

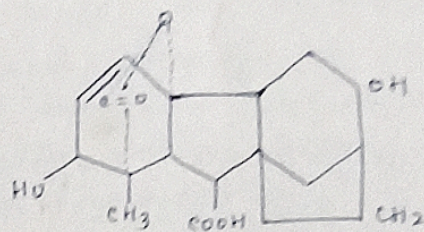
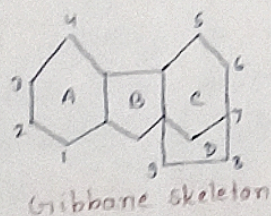
GIBBERELLINS

Definition:- The gibberellins are plant growth hormones which enhance the longitudinal growth of stem. The presence of meristematic tissue is necessary for the elongation growth caused by gibberellins.

Discovery:- Gibberellins were discovered in 1926 by a Japanese plant pathologist Kurosawa. Fetus of fungus Gibberella Fujikuroi named this phytohormone gibberellin.

Kurosawa observed that some rice seedling grows much taller than the others plant were found to be infected by Gibberella Fujikuroi. So, the disease was known as 'Bakanae disease'. The diseased plant (rice) become tall and finally they dies. The two workers Yabuta (1935) & Sumiki (1938) obtain the crystalline form of Gibberellin and named it gibberellic acid (GA). Cross et al. (1962) reported that six gibberellins found in the mixture. GA_1 , GA_2 , GA_3 , GA_4 , GA_7 and GA_9 . Till now, about 52 different types of gibberellins are known and they have been isolated from a variety of plants and plants parts.

Chemical Structure:- All the different types of gibberellins, known so far, the gibbane skeleton. The individual members differ with each other in their side attachment of various groups viz - OH group, -COOH group, etc.



Bioassay of Gibberellins:-

Three types of bioassays are widely used, because of their ease of performance, reliability, sensitivity and range of response. They are:-

1. Dwarf seedling bioassay
2. The hypocotyl bioassay.
3. Cereal endosperm bioassay.

1. Dwarf seedling bioassay :-

Mode of action of Gibberellins / Physiological effects of Gibberellins :—

1. Stem elongation → Gibberellins produce extraordinary elongation of stem in intact plants. Many seedlings (eg. tomato, lettuce, radish etc) when grown in petridishes containing G_A solution, show marked elongation of hypocotyl. The elongation of stem is resulted due to cell division and cell elongation induced by G_A .

2. Reversal of Dwarfism → One of the most striking effects of the gibberellins is the reversal of dwarfism in many genetically dwarf plants. 'Rosette' plant of sugar beet, when treated with G_A , undergoes marked longitudinal growth of axis. ~~Similar~~ Similarly dwarf pea & dwarf corn becomes tall. Extensive studies indicated that the dwarf plants have very low G_A level which appears, to account for the dwarfing habit. It is therefore, external supply of G_A to such plants causes rapid elongation growth.

3. Bolting → Plants are biennials. First year certain dwarf plants grow only a rosette of leaves (dense order) which is attached to a very short axis (stem condensed) and then in the next year develop an elongated 'shoot' bearing flowers & fruits. The phenomenon is called bolting. The bolting is induced normally by winter cold which changes the level of endogenous gibberellins. The exogenous application of gibberellin induces bolting in the first year substituting the cold treatment.

4. Breaking of dormancy →

Gibberellins have also been shown to break the dormancy in seeds & buds. The dormancy of trees buds during favourable condn't can also be broken by exogenous supply of gibberellins.

5 Seed germination → Some of the light sensitive seeds, viz. *Lactuca sativa*, barley etc can germinate with the treatment of GA even in complete dark, which otherwise require light conditions.

6 De-novo synthesis of Enzyme α -Amylase →

GA induces de-novo (a new) synthesis of enzyme α -amylase in the endosperm of germinating barley seeds. This has been experimentally shown by isolating layer and treating it with gibberellin solution.

7 Parthenocarpy → Formation of seedling seedless fruits without fertilization can also be induced by gibberellin treatment in many plants. (eg. tomatoes, apples, cucumbers, etc.)

8 Cell Division → It has been demonstrated that gibberellins can stimulate cell division in the vascular cambium of many deciduous trees in spring season.

