Difference Between Plant Hormones and Plant Growth Regulators

www.differencebetween.com

Key Difference - Plant Hormones vs Plant Growth Regulators

Plant growth and development is regulated by different chemicals of plants. They are known as plant growth substances. There are two major categories of plant growth substances named plant hormones and plant growth regulators. Sometimes these two words (plant hormones and plant growth regulators) are used interchangeably. Some refer to plant growth regulators as plant hormones. Plant hormones are the chemicals which are synthesized by plants naturally during the metabolic processes of plants. Plant growth regulators are the chemicals synthesized artificially by humans to regulate the plant growth and development. The key difference between plant hormones and plant growth regulators is that **plant hormones are natural** while **plant growth regulators are artificial and are applied to plants by humans.** Plant growth regulators mimic the function of natural plant hormones.

What are Plant Hormones?

A hormone is a chemical which controls the functioning and development of organisms. Even in plants, these chemicals play a major role in regulating plant growth, development, and reproduction. They are known as plant hormones. Plant hormones are synthesized in specific areas of the plant such as leaves, stems, roots, etc., and are transported to different areas for the function. Four key characteristics can be identified in plant hormones. They are endogenous nature, mobility, regulatory effect and remarkable response. There are five major groups of plant hormones named auxin, gibberellin, cytokinin, abscisic acid, and ethylene.

Auxin

Auxin is the first plant hormone discovered and studied extensively. Auxin is produced in the stem tip and promotes stem elongation. Auxins can be commonly found in seed embryos, young leaves, and apical meristems. Auxin inhibits the growth of lateral buds. It promotes and maintains apical dominance. Hence, lateral buds remain dormant. Lateral buds break their dormancy when the apex of the plant

is removed, and the auxin production is ceased. Another function of auxin is the cell differentiation. Indole acetic acid is one common type of auxin.

Cytokinin

Cytokinin is another major category of plant hormones, which promotes cell division. Cytokinins are produced in growing areas such as root tips and meristems. They travel through the xylem to their working destinations, i.e., leaves and stems. Cytokinins perform several functions performed in plants, including stimulation of growth and cell differentiation in stems and roots with auxins, promotion of growth and development of chloroplasts, and production of anti-aging effects on some plant parts. One important function of cytokinin is that it provides a younger and healthier look to plants. Florists use cytokinins to keep cut flowers look fresh for longer.

Gibberellins

Gibberellins are produced in the root and stem apical meristems, young leaves, and seed embryos. Gibberellins are involved in shoot elongation, seed germination, fruit and flower maturation, seed dormancy, gender expression, and seedless fruit development, and the delay of senescence in leaves and fruits.

Ethylene

Ethylene is a gas produced in fruits, flowers and aging leaves and it promotes fruit ripening. Sometimes ethylene stimulates plant growth and development of roots.

Abscisic Acid

Abscisic acid promotes seed dormancy by inhibiting cell growth. Opening and closing of stomata in leaves are also maintained by abscisic acids in plants. Abscisic acids delay cell division and inhibit fruit ripening.

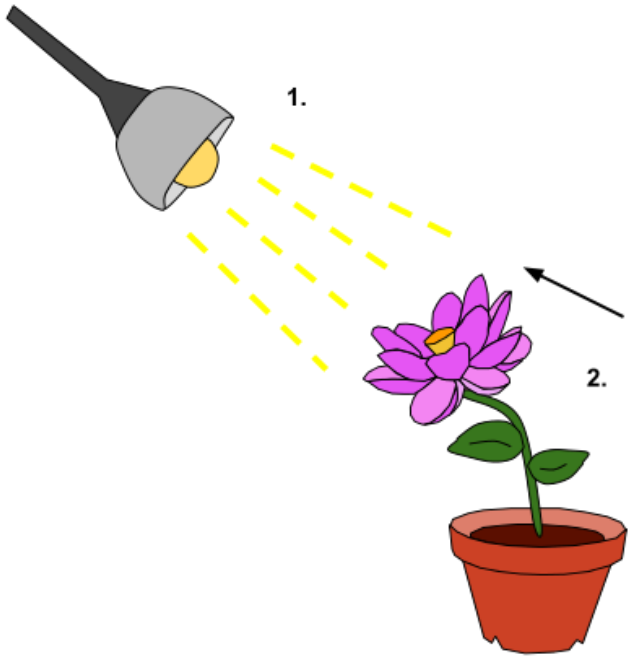

Figure 01: Phototropism shown by plants in response to auxin action.

