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Effect of Growth Regulators on Stem Cuttings of Jatropha Species

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ABSTRACT

The study was conducted to assess effect of growth regulators on stem cuttings of Jatropha species the Vegetative propagation through Stem cuttings of Jatropha curcas and J. gossypifolia were treated with different combinations of auxins (IAA+NAA and IBA+NAA) along with distilled water (control). Stem cuttings of J. curcas IBA+NAA at 100 ppm was proved significantly effective for percent rooting. Similarly observations for J. gossypifolia showed highest rooting percentage for IAA+NAA at 200 ppm with maximum leaves per cuttings.

Keywords: Stem cuttings, propagation IAA ,IBA , NAA and rooting percentage.

I. INTRODUCTION

This The genus Jatropha is a morphological diverse genus belonging to family Euphorbiaceae native of Mexico and central America, but is widely distributed in wild or cultivated stands in Latin America ,Africa ,India and South East Asia (Dehgan and Webster(1979). Jatropha plant which has been identified as a potential biodiesel crop, National and State Governments have drawn ambitious programmes for its large scale cultivation (Kou and Chou, 2007; Mandpe et al., 2005 and Openshaw, 2000). Most of the species of the Jatropha can be cultivated in the tropical and subtropical regions of the country. It has low requirements to soil quality and can grow under low rainfall conditions (Heller, 1996). In most the vegetatively propagated plant species, there may be need for preplanting practices to ensure rapid development of the crop. Among such practice is the pre-treatment of clonal materials with growth hormones like Indole-3-Butyric Acid (IBA), Indole-3-Acetic Acid (IAA) and Naphtalene Acetic Acid (NAA) (Kumar and Arumugam, 1980). Kumar and Swankar (2003) reported that rooting and sprouting in J. curcas was more with IBA than NAA. Similar report was made by Narin and Watna (1983).

The cultivation of Jatropha species is also reported to and control erosion (Gubitz et al., 1999). Among various bio-diesel plants Jatropha curcas L. in particular have become popular for the cultivation in the region of Maharashtra for afforestration of wasteland under both irrigated as well as rain fed conditions.Investgation carried out on stem cuttings of Jatropha curcas and Jatropha gossypifolia (Gaikwad and Mukadam, 2009). The effect of growth hormones such as IAA ,IBA and NAA at different concentrations on Celastrus paniculata and Clerodenron serratum have been reported (Naidu et al., 2009). Similarly IBA and NAA at different concentrations on Morus Alba stem cuttings was studied and found that number of sprouted cuttings, length of the roots per cutting, percentage of rooted cutting, lengths of longest sprouts of root were higher in IBA 2000 mg/L (Singh et al., 2014).

Therefore present study was planned with the aim to improve rooting in cuttings through application of plant hormone for mass propagation of Jatropha species.

II. MATERIALS AND METHODS

In the present study healthy semi hard wood cuttings from five years old mature thick terminal branches of Jatropha curcas and three years of old Jatropha gossypifolia mature branches were selected from Botanical Research garden at Department of Botany, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (M.S).

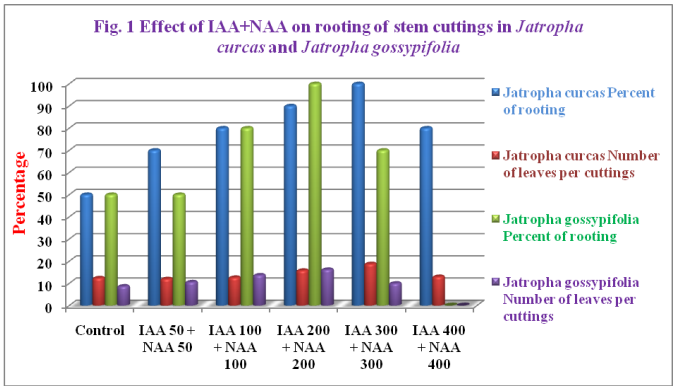
Stem cutting from the basal portion of branches with short internode of Jatropha curcas and Jatropha gossypifolia of 20-30 cm length and 3 to 4 cm thick were selected (Thitithanavanich, 1985, Kobilke, 1989, Heller, 1992, Kaushik and Kumar, 2005), Kathiravan et al. (2009) reported that longer cuttings were more successful in vegetative propagation than shorter cuttings. According to Adekola et al. (2012) and Aminul-Islam et al. (2010) Sahoo et.al (2014) longer cuttings of J. curcas were found to perform better in terms of all the rooting due to fact that longer cuttings probably have higher food reserves.

