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Effect of Salicylic Acid on Rooting of Poinsettia (Euphorbia pulcherrima)

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ABSTRACT

The poinsettia's species name pulcherrima means "most beautiful" and that it is! Poinsettia's brilliant red floral display held against rich green foliage has made this unlikely species a holiday favorite. Its appealing presentation of the traditional Christmas colors has so endeared poinsettia that it is now second only to the Christmas tree as the most popular holiday plant. Studies have shown that rooting substrate is one of the effective factors at rooting of hard rhizogenetic plant such as poinsettia. The purpose of this study is to determine an appropriate concentration of salicylic acid (SA) on rooting of poinsettia. Present study showed that there was a great variation in most of the measured characters at $P< 0.05$ percent level. The obtained results show that salicylic acid treatments have caused the increase of percent of rooting. The use of Salicylic acid caused a positive effect on rooting. The callus percentage was obtained in control and 400 treatments. This study shows that plant growth regulators salicylic acid have a profound influence on rooting of poinsettia.

Keywords: Cuttings, Poinsettia, Rooting, Salicylic acid.

INTRODUCTION

Euphorbia pulcherrima Willd. (Family - Euphorbiaceae) is one of the most popular houseplants seen during the Christmas time. It has brilliant colored bracts ranging from scarlet, crimson, yellow to red and white. The ability of these spectacular bracts to remain fresh and intact for three - four months adds to its demand as an ornamental. Though Euphorbia pulcherrima is native of Central America, this fast growing plant is one of the most common growing shrubs throughout the world. The latex of Euphorbia pulcherrima has been reported to be poisonous to livestock (Anonymous 1978). However, in veterinary medicine it is used to kill maggots in the wounds of livestock. There are compounds (growth retardants/inhibitors, polyamines, phenolics) that modify main hormone effects on rooting (Hartmann et al., 2002). Salicylates, which are involved in phenolic compounds, have been considered as phytohormones (Raskin, 1992). In some woody and herbaceous plant species, salicylic acid (SA) highly promoted the In vivo rooting of cuttings when applied particularly with auxin (Bojarczuk & Jankiewicz, 1975; Kling & Meyer, 1983). SA inhibited IAA-induced rooting of apple stem slices In Vitro by enhancing oxidation of IAA during the auxin sensitive phase (24-96 h) (De Klerk et al., 1997). The use of

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salicylic acid caused a positive effect on rooting of henna, the maximum leaf was obtained in 2000 $ml.L^{-1}$ naphthalene Acetic Acid + 200 $ml.L^{-1}$ salicylic acid (Salehi Sardoei et al., 2013). Adventitious root formation comprises three successive interdependent physiological phases (induction, initiation and expression) (Gaspar et al., 1992). It suggested that phenolic compounds which are known to inhibit root formation might actually enhance root formation if applied during the appropriate phase of rhizogenesis (Berthon et al., 1993). Thus, applications of salicylic acid after IBA might be more effective on the auxin to induce root formation than simultaneous treatments of both substances. However, it is very difficult to estimate the proper application time of SA In vivo cuttings due to the lack of uniformity or stability in propagation material. Therefore, initial applications of SA to cuttings may also give useful results. The main objective of the present work was to study the effects of salicylic acid on the rooting of Euphorbia pulcherrima plants.

MATERIALS AND METHODS

Plant Material and Cultivation Conditions

The completely randomized design (CRD) was used in this experiment. Four replicates were carried out for this study (n=4). Ten semi-hard cuttings of poinsettia were used for each replication. In first week of March 2012, the cuttings were collected from current year branches of the same plants. After remove the lower leaves of cuttings and stab in under of cuttings, samples uniformly were cultured in treatments.

Treatments

The cuttings initially were immersed in 3% benomyl solution for 30 minutes in order to treat and then immediately placed in growth regulators of salicylic acid (0, 100, 200, 300 and 400 $ml.L^{-1}$) for 24 hours After short time, Finally planted into sand (Hartmann et al., 2002).

