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## Role of Plant Growth Regulators in Improving Fruit Set and Yield in Fruit Crops

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Plant Growth Regulators (PGRs) are organic compounds that influence physiological processes in plants when applied in small quantities. In fruit crops, they play a significant role in regulating flowering, fruit set, fruit growth, and yield. Many fruit crops suffer from problems such as poor fruit set, heavy flower drop, irregular bearing, and low fruit retention, which ultimately reduce productivity. Application of plant growth regulators such as auxins, gibberellins, cytokinins, and growth retardants can effectively improve fruit set, reduce premature fruit drop, enhance fruit size, and increase overall yield. Auxins like NAA are widely used to minimize flower and fruit drop, while gibberellins promote fruit development and increase fruit size. Cytokinins stimulate cell division and improve fruit quality. Growth retardants such as paclobutrazol help regulate vegetative growth and induce flowering in crops like mango. Proper use of PGRs in orchard management improves productivity, fruit quality, and economic returns to farmers. This article reviews the role of plant growth regulators in improving fruit set and yield in major fruit crops, along with recommended application doses and methods.

**Keywords:** Plant Growth Regulators, Fruit Set, Yield Improvement, Auxins, Gibberellins, Cytokinins, Paclobutrazol, Fruit Crops.

### Introduction

Fruit crops play an important role in horticultural production and human nutrition. They provide essential vitamins, minerals, antioxidants, and dietary fiber. However, fruit production is often affected by several physiological problems such as irregular flowering, poor fruit set, heavy flower drop, and premature fruit drop. These issues reduce yield and affect fruit quality. Plant Growth Regulators (PGRs) are chemical substances that influence plant growth and development. They act as signaling molecules that regulate physiological processes such as cell division, elongation, flowering, fruit development, and ripening. In horticultural crops, PGRs are widely used to manipulate plant growth and improve productivity. The use of PGRs in fruit crops has become an important component of modern orchard management. Their application helps improve fruit set, enhance fruit retention, increase fruit size, and regulate flowering. Proper use of PGRs can significantly increase fruit yield and quality, thereby improving farmers' income.

### Types of Plant Growth Regulators Used in Fruit Crops

#### Auxins

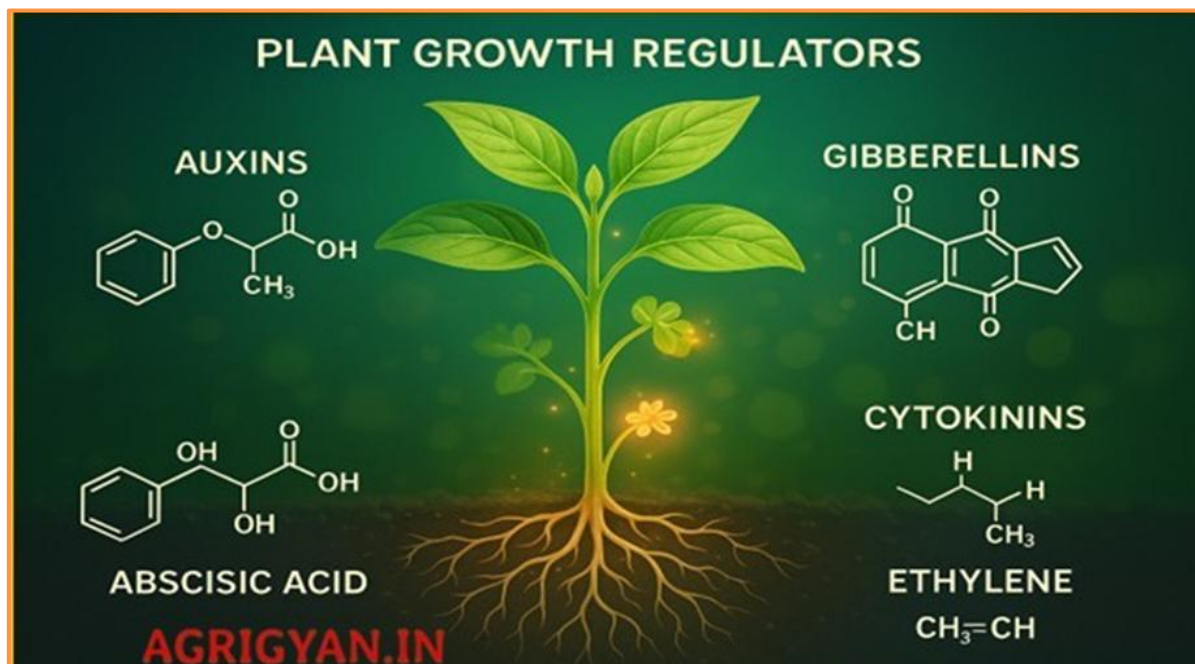
Auxins are one of the most important plant hormones involved in plant growth regulation. They play a major role in cell elongation, root initiation, and fruit development.

