

Functions and Applications of Plant Hormones in Horticulture

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ABOUT THE STUDY

Horticultural practices have evolved significantly, with one of the most crucial developments being the understanding and utilization of plant hormones. Plant hormones, also known as phytohormones, play a fundamental role in regulating various physiological processes in plants. In horticulture, the application of these hormones has revolutionized crop production, quality enhancement, and overall plant management.

Plant hormones are naturally occurring chemical messengers produced by plants to regulate growth, development, and response to environmental stimuli. These hormones are synthesized in specific plant tissues and transported to other parts of the plant, where they exert their effects. Auxins are crucial for root development and are often used as rooting hormones to propagate plants through cuttings. This technique is widely employed in horticulture for vegetative propagation. Auxins are primarily responsible for controlling cell elongation and differentiation. They influence apical dominance, where the main shoot apex suppresses the growth of lateral shoots, and are crucial for phototropism and gravitropism. Gibberellins promote flowering, seed germination, and stem elongation. They are often used in horticulture to induce rapid growth in certain crops and promote flowering in ornamental plants. Cell division and differentiation are facilitated by cytokinins. They counteract the aging process in plant tissues, delaying senescence. In horticulture, cytokinins are used to enhance the shelf life of cut flowers and delay leaf yellowing in ornamental plants. Abscisic Acid (ABA) is associated with stress responses in plants, such as drought and cold tolerance. It also regulates seed dormancy and stomatal closure, helping plants conserve water. In horticulture, ABA can be used to manage water stress and improve plant survival during transplantation. Ethylene is a gaseous hormone

involved in fruit ripening, senescence, and responses to stress. It plays a significant role in regulating the ripening of fruits like tomatoes and bananas. Ethylene is often used in controlled atmospheres to manipulate fruit ripening and prolong shelf life.

Plant hormones play a vital role in fruit development. Auxins and gibberellins are used to increase fruit size and prevent fruit drop in various horticultural crops like apples, grapes, and citrus fruits. While the use of plant hormones has undeniably revolutionized horticulture, there are challenges and ethical considerations that need to be addressed. Excessive use of synthetic hormones can lead to environmental pollution and disrupt natural ecosystems. Careful management and controlled application are essential to mitigate these effects. There is ongoing debate about the potential health risks associated with the consumption of crops treated with synthetic hormones. Consumer awareness and regulations are essential to ensure food safety. Continuous use of hormones may lead to plant resistance or reduced responsiveness, necessitating higher concentrations or alternative treatments. Costs of production may rise as a result of this. Different countries have varying regulations regarding the use of hormones in horticulture. Harmonizing regulations and ensuring proper labeling and documentation are crucial for global trade and consumer protection. Plant hormones play a multifaceted role in plant growth, development, and adaptation to environmental challenges. From cloning and propagation to fruit production and post-harvest management, hormones are indispensable tools for horticulturists. However, their use comes with responsibilities and challenges, including environmental and health concerns. As horticulture continues to evolve, the ethical and sustainable application of plant hormones will be pivotal in ensuring food security, preserving biodiversity, and meeting the demands of a growing global population.

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