TRENDS IN AGRICULTURE SCIENCE
Popular Article
Vol.3 Issue 08 August 2024, Page: 2159-2161

Role of Plant Growth Regulators in Mulberry

Saranya M*
Department of Sericulture, Forest College and Research Institute,
Tamil Nadu Agricultural University Mettupalayam- 641 301, Tamil Nadu.
DOI:10.5281/TrendsinAgri.13624133

Abstract

Mulberry (*Morus* sp.) is the deep rooted, perennial crop is one of the economically important trees grown in Asian country which is sole food for silkworm growth and development. Plant growth regulators are organic compounds synthesized in specified plant parts in small quantity and are transported to the place of requirement leading to a change in physiological responses. The commercially available plant growth regulators are auxins, gibberellins, cytokinins, abscisic acid and ethylene. About 80% rooting was obtained from shoots cultured on the MS supplemented with NAA (1.0 mg/l) (Mohammad Anis *et al.,* 2003). Regeneration and production of multiple shoots were achieved from nodal segments with auxillary buds of a field grown mature tree of *Morus nigra* L (Das *et.al.,* 1995).
Keywords: Mulberry, growth regulators and growth improvement

INTRODUCTION

Plant growth regulators are organic compounds synthesized in specified plant parts in small quantity and are transported to the place of requirement leading to a change in physiological responses. The plant growth regulators play a vital role in mulberry leaf yield which leads to increase the cocoon yield. The commercially available plant growth regulators are auxins, gibberellins, cytokinins, abscisic acid and ethylene. Thus, the usage of plant growth regulators is also somewhat different. Under favorable conditions, plant growth promoters are increasing the sprouting of plants and enhance the leaf yield. Under unfavorable conditions, plant growth retardants are used to reduce the yield losses by reducing the evaporation and transpiration.

AUXIN

Auxins are widely used in plant propagation and tissue culture. Cuttings are routinely treated with auxins to induce root formation. Auxin is synthesis by Indole-3pyruvic acid (IPA) pathway by using the precursor Tryptophan. Plants largely produce auxin in shoot tips and translocate to roots. The primary auxin in plants is indole-3-acetic acid. The synthetic auxins are α-naphthalene acetic acid (NAA) and 2,4- Dichlorophenoxy acetic acid (2,4-D).

CYTOKININ

Cytokinins in the intact plant are the phytohormones that work from the bottom up. Made in the roots (also seeds and fruits), cytokinins travel up the xylem and promote lateral growth.

Published: 30 August 2024
ISSN: 2583-7850

Since auxins travel down from the growing tip and act to suppress lateral growth, these two types of hormones strike a balance. This relationship persists in tissue culture. When the active concentration of the two hormones are balanced, callus formation and growth is favored. When cytokinin predominates, shoots are formed. Although the name "cytokinin" indicates that these molecules promote cell division, in reality cell division requires both hormones (Singh *et al.,* 2014). Optimal hormonal conditions for propagation differ from species to species, and also differ with the stage of development

Cytokinin functions

Lists of some of the known physiological effects caused by cytokinins are listed below.

1. Stimulates morphogenesis (shoot initiation/bud formation) in tissue culture
2. Stimulates the growth of lateral buds-release of apical dominance
3. Stimulates leaf expansion resulting from cell enlargement
4. May enhance stomatal opening in some species
5. Promotes the conversion of etioplasts into chloroplasts via stimulation of chlorophyll synthesis.

GIBBERELLIN

Gibberellins are acidic compounds and are therefore also called gibberellic acids (GA) with a different subscript to distinguish between them. GA_3 has historically been called gibberellic acid but the term is also often used in describing all gibberellins. GA's are wide spread and also for ubiquitous in both flowering (Angiosperms) and Non-flowering (Gymnosperms) plants as well as ferns. They have also been isolated from lower plants such as mosses and algae, atleast two fungal species and most recently from two bacteria species (Honda, 1970).

GA has stimulating effect on plant height (stem), petiole and lamina. Suzuki and Kitano (1988) reported that GA stimulates shoot elongation but depresses the leaf enlargement. Furthermore, CCC which inhibits the GA biosynthesis, plant height and internodal length has increased the leaf yield. But GA found more effective under limited moisture conditions.

EHYLENE

Ethylene, unlike the rest of plant hormone compounds is a gaseous hormone. Like abscisic acid, it is the only member of its class. Of all the known plant growth substances, ethylene has the simplest structure. It is produced in all higher plants and is usually associated fruit ripening and the triple response (Dennis, 2002).

Function of ethylene

Ethylene is known to affect the following plant processes

1. Stimulates shoot and root growth and differentiation (triple response)
2. May have a role in adventitious root formation

Published: 30 August 2024
ISSN: 2583-7850

3. Stimulates leaf and fruit abscission
4. Stimulates bromeliad flower induction
5. Induction of femaleness in dioecious flowers
6. Stimulates flower opening
7. Stimulates flower and leaf senescence
8. Stimulates fruit ripening

ABSCISIC ACID

Abscisic acid is a single compound unlike the auxins, gibberellins and cytokinins. It was called "abscisin II" originally because it was thought to play a major role in abscission of fruits. At about the same time another group was calling it "dormin" because they thought it had a major role in bud dormancy.

Functions of abscisic acid

1. Stimulates the closure stomata (water stress brings about an increase in ABA synthesis).
2. Inhibits shoot growth but will not have as much effect on roots or may even promote growth of roots
3. Induces seeds to synthesize storage proteins
4. Has some effects on induction and maintenance of dormancy

Conclusion

Mulberry leaf is the main basic food plant of the silkworm (*Bombyx mori* L.), which converts leaf and protein in to silk. Due to increasing demand of silk and the limited arable land in the country, stress has been laid on the higher production and improvement of foliage quality to meet the growing demand of sericulture industry of the country. The production of quality foliage can be increased by the increasing assimilation rate of the plant and directing its movements to the foliage through the application of the growth regulators.

Reference

Das C, T.Sengupta, S.K. Sen, S. M. Quadri and B. Sharatchandra. 1995. Growth regulators for mulberry. *India silk (November),* pp. 23-24.

Dennis T T. 2002. Advances in mulberry tissue culture. *Journal of plant biology*, 45:7-21.

Honda T. 1970. Studies on the propagation of mulberry trees by cuttings. *Bulletin in sericulture experiment,* 24: 231-236.

Mohammad anis, Mohammad faisal and S. K. Singh. 2003. Micropropagation of mulberry (*Morus alba*) through *in vitro* culture of shoot tip and nodal explants. *Plant tissue culture,* 13(1): 47-51.

Singh K. K, T. Choudhary, A. Kumar. 2014. Effect of various concentrations of IBA and NAA on the rooting of stem cuttings of mulberry (*Morus alba* l.) under mist house condition in garhwal hill region. *Indian journal of hill farming.* 27(1): 125-131.

Suzuki T, Kitano M, Kohno K. 1988. Lateral bud outgrowth on decapitated shoots of low pruned mulberry (*morus alba* l.). *Tree physiology,* 4:53-60.

Published: 30 August 2024
ISSN: 2583-7850