Plant-Growth Parameters:

three months after rooting, Some traits are determined that they were including Rooting percentage, stem length, No. of root, leaf and stem, average root length, largest root length, Mean root length and callus percentage.

Data Analysis

Analysis was performed on data using SPSS ver 16. Comparisons were made using one-way analysis of variance (ANOVA) and Duncan's multiple range tests. Differences were considered to be significant at $P < 0.05$.

RESULTS AND DISCUSSION

Statistical results showed that the hormonal treatments increased rooting percentages. Also the maximum percent of rooting was related to 300 and 200 $mg.L^{-1}$ treatments respectively. Application of salicylic acid was promoted the rooting of Populus cuttings depending on varieties and concentrations (Bojarczuk & Jankiewicz, 1975). However it was ineffective in rooting of Tillia clones (Smith, 1975). The maximum No. of root, leaf and stem for 400, control, 200 and 400 $mg.L^{-1}$ treatments respectively. Several studies showed that salicylic acid synergistically acted with IAA and promoted the root formation in mung bean cuttings**.** But it was or non effect on Acer cuttings **(**Kling & Meyer, 1983). salicylic acid combined with NAA synergistically promoted the root number and root lengths of the cuttings of several Populus spp. Although this effect had seemed to be in relation with the clonal differences and cutting time rather than

concentration and treatment methods (Bojarczuk & Jankiewicz, 1975). maximum stem length created in 400, 100 and 200 mg.L^{-1} treatments.

Table 1 - Effect of concentration of salicylic acid on rooting cuttings of semi-rigid Poinsettia (Euphorbia pulcherrima)

Treatments (mg.L^{-1})	Rooting percentage (%)	Stem length (cm)	No. Root	No. Leaf	No. Stem	Largest root length (cm)	Mean root length (cm)	Callus percentage (%)
control	35b	3.69a	9.81a	6.57a	2.13a	28.1a	15.1a	32.5a
100	45b	4.46a	11.6a	5.43a	2.49a	16.4b	9.98ab	27.5a
200	50a	4.26a	5.54a	5.35a	2.66a	9.62b	5.39b	25ab
300	75a	2.66a	11.4a	5.68a	2.25a	7.50b	5.20b	12.5b
400	35b	4.75a	13.3a	4.99a	2.66a	14b	11.2ab	32.5a

*Means separated by Duncans multiple ranges test at the P< 0.05 level

The use of SA caused a positive effect on rooting. This result previously reported in clones of different Populus spp (Bojarczuk & Jankiewicz, 1975). Callus percentage obtained in control and 400 mg.L^{-1} treatments. The significant point is that the use of salicylic acid in control treatments was from positive effect on the largest root length and mean root length. The promotive effects of chlorogenic and ferulic acid on the formation of root meristemoids during the initiative phase coincides demonstrated by Smith & Thorpe (1977). SA found to be inhibitory on In vitro rooting of stem discs of apple when applied before auxin (Van Der Krieken et al., 1997). This effect was attributed to enhanced oxidation of IAA during the auxin sensitive phase by salicylic acid (De Klerk et al., 1997).

Salicylic acid showed significant effect on rooting percentage, largest root length and mean root length and callus percentage traits. Results show that application of salicylic acid at mentioned levels has caused the significant increase of rooting percent (Blythe et al, 2004). The cause of positive effect of these materials on rooting can be attributed to the effect of auxines at provocation of division of the initial starter cells of root (Berthon et al, 1993).

CONCLUSION

The use of salicylic acid caused a positive effect on Rooting. salicylic acid treatment showed the highest content of rooting. This study shows the importance of this compound for root formation. Also, applications of of salicylic acid increased rooting percentages. Our future investigations will be focused on estimate the proper application time of salicylic acid on the rooting process.

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