What are Plant Growth Regulators?

Plant growth regulators are chemicals which are synthesized artificially by humans to regulate plant growth and development. These substances act as natural plant hormones. Hence they can be known as exogenous plant hormones as well. Plant growth regulators are used in agriculture, horticulture, and floriculture. They are applied at low concentrations, and they are not hazardous to man or animals. However, plant growth regulators should be applied in correct concentrations and misusing may create adverse effects on productivity and quality of the food harvest.

Plant growth regulators are usually applied as foliar sprays or liquids to drench the soil. Unlike natural plant hormones, the effect of plant growth regulators is short lived and require reapplication in order to achieve the desired effect.

Figure 02: Plant growth regulators are used in agriculture, horticulture, and floriculture.

What is the difference between Plant Hormones and Plant Growth Regulators?

Plant Hormones vs Plant Growth Regulators	
Plant hormones are chemicals synthesized by plants; they are involved in plant growth and development.	Plant Growth Regulators are chemicals synthesized artificially by humans; they are involved in plant growth and development.
Examples	
Examples of plant hormones include Auxin, Gibberellin, Cytokinin, Abscisic acid, and Ethylene.	Naphthalene acetic acid (NAA), Indolebutyric acid (IBA), Naphthoxyacetic acid (NOA), Ethephon, Chlormequat chloride, etc. are examples.
Synthesis	
Plant Hormones are synthesized as a result of plant metabolic processes. Hence, they are natural substances.	Plant Growth Regulators are formulated by humans. Hence, they are artificially synthesized substances.
Origin	

Plant Hormones are endogenous.	Plant Growth Regulators are exogenous.
Effect	
Plant Hormones are long-lived chemicals. Hence, the effect is long lasting.	Plant Growth Regulators are short lived. Hence, the effects are temporary. Reapplication is required.

Summary - Plant Hormones vs Plant Growth Regulators

Plant hormones and plant growth regulators are chemicals which control plant growth and development. Plant hormones are natural substances produced as a result of metabolic processes in plants. Plant growth regulators are synthesized artificially by humans to use in agriculture and floriculture. Plant growth regulators mimic the natural plant hormones by their action. However, plant hormones are natural, and plant growth regulators are man-made. This is the main difference between plant hormones and plant growth regulators.

References:

1."The differences between plant hormone and plant growth regulator | Tri-DWARF Industrial Co.Ltd." TriDWARF Industrial CoLtd RSS. N.p., n.d. Web. Available here. 21 June 2017.
2. Weber, Danielle. "Plant Hormones: Chemical Control of Growth and Reproduction." Study.com. Study.com, n.d. Web. Available here. 21 June 2017.

Image Courtesy:

1. "Phototrophic Response to Stimulus"By Mtomanelli15 - Own work (CC BY-SA 4.0) via Commons Wikimedia
2. "DCTC-Landscape-Horticulture" (CC BY-SA 3.0) via Commons Wikimedia

How to Cite this Article?

APA: Difference Between Plant Hormones and Plant Growth Regulators. (2017, June 23). Retrieved (date), from http://www.differencebetween.com/ difference-between-plant-hormones-and-vs-plant-growth-regulators/

MLA: "Difference Between Plant Hormones and Plant Growth Regulators." *Difference Between.Com*. 23 June 2017. Web.

Chicago: " Difference Between Plant Hormones and Plant Growth Regulators." *Difference Between.Com*. difference-between-plant-hormones-and-vs-plant-growth-regulators (accessed [date]).