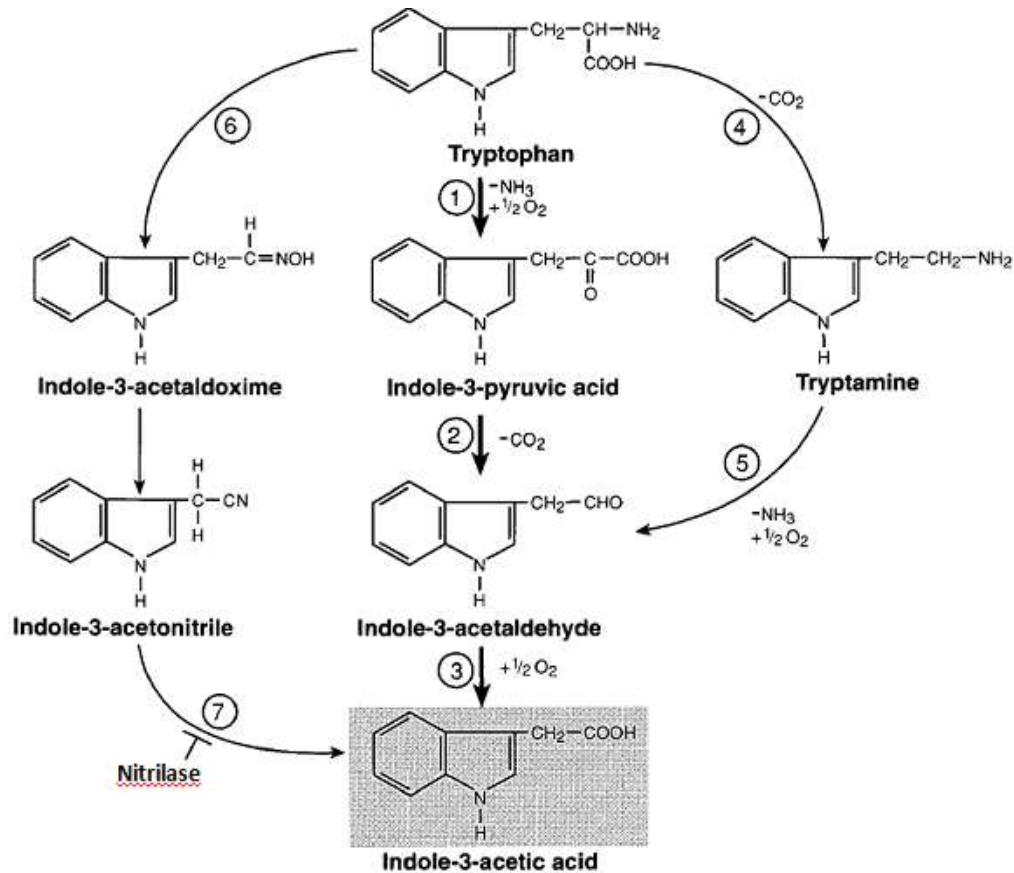
The mechanism of IAA polar transport involves a pH difference across the cell membrane allowing the movement of IAA into the cell.

Auxin Is Also Transported Nonpolarly in the Phloem

Most of the IAA that is synthesized in mature leaves appears to be transported to the rest of the plant nonpolarly via the phloem. Auxin, along with other components of phloem sap, can move from these leaves up or down the plant at velocities much higher than those of polar transport. Auxin translocation in the phloem is largely passive, not requiring energy directly.



Auxin Synthesis: in Young developing leaves, Terminal buds, growing axillary buds and Seeds in developing fruits. Biosynthesis by the tryptophan-dependent and tryptophan-independent pathways can lead only to an increase in the concentration of free IAA.

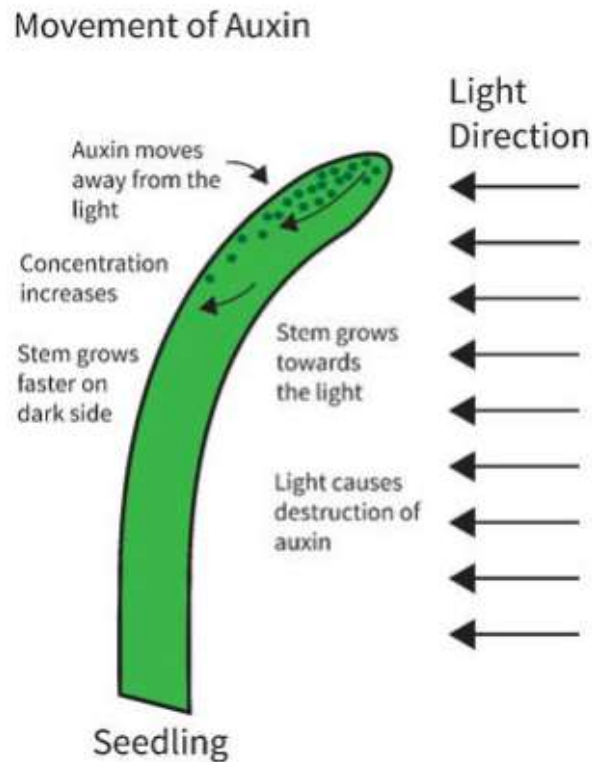


Auxin Responses

1. Cell enlargement - auxin stimulates cell enlargement and stem growth.
2. Cell division - auxin stimulates cell division in the cambium and, in combination with cytokinin, in tissue culture.
3. Vascular tissue differentiation - auxin stimulates differentiation of phloem and xylem.

4. Root initiation - auxin stimulates root initiation on stem cuttings, and also the development of branch roots and the differentiation of roots in tissue culture.

5. Tropistic responses - auxin mediates the tropistic (bending) response of shoots and roots to gravity and light.



6. Apical dominance: Auxin, produced in the shoot apex, can repress the development of axillary buds in a process known as apical dominance. If the shoot apex is removed, this inhibition is released and the axillary buds develop as side shoots.

7. Leaf senescence - auxin delays leaf senescence.

8. Promotes femaleness in dioecious flowers (via ethylene).