Common auxins used in fruit crops include:

- Indole-3-acetic acid (IAA)
- Indole-3-butyric acid (IBA)

- Naphthalene acetic acid (NAA)
- 2,4-Dichlorophenoxyacetic acid (2,4-D)

Auxins are widely used to reduce flower and fruit drop in fruit crops such as mango, citrus, and apple.



### Gibberellins

Gibberellins are growth-promoting hormones that stimulate cell elongation and fruit growth. The most commonly used gibberellin in horticulture is GA<sub>3</sub> (Gibberellic Acid).

Functions of gibberellins include:

- Increasing fruit size
- Improving fruit set
- Enhancing cluster elongation in grapes
- Promoting seedless fruit development

### Cytokinins

Cytokinins promote cell division and delay leaf senescence. They play a role in fruit development and improve fruit quality.

Common cytokinins include:

- Kinetin
- Zeatin
- Benzyl adenine (BA)

These hormones are often used to increase fruit size and improve fruit quality.

### Growth Retardants

Growth retardants reduce vegetative growth and promote flowering in certain fruit crops.

Important growth retardants include:

- Paclobutrazol
- Chlormequat chloride (CCC)
- Daminozide

Paclobutrazol is widely used in mango to regulate vegetative growth and promote flowering.

### Role of PGRs in Improving Fruit Set

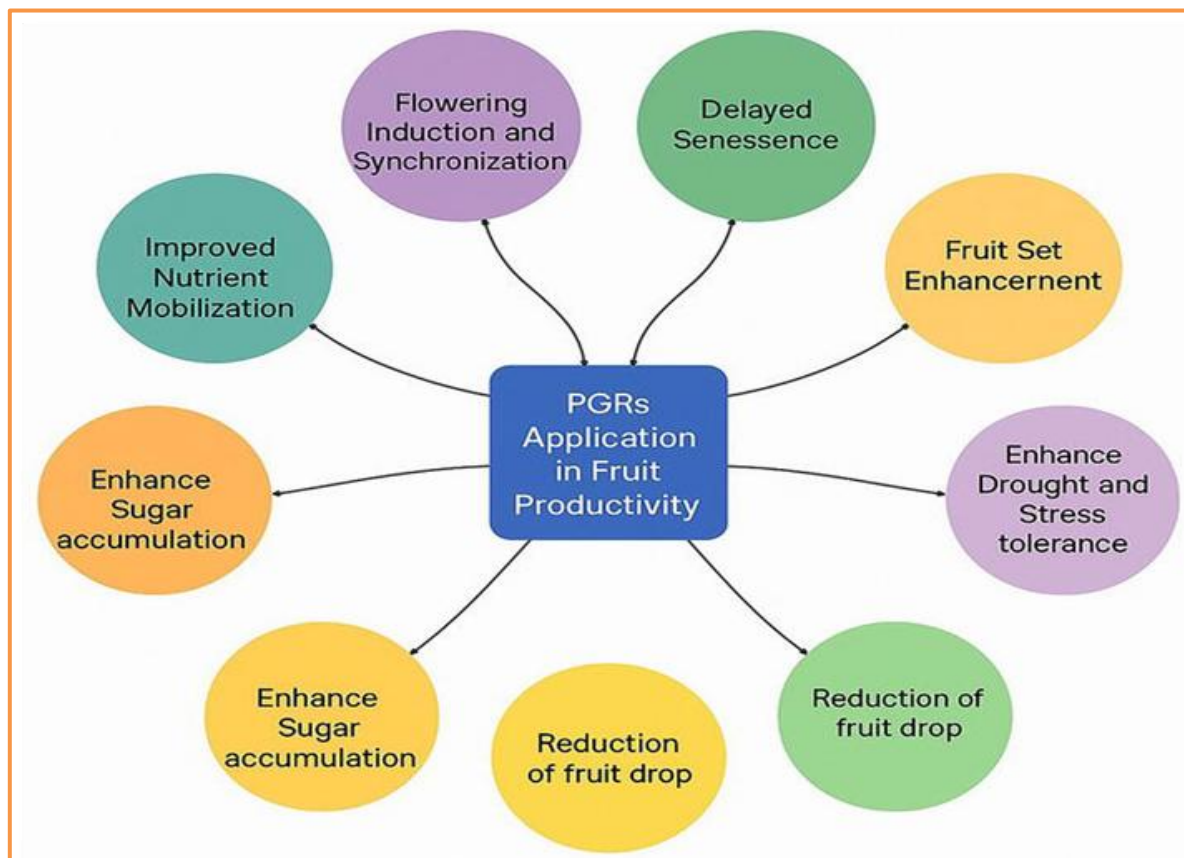
Fruit set refers to the successful transformation of flowers into fruits after pollination and fertilization. Many fruit crops experience low fruit set due to environmental stress, poor pollination, or hormonal imbalance.

Plant Growth Regulators help improve fruit set through the following mechanisms:

- Enhancing pollen germination
- Promoting fertilization

- Reducing flower drop
- Improving fruit retention

Auxins such as NAA are widely used to prevent premature fruit drop. Gibberellins also help improve fruit set in certain fruit crops such as grapes and citrus.



### Role of PGRs in Fruit Development

Fruit development involves cell division and cell enlargement. Plant Growth Regulators influence both of these processes.

Gibberellins promote cell elongation, resulting in larger fruits. Cytokinins stimulate cell division and improve fruit growth. Auxins help maintain fruit retention and support fruit development.

Application of PGRs during early fruit development can significantly increase fruit size, weight, and quality.

### Effect of PGRs on Fruit Yield

Plant Growth Regulators improve fruit yield through several mechanisms:

1. Increasing fruit set
2. Reducing flower and fruit drop
3. Improving fruit size and weight
4. Enhancing fruit quality

Proper application of PGRs results in higher fruit yield and improved economic returns for growers.

### Recommended PGR Doses for Major Fruit Crops

Table 1: PGR Application in Mango

PGR	Concentration	Purpose	Stage of Application
NAA	20–30 ppm	Reduce fruit drop	Pea stage
Paclobutrazol	3–5 g a.i./tree	Induce flowering	Soil application before flowering
GA <sub>3</sub>	25–50 ppm	Improve fruit size	Fruit development stage

**Table 2: PGR Application in Grapes**

PGR	Concentration	Purpose	Stage
GA <sub>3</sub>	20–40 ppm	Increase berry size	After fruit set
GA <sub>3</sub>	10–20 ppm	Cluster elongation	Pre-bloom
CCC	500 ppm	Improve fruit set	Pre-flowering

**Table 3: PGR Application in Citrus**

PGR	Concentration	Purpose	Stage
NAA	10–20 ppm	Reduce fruit drop	After fruit set
2,4-D	10 ppm	Improve fruit retention	Pre-harvest
GA <sub>3</sub>	20 ppm	Improve fruit size	Early fruit development

**Table 4: PGR Application in Banana**

PGR	Concentration	Purpose	Stage
GA <sub>3</sub>	50–100 ppm	Increase finger length	After bunch emergence
NAA	50 ppm	Improve fruit size	After flowering
2,4-D	25 ppm	Reduce fruit drop	Early fruit stage

## Methods of Application

Plant Growth Regulators can be applied through different methods depending on the crop and purpose.

### foliar Spray

This is the most common method used in fruit crops. The PGR solution is sprayed directly on plant leaves.

### Soil Application

Growth retardants such as paclobutrazol are often applied to the soil around the tree base.

### Trunk Injection

In some fruit trees, PGRs are injected directly into the trunk for rapid absorption.

## Advantages of Using PGRs

- Improves fruit set and retention
- Increases fruit size and yield
- Enhances fruit quality
- Regulates flowering and fruiting
- Improves orchard productivity

## Limitations of PGR Use

Despite their benefits, improper use of PGRs can cause problems.

- Excessive application may cause abnormal growth
- Incorrect timing reduces effectiveness
- Requires technical knowledge for proper use

Therefore, PGRs should always be applied in recommended concentrations and at the correct growth stage.

## Future Prospects

With advances in horticultural science, the use of PGRs is becoming more precise and efficient. Research is focusing on:

- Developing new PGR formulations
- Optimizing application timing
- Combining PGRs with precision agriculture techniques

These innovations will further improve fruit productivity and sustainability.

## Conclusion

Plant Growth Regulators play a crucial role in improving fruit set, fruit retention, fruit development, and overall yield in fruit crops. Their proper use helps overcome common

problems such as flower drop, poor fruit set, and low fruit retention. Auxins, gibberellins, cytokinins, and growth retardants are widely used in modern orchard management to enhance productivity and fruit quality. However, careful selection of PGR type, concentration, and application timing is essential to achieve maximum benefits. Future research and technological advancements will further enhance the efficiency of PGRs in fruit crop production.

## References

1. Davies, P. J. (2010). *Plant Hormones: Biosynthesis, Signal Transduction and Action*. Springer.
2. Taiz, L., Zeiger, E., Møller, I., & Murphy, A. (2015). *Plant Physiology and Development*. Sinauer Associates.
3. Westwood, M. N. (1993). *Temperate Zone Pomology*. Timber Press.
4. Srivastava, L. M. (2002). *Plant Growth and Development*. Academic Press.
5. Kumar, R., & Singh, R. (2018). Role of plant growth regulators in fruit production. *Journal of Horticultural Science*, 13(2), 45–52.
6. Bose, T. K., Mitra, S. K., & Sanyal, D. (2001). *Fruits: Tropical and Subtropical*. Naya Udyog.