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Phytohormones: As Plant Growth Regulator

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Abstract

Plant hormones have been extensively studied for their roles in the regulation of various aspects of plant development. However, in the last decade important new insights have been made into their action during growth and development of plant. Phytohormones are chemical messengers that coordinate cellular activities. This article introduces the plant hormones (auxin, cytokinin, gibberellic acid, ethylene, abscisic acid, salicylic acid and jasmonic acid) through their roles, during the plants life, from seed-to-seed. Plant hormones are a group of naturally occurring, organic substances which influence physiological processes at low concentrations. The processes influenced consist mainly of growth, differentiation and development, though other processes, such as stomatal movement, may also be affected. Plant hormones1 have also been referred to as 'phytohormones' though this term is infrequently used.

Introduction :

Plants need sunlight, water, oxygen, minerals for their growth and development. These are external factors. Apart from these, there are some intrinsic factors that regulate the growth and development of plants. These are called "plant hormones" or "Phytohormones". These hormones are produced in almost all parts of the plant and are transmitted to various parts of the plant. They may act synergistically or individually. Roles of different hormones can be complementary or antagonistic. Hormones play an important role in the processes like vernalisation, phototropism, seed germination, dormancy etc. along with extrinsic factors.Synthetic plant hormones are exogenously applied for controlled crop production.

Plant hormones control all the growth and development activities like cell division, enlargement, flowering, seed formation, dormancy and abscission.Based on their action, plant hormones are categorised into two categories: 1) Plant Growth Promoters 2) Plant Growth Inhibitors

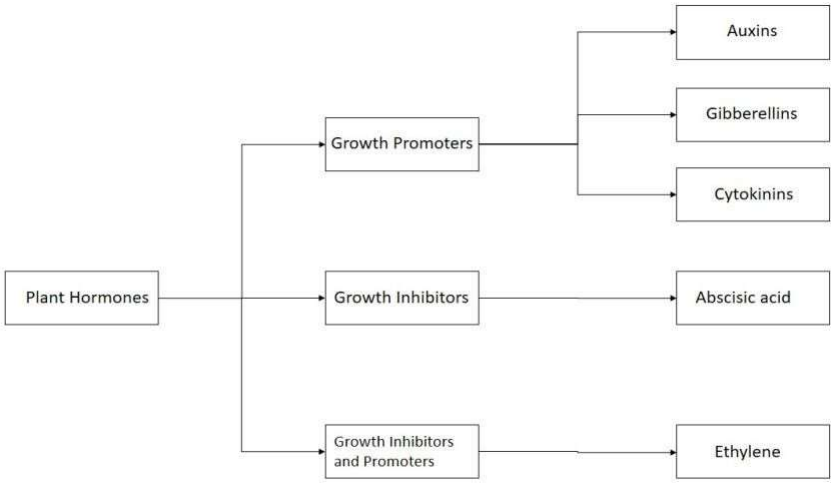

Fig. Phytohormones/ Plant Hormones

Types of phytohormones or plant hormones :

Auxins:

Auxins are produced by apical meristems, developing seeds and young flower buds and leaves.An important example of naturally occurring auxin is indole-3-acetic acid, while indole butyric acid is an artificially synthesized auxin.

Some important functions of auxins -

Auxins facilitate cell elongation of stems and roots. Auxins cause the growth of apical buds and suppress the growth of lateral buds (apical dominance). Auxins also facilitate parthenocarpy in fruits and prevent the premature fall of flowers and leaves. Auxins promote flowering and fruit growth. It also increase the rate of respiration in plants.

Gibberellins :

Gibberellins are produced in developing embryos, bud leaves and root tips. An example of gibberellin is gibberellic acid (GA3).

Some important functions of gibberellins -

Gibberellins promote growth and cell elongation in leaves and stems. Gibberellins induce flowering and parthenocarpy in plants and increase the size of fruits. These hormones are also responsible for breaking seed dormancy so that the process of germination can be initiated.

Cytokinins:

Cytokinins constitute an important class of plant hormones that promote cell division in both roots and shoots. An important naturally occurring cytokinin is zeatin,

whereas kinetin is an artificially synthesized cytokinin.

The functions of cytokinins -

The main function of cytokinins is to promote cell division and differentiation of cells and tissues in plants. Cytokinins work antagonistically and help to overcome apical dominance induced by auxins. Cytokinins delay senescence in leaves, fruits and vegetables and promote flowering.These hormones generate resistance in plants against diseases and unfavorable conditions.

Ethylene:

Ethylene is a gaseous hormone synthesized in all parts of plants. It is majorly synthesized during the ripening of fruits.

The functions of ethylene -

Ethylene promotes transverse growth and inhibits lateral growth. This hormone also promotes senescence and abscission of leaves, fruits and vegetables. Ethylene aids plants in overcoming seed or bud dormancy and promotes fruit ripening.

Abscisic acid:

Abscisic acid is a type of phytohormone that causes growth inhibition and is synthesized by stems, leaves, fruits, and seeds of the plant. It is also called the stress hormone as it helps the plant withstanding various kinds of environmental stresses.

Different functions of abscisic acid -

Abscisic acid inhibits plant growth, induces seed and bud dormancy, promotes senescence and wilting of leaves and abscission of leaves and flowers. This hormone also regulates transpiration through plants by inducing the closure of stomata.

Conclusion :

This article has attempted to assemble all the relevant information regarding the plant hormones or phytohormones. Plant hormones have a very vital role to play during the plant's exposure to environmental stresses, as they mediate growth and development, and the allocation of nutrients.

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