IJASRM
International Journal of Advanced Scientific Research and Management, Special Issue I, Jan 2018.
www.ijasrm.com
ISSN 2455-