

# Gibberellic Acid for Fruit Set and Seed Germination

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## The Germination Process

The first stage of germination consists of ingesting water and an awakening or activation of the germ plasma. Protein components of the cells that were formed as the seed developed, became inactive as it matured. After an uptake of water, the system is reactivated and protein synthesis resumes. Enzymes and hormones appear and begin to digest reserve substances in the storage tissues and to translocate the digested substances in the storage tissues to the growing points of the embryo. The sequence of the metabolic pattern that occurs during germination involves the activation of specific enzymes at the proper time and regulation of their activity.

Control is exercised by four classes of plant hormones: inhibitors such as abscissic acid which block germination; auxins which control root formation and growth; the gibberellins which regulate protein synthesis and stem elongation; and cytokinins that control organ differentiation. Ethylene is also believed to have a control function in some plants. Sometimes the last three controls are used together to crash through dormancy in germinating difficult seed.

## Gibberellic Acid

Gibberellic acid (actually a group of related substances called gibberellins) was discovered as a metabolic byproduct of the fungus *Gibberella fujikuroi*, which causes the stems of growing rice to elongate so rapidly the plant collapsed. Synthetic forms of gibberellic acid are available commercially.

Gibberellic acid (GA) is a very potent hormone whose natural occurrence in plants controls their development. Since GA regulates growth, applications of very low concentrations can have a profound effect. Timing is critical: too much GA may have an opposite effect from that desired; too little may require the plant to be repeatedly treated to sustain desired levels of GA.

## Effects of Gibberellic Acid

1. Overcoming dormancy. Treatment with high concentrations of GA is effective in overcoming dormancy and causing rapid germination of seed. Concentrations of about 2 ppm can cause tubers to sprout earlier.
2. Premature flowering. If a plant is sufficiently developed, premature flowering may be induced by direct application of GA to young plants. This action is not sustained and treatment may have to be repeated. Formation of male flowers is generally promoted by concentrations of 10 to 200 ppm., female flowers by concentrations of 200 to 300 ppm. Concentrations of more than 600 ppm markedly suppresses initiation of both male and female flowers.
3. Increased fruit set. When there is difficulty with fruit set because of incomplete pollination, GA may be effectively used to increase fruit set. The resulting fruit maybe partially or entirely seedless. GA has increased the total yield in greenhouse tomato crops both as a result of increased fruit set and more rapid growth of the fruit.

4. Hybridizing. Pollination within self-incompatible clones and between closely related species may some times be forced by the application of GA and cytokinin to the blooms at the time of hand pollination.
5. Increased growth. GA applied near the terminal bud of trees may increase the rate of growth by stimulating more or less constant growth during the season. In a Department of Agriculture experiment, the GA was applied as a 1% paste in a band around the terminal bud of trees. Treatment was repeated three times during the summer. Walnut tee growth was 8.5 ft. for treated trees, 1.5 ft. for untreated trees.
6. Frost protection. Spraying fruit trees at full-blossom or when the blossoms begin to wither can offset the detrimental effects of frost.
7. Root formation. GA inhibits the formation of roots in cuttings.

## Recipes

Although GA is not listed as a "poison", the following precautions should be observed: Flush with water any GA that may get into the eye. Avoid skin contact if possible. If skin contact is suspected, wash with soap and water. Do not re-enter an area after spraying until the GA spray is fully dry. Avoid ingestion of GA.

The powder may be dissolved as specified below to give the desired concentration.

Concentration parts/million	GA mg	Water ml (cup)	Purpose
50	125	2400 (10 1/2)	Early flowering
200	125	600 (2 1/2)	Early flowering
800	125	160 (2/3)	Blossom set
2000	125	60 (1/4)	Seed germination
1% paste	125	5 ml (1 tsp.) lanolin	Growth promoter

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