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Topic: Plant hormone- Gibberellin

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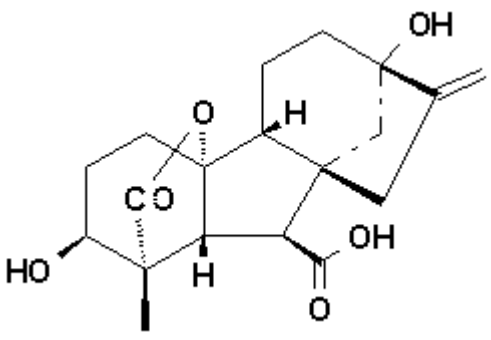
Plant hormone - Gibberellin

Gibberellins are the plant growth regulators involved in regulating the growth and influencing different developmental processes which include stem elongation, germination, flowering, enzyme induction, etc.

Gibberellins have different effects on plant growth and the stem elongation is the most dramatic amongst all. The stem starts to grow when it is applied in low concentration to a bush. The internodes grow so long that the plants become indistinguishable from climbing. The Gibberellins overcome the genetic limitations in different dwarf varieties.

There are more than 70 gibberellins isolated. They are GA1, GA2, GA3 and so on. GA3 Gibberellic acid is the most widely studied plant growth regulators.

Structure of Gibberellin:



(Fig.- Structure of Gibberellin)

Gibberellin is a diterpenoid. It forms the basis of molecules such as vitamins A and E. The figure below shows the structure of the Gibberellin A1, the first identified gibberellin.

The structure of all the gibberellins is the same with several side groups attached. These groups determine the unique functions of gibberellins in different tissues.

Gibberellin was originally purified and identified by Japanese scientists studying a fungal rice disease in the 1930's. By the end of the decade, they had extracted gibberellin from the fungus attacking the rice crops. Upon applying the extracted gibberellin solution to healthy crops, they noticed it had the same effect. Further tests in the United Stated in the 1940's and 50's revealed many more functions of gibberellin. Gibberellin has the ability to overcome dormancy in seeds, extend the length of cells and encourage division, and even has hormonal and signaling roles in the fruiting and senescence processes.

The important function of gibberellins are mentioned below:

Seed Germination: Some seeds that are sensitive to light such as tobacco and lettuce exhibit poor germination in the absence of sunlight. Germination begins rapidly if the seeds are exposed to the sunlight. If the seeds are treated with gibberellic acid, the light requirement can be overcome.

Dormancy of Buds: The buds that are formed in autumn stay dormant until next spring. This dormancy can be overcome by treating them with gibberellin.

Root Growth: Gibberellins have almost no effect on the growth of roots. However, some inhibition of growth can occur at a higher concentration in a few plants.

Elongation of the Internodes: Internodes elongation is the most pronounced effects of gibberellins on plant growth. In many plants such as dwarf pea and maize, the genetic dwarfism can be overcome.

For example, the dwarf pea plants have expanded leaves and short internodes. But the internodes expand and look like tall plants when treated with gibberellin.

Gibberellins exhibit their impact by altering gene transcription.

Uses of Gibberellins:

Gibberellin is commercially obtained from fungi. It is used to facilitate the germination of seeds.

It is sprayed on the grapevines and used to enlarge them.

It is used on cucumber plants to produce all male flowers. This helps the farmers to obtain pollen of desired characteristics to be used for hybridization.

Biennial plants produce flowers only during low temperatures. When gibberellin is applied, these plants will flower irrespective of the low temperatures.

The dwarf varieties of plants which are genetic mutants can be made to grow by applying gibberellins to them.

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