MINI REVIEW

A Short Comprehensive Study on Novel Amino-Compound for Growth and Development of Plants

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Abstract

Polyamines (PAs) are aliphatic nitrogenous bases containing two or more amino groups. The impact of polyamines on plants have been observed to play important role in flowering without showing the extreme dwarfism trait, although these can have partially shortened internodes. The floral phenotypes seen included petaloid anthers, stigmoid anthers, extra petals, and green spaghetti. The appearance of the conjugates occurred late in development at both temperatures; however, there clearly was no correlation with flowering per se. On the basis of topping and leaf gro.wth analysis, the authors proposed, however, that the conjugates might be related to the appearance of ripening to flower. Changes in polyamine or polyamine-conjugate levels might be the result of a genetic factor that is independent of the flowering effect. Because of the difficulties in doing appropriate experiments with intact plants, several investigators have turned to analyses of floral initiation and development in organogenic cultures. The present study symbolizes the review of significant impact of Polyamines in promoting growth and development of and lowers Plants.

Keywords: Polyamines, Spermine, Spermidine, Putrescene, ODC, Floral Initiation.

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Introduction

The polyamines are organic molecules with two or more amino groups which bound to cell membranes and a varied macromolecules or can be found in free state in a cell (Marian *et al*. 2000). The role of polyamines have been studied in relation to their occurrence in various algal groups (Hamana and Matsuzaki, 1982; Bias *et al*., 2001; Applewhite *et al*., 2010; Groppa *et al*., 2018) and their involvement in cell division (Cohen *et al*., 1984; Garcia-Jimenez *et al*., 1998).

The data concerning in macrophytes, the endogenous level and uptake role taken by or transport of polyamines within the thallus have been given for *Ulva rigida* by several workers (Badini *et al*., 1994). Additionally, Uriostegui-Guzman *et al*. (2002) studied the implication of polyamines in reproductive events in algae by reporting variations in the endogenous levels of polyamines in different stages of cystocarp maturation in *Gracilaria cornea*. The accumulation of spermidine and putrescine in response to lethal hyposaline stress in several species of intertidal marine macroalgae. Polyamines have also been used for studying *in vitro* regulatory events of sporeling morphogenesis for *Grateloupia doryphora* (Gracia-Jimenez *et al*., 1998; Durmu and Kadioglu, 2005; Duan *et al*., 2006). The polyamines likes spermine, spermidine and putrescine together with their isomers Nor-spermine and Nor-spermidine in *Euglena gracilis*. Hamana *et al*. (1990) found differences in the composition of polyamines were related to the taxonomic position within different algal groups. Regarding potential physiological activities of polyamines in macroalgae, Polyamines induced growth and morphogenesis of sporelings of *Grateloupia doryphora, Gracilaria corticata* and *G. verrucosa* in the same as glycerol (Garcia-Jimenez *et al*., 1998; Kumari and Solanki, 2020). The application of the polyamines cadaverine, spermidine, and spermine stimulated both DNA synthesis and a limited amount of mitotic activity. The exogenous applications of putrescine, spermidine or spennine can induce cell division in almond protoplasts on a basal medium in land as well as in marine plants. In most of the reviewer, Putrescine was the most effective in some plants which may further surveyed the other polyamine contents in different organs of seedlings of a number of plant species.

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Quick Initiation of floral bud through fusion of polyamines

Polyamines and/or polyamine-conjugates have been analyzed with respect to floral initiation in intact plants and in in vitro systems. A further complication is that a number of different variables have now been reported including pH, cytokinin and oligosaccharins, as well as polyamines (Anwar *et al*., 2015). A variety of signals can induce a change, or that the real underlying variable has not yet been found. The implication of these signals may either that in the intact plant a variety of signals can be alternatively associated with the floral/vegetative switch, or that the in vitro and in vivo systems respond differently. An additional difficulty is that researchers using since any shoot will flower eventually, these variation between a regenerated floral bud and vegetative shoot may be only a very small number of nodes (Tiburcio *et al*., 2014; Paul and Roychoudhury, 2017).

Through developmental assay, the various "vegetative" media seems to be delaying flowering for a short time, which further permitting a change of the tissue to a true vegetative mode of growth . The results represent the best evidence to date on the involvement of polyamines in floral initiation. These may be comparable illustration from similar studies done on vegetative bud formation in various in vitro systems, for example from leaf discs.

Promotion of polyamines on floral development

Many researchers reported the role of varied polyamines in floral development. They have been characterized the enzyme activities, polyamines, soluble polyamine-conjugates, and insoluble polyamine-conjugates in developing tobacco ovaries (Slocum *et al*., 1984). The ORNdc-specific activity arose about 3-fold during the course of ovary development and fruit set; which significantly increases the free putrescine titer but with no significant change in the spermidine and spermine titers. It was seen more than 80% of the total content for all three polyamines probably acts as caffeoyl derivatives (Durmu and Kadioglu, 2005; Tun *et al*., 2006; Kusano *et al*., 2008). All these results re-emphasizes the free and bound forms of the polyamines. Subsequently, the demonstration of DFMO may interpret the tobacco ovary development. Although each of the studies has been discussed to relevant the evidence implies the polyamines, which may be impart its role during crucial differentiation, further hormonal regulation of reproductive development in plants. Thus the explanation results similar perturbation of many metabolic pathways produces systematic floral aberrations.

Action of polyamines on fruit development

Several evidences implicated by scientist's shows a primitive role for polyamines in fruit development. A report of increased ovary showed in apples that spraying polyamines at minimal concentrations on flowers, resulted after full bloom increased both fruit set and yield, apparently by increasing fruit growth rate during the stage of rapid cell division. Flower bud formation was also increased. A more recent study of exogenous putrescine in applications on apple has reported increased fruit set with one cultivar on one rootstock but no effect on another rootstock or with two other cultivars. Increased fruit set has also been reported in olives following application of putrescine at high concentration during flowering.

Couple of polyamines interaction with growth regulators

Some investigators have suggested that polyamines as a part of the signal response pathway for various plant hormones. The polyamines could help to break dormancy and stimulate cell proliferation in tuber slices of *Helianthus tuberosus*, normally a hormone dependent process (Bagni and Tassoni, 2006; Kumar *et al*., 2008; Kusano, 2008; Anwar *et al*., 2015; Kumari and Solanki, 2020). The selection of etiolated pea seedlings, they measured polyamines in buds and internodes before and after red light treatments. The use of Red light inhibited internode growth, stimulated bud development, further increased the titers of putrescine, spermine, and spermidine in the bud while reducing them in the internode (Tun *et al*., 2006; Li *et al*., 2014). Since then, polyamines plus ethylene, to gibberellic acid, and to cytokinins, resulted during *in vitro* floral initiation may suggested as anti-senescent properties of polyamines could be interpreted the relationship to cytokinins. There is no body of evidence for hormones comparable to the polyamine data, although a few reports show an increase of polyamine synthesis by cytokinin in some plants.

Conclusion

The present paper represents a comprehensive review of the published literature on the relationship between PAs and plant growth, development and stress tolerance. We explored the role of PAs in plant developmental processes ranging from flowering to senescence, and discussed the effects of PAs on plant growth and development. This information provides a reference for the future research on the regulation mechanism of PAs and the use of exogenous PAs to regulate plant growth in production. In recent years, many studies have focused on the relationship between PAs and plant growth and development, but most of them have been relatively simple and similar. There is considerable murkiness about the roles of polyamines in plant development. A number of studies suggest that polyamines do something interesting and important. However, these are suggestions, not clear-cut conclusions for the utilities of polyamines compound.

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