The cuttings were planted in right season i.e. February to March and September to October . Polybags having size of 22.5 x 12.5 cm were used for planting (Heller, 1992). Polybags were filled with mixed soil and well decomposed farm yard manure in equal proportion in ratio (1:1:1). The drainage holes were provided at the bottom of the polybags. The treated as well as untreated cuttings were planted to a depth about 6 to 8 cm.

Various concentrations of growth regulators were prepared. Basal slanting was done bellow the buds. The cutting were washed in tap water and tied in bundles of 10 each. Cutting bundles were treated with 0.3 % Benomyl for 15 minutes. These cutting bundles were treated with 50–400 ppm concentrations of growth regulators for 12 hours by dilute solution soaking method described by Hartmann and Kester (2007), one lot served as control. The cuttings were dipped with basal 4–6 cm portion in solution. The experiment was laid out in randomized block design with replications. The cuttings were planted in polybags. After 90 days, planting observations were recorded.

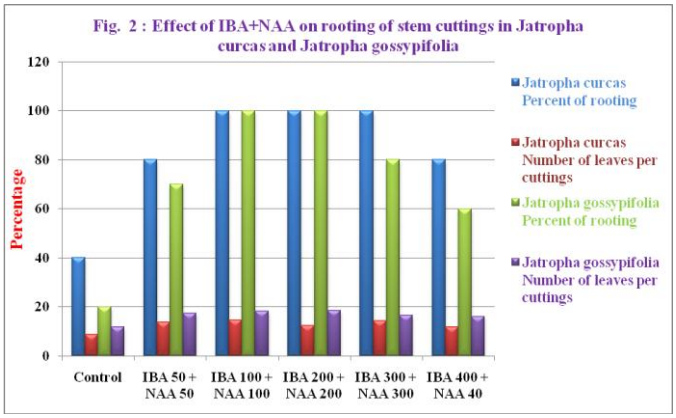
III. RESULTS AND DISCUSSION

The effect of IAA+NAA on rooting of stem cutting in Jatropha curcas and J. gossypifolia above hormones for different concentrations 50, 100, 200, 300, and 400 ppm were used. The observations were taken for percent rooting and number of leaves per cutting. Stem cuttings of J. curcas, IAA+NAA at 300 ppm was proved significantly effective for percent rooting and more number of leaves. Similarly observations for J. gossypifolia showed highest rooting percentage for IAA+NAA at 200 ppm with maximum leaves per cuttings which was shown in table 1 and Figure 1.



The effect of IBA+NAA in combination on rooting of stem cutting in Jatropha curcas and J. gossypifolia growth hormones for different concentrations 50, 100, 200, 300 and 400 ppm were used. The observations were taken for percent rooting and number of leaves per cuttings and leaves per cuttings which was shown in table 2.

The stem cutting of J. curcas treated for IBA+NAA at 100 ppm were observed effective for percent rooting.Similarly stem cuttings of J. gossypifolia treated for IBA+NAA at 200 ppm proved effective for maximum rooting percentage and leaves per cuttngs. The failure of vegetative cuttings of Jatropha curcas and Jatropha gossypifoila in setting due to fungal infection or other unknown causes which was shown in Figure 2.



Use of vegetative stem cuttings for the propagation of plants have been found very effective method in number of plants like Ficus carica , Nerium indicum Nambison et.al (1977), Punica granatum Chapman and Hussey (1980),Casuarina junghuhniana Ravichandran et.al (1994), Casuarina equisetifolia sunil puri (1990) Meizotropis buteiformis Gaisamudre and Dhabe (2011) Jatropha curcas Gaikwad(2011), similar type of

experiments were carried in the present studies to propagate Jatropha plants from shoot cuttings.

IV. CONCLUSION

Jatropha plant which has been identified as a potential biodiesel crop. The effect of growth regulators on stem cuttings of Jatropha species through Stem cuttings of Jatropha curcas and J. gossypifolia. Stem cuttings of J. curcas IBA+NAA at 100 ppm was proved significantly effective for percent rooting. Similarly observations for J. gossypifolia showed highest rooting percentage for IAA+NAA at 200 ppm with maximum leaves per cuttings.

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