



Roles of Hormone in Crop Production

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Abstract

The crop production of our country has increased manifold since the sixties by using improved agricultural technology like seeds, fertilizers, agricultural pesticides. At present, special importance is given to gene-technology, hybrid seeds and tissue culture, *etc.* for crop production. There is a limit to crop production through the use of agricultural technology. Increasing food production for a changing population is a difficult question for today's world. To cope up with such emerging problems use of hormones in crop production are showing very good results.

Keywords: Gene-technology, Hormones, Hybrid seeds, Tissue culture

Introduction

With the steady increase in population, the demand for food production is increasing day-by-day. This food production demand can be met by increasing the cultivated area and productivity along with appropriate uses of advanced agricultural technology (Ahammed *et al.*, 2016). But it is impossible to increase the amount of cultivable land; rather the amount of agricultural land is decreasing day-by-day through industry, housing, roads. Cultivation is increasing, but there is a limit to the growth; because, every land has its own production capacity. The crop production of our country has increased manifold since the sixties by using improved agricultural technology like seeds, fertilizers, agricultural pesticides. At present, special importance is given to gene-technology, hybrid seeds and tissue culture, *etc.* for crop production. There is a limit to crop production through the use of agricultural technology. Increasing food production for a changing population is a difficult question for today's world. To find answers to these difficult questions, scientists are giving special attention to the use of hormones in agriculture, and scientists believe that the use of hormones will become a major tool in crop production (Chesterfield *et al.*, 2020).

Hormone

A hormone is a biological chemical substance that is

produced in the plant body and form very small amounts to various physiological stresses in the plant body, their amount decreases in the plant body, and then the application of exogenous hormones is of particular benefit.

Hormones are used in agriculture are divided into three categories:

1. Growth Hormone

Example: NAA or Naphthalene Acetic Acid, IAA or Indole Acetic Acid, IBA or Indole Butyric Acid, GA or Gibberellic Acid, *etc.*

2. Growth Retardant Hormone

Example: MH or Maleic hydrazide, C.C.C. or Cycocel, TIBA or Tri-iodo Benzoic Acid, *etc.*

3. Flower-Fruit Regulating Hormone

2,4-D or 2,4-dichlorophenoxyacetic acid

Hormones should never be used directly; hormones can be used by mixed with different media. There are different methods of making hormones; some are described below.

Aqueous Formulation of Hormones

There are some hormones that do not dissolve in water, such as fear. But they are easily dissolved in ethyl alcohol. Therefore, the hormones are first dissolved in small amounts

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in ethyl alcohol, then diluted with distilled water. The amount of water and alcohol to mix depends on the concentration of the hormone mixture. Hormone concentrations are measured in PPM units. The concentration of milligrams of hormone dissolved or mixed in one litre of mixtures will be same in PPM. If 100 mg NAA hormone is mixed with 1 litre of water and alcohol, then NAA concentration of that liquid will be 100 PPM. A low concentration of hormone (10-500 ppm) is soaked for 12-24 hours. A high concentration of hormone (1000-1,00,000 ppm) is taken by dipping the tip of the branch pen for 5-10 seconds. Since the potentiality of hormones gradually decreases, it is always best to avoid using ready-made hormone mixtures.

Hormone Preparation through Powder

Compared to aqueous medium, powder is used as a mixture to produce hormones. For preparation of powder hormone, a mixture of powder of equal concentration is prepared by mixing the hormone mixed with alcohol in small quantity. For grafting, powder is applied by soaking a 2 cm length fork in water and discarding the excess powder with a sieve.

Formulation of Hormones through Powder Ointments

Ointment hormones are made by heating lanolin, which looks like vaseline, into a liquid, mixing it with hormones, and then cooling it. 10 mg of hormones should be mixed with 10 g of lanolin to make 10 g of ointment hormone with a concentration of 1000 PPM. Ointment hormones are applied to the cut while making the grafting.

Uses of Hormones in Crop Production

Direct effects of hormone in crop production are:

- *Higher branch production*: Used of IBA or Indole Butyric Acid enhance the branch production in Potato plant.
- *Enhanced the flowers, fruits and shaped of the fruits*: Application of cycocel at 1000 PPM increased the number of flowers and fruits in citrus plant.
- *Reduced premature dropping of flowers and fruits*: By spraying of 2,4-D at 1-5 PPM in tomato plant can reduce the premature fallen of fruits and flowers.
- *Unseasonal flower and fruit production*: Application of ethrel at 100-200 PPM in Kew pineapple induced early flowering at 50 day after planting.
- *Increase yield by removing unnecessary flowers and fruits*: For removing unnecessary flowers in mango 10-20 PPM Naphthalene Acetic Acid (NAA) is used.

Indirect effects of hormone in crop production are:

- *Use in budding, grafting and other technique of planting material production*: For Mosambi cutting and pear grafting 200-250 PPM of IBA are used.
- *Breaking of seed dormancy*: For breaking dormancy of potato seed, gibberellic acid is used.
- *Help in germination*: For fast germination of papaya seed, seeds are soaked under gibberellic acid mixtures of 2000 PPM.
- *Production of seedless fruit*: For production of seedless guava fruit used 8000 PPM of gibberellic acid.
- *Higher seed production*: For increase in seed production of French bean, 5000 PPM of cycocel are sprayed.
- *Fast fruit ripening*: For fast ripening of fruit, ethylene are used.
- *Keeping flowers, fruits and vegetables fresh for a long time*: By application of 2500 PPM MH in onion germination are stopped up to 5 months.
- *Use in weeding and other work*: 2,4-D are used for control of broadleaf weed and cycocel are used for protection of wheat during flood.

Conclusion

Increasing food production for a changing population is a difficult question for today's world. Uses of hormones are one of the measures which will increase many folds if we use hormone in crop production efficiently.

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