AgriCos e-Newsletter
ISSN: 2582-7049
AgriCos e-Newsletter
Open Access Multidisciplinary Monthly Online Magazine
Volume: 03 Issue: 12 December 2022 Article No: 22

Plant Growth Regulators: Role in Horticulture

Sukanya Misra
Teaching cum Research Associate (Fruit Science), Rani Lakhsmi Bai Central Agricultural University, Jhansi, (U.P.)

SUMMARY

Plant growth regulators (PGRs) are organic substances that alter physiological processes in plants. PRGs, also known as biostimulants or bioinhibitors, work inside plant cells to either stimulate or block a particular enzyme or set of enzymes, which helps control how plants metabolise food. They often only become active in plants at very low concentrations. In the 1930s, the significance of PGRs was first realized. Since then, both natural and artificial substances that modify the size, shape, and function of agricultural plants have been found. Today, specialised PGRs are employed to alter the rate and pattern of crop growth throughout the many developmental stages, from germination to harvest and post-harvest preservation. It may be beneficial to use chemicals that regulate growth and have a positive impact on important agronomic crops. But in order for PGRs to be profitable, harvested yields must be raised or crop quality must be improved.

INTRODUCTION

An organic substance known as a plant hormone is produced in one section of a plant and moved to another location where, at incredibly low quantities, it causes a physiological response. Plant hormones can either promote or inhibit growth depending on the particular hormone, its concentration, time, and the plant part it is acting on. Natural hormones can be found in plants. When they are produced through chemical synthesis, they are referred to as PGRs, or plant growth regulators. Some plant growth regulators (PGRs) mimic the physiological actions of plant hormones, whilst others block their synthesis or action. Effects on yield of PGRs' numerous current applications are frequently indirect (Morgan, 1979). Some of these applications include: (1) preventing lodging in cereals; (2) preventing fruit drop before harvest; (3) synchronising maturity to enable mechanical harvest; (4) hastening maturity to shorten turnover time; and (5) lowering labour requirements. There are substances that can change specific agronomic traits including lodging, plant height, seed number, and maturity, according to studies on important grain crops like corn, soybean, wheat, and rice. Even so, yields haven't always grown as a result of these adjustments. Auxins, gibberellins, cytokinins, abscisic acid, and ethylene are the five groups of chemical substances that make up plant hormones. Each class is briefly discussed below.

Role of Auxins:

Although these substances have the ability to limit branching by suppressing the production of lateral buds at high concentrations, even though they typically contribute to the lengthening of shoots. Auxins are typically produced in apical buds, growing seeds, and young leaves. Auxins can be employed as herbicides in addition to being plant growth regulators (2,4-D and other phenoxy herbicides). Synthetic auxins NAA and NAD can be used in apple production to thin fruit, stop the growth of water sprouts and suckers, and avoid fruit drop before harvest. Despite not being a true auxin, carbaryl has a chemical structure that is comparable to auxins and functions similarly in fruit thinning.

Role of Gibberellins:

Gibberellins aid in growth as well. Young leaves, developing seeds, fruit, and roots are where they are formed. Gibberellins play a role in the regulation of dormancy and produce cell elongation during shoot growth. Gibberellins have been employed in agriculture to increase fruit size, stop fruit rusting, and encourage lateral branching. A number of growth inhibitors, such as Apogee, restrict gibberellin production, which prevents shoot growth**.**

Role of Cytokinins:

Cytokinins promote cell division. Cytokinins are involved in branching and stimulating bud initiation. They are used as fruit thinners (Maxcel® or Cilis Plus® 6-BA) in apples. For more information on the use of these products for thinning see Ontario.ca/apples and find Thinning of Tree Fruit. Cytokinins are generally used in plant cell culture at a concentration range of 0.1-10.0 mg/L. When added in appropriate concentrations they

may regulate cell division, stimulate auxiliary and adventitious shoot proliferation, regulate differentiation, inhibit root formation, activate RNA synthesis, and stimulate protein and enzyme activity.

Role of Abscisic Acid:

A growth inhibitor is abscisic acid (ABA). Along with many other plant tissues, mature leaves release ABA, which regulates the dormancy of buds and seeds and prevents shoot growth. It also seems to play a role in how plants react when faced with water stress. Commercial ABA (ProTone formulations can be used to quicken fall defoliation in a variety of fruit crops as well as to quicken apple post-bloom thinning and grape colour development.

Role of Ethylene:

This is the only known gaseous plant hormone. Many plant organs synthesize ethylene, and it moves readily in the air surrounding the tree. Usually, ethylene has an inhibitory effect on plants and is most commonly associated with plant stress. It promotes abscission of leaves and fruits, inhibits shoot elongation, favors caliper development, and, along with auxin, inhibits lateral bud development. On the other hand, it can break dormancy in buds and seeds and causes rapid ripening of apples. In apples, ethylene is involved in the transition of fruit from being physiologically mature to ripe. Once exposed to ethylene, their storage life is shortened. Ethephon is a synthetic substance that, when applied, releases ethylene and is used to thin down fruit and synchronise fruit ripening and abscission in order to prepare fruit for mechanical harvest. The natural precursor to ethylene production in plants, known by the trade name ACC (aminocyclopropane carboxylic), functions similarly to ethephon. It is utilised for apple and peach thinning. Fruit has a longer shelf life and can be left on trees for longer thanks to AVG (aminoethoxyvinyl glycine, commonly known as ReTain), which prevents the generation of ethylene. 1-MCP (1-Methylcyclopropene, also known as SmartFreshTM) stops the activity of ethylene by inhibiting the ethylene receptor. Since.1-MCP is a gas, it has been used in storage facilities to lessen post-harvest ripening. Apples and pears can be sprayed with 1-MCP (Harvista) prior to harvest to postpone fruit ripening and lengthen postharvest storage life. The sprayable mixture can be used to enhance fruit set on delicious cherry during bloom on cultivars like Regina that have a propensity for having poor fruit set.

CONCLUSION

A growing trend in horticulture with many benefits is the use of plant regulators. The method of using plant growth regulators in horticulture produces positive outcomes. The conclusion that the application of plant growth regulators in horticultural plants can be a challenge for all those who act in the area, presenting practical advantages and attractive possibilities for future use, leads to additional studies, weights, and conversations on the subject.

REFERENCES

Morgan P.1980. Synthetic growth regulators: potential for development. Botanical gazette. 1;141(4):337-46.

Bons HK, Kaur M.2020. Role of plant growth regulators in improving fruit set, quality and yield of fruit crops: a review. The Journal of Horticultural Science and Biotechnology. 3;95(2):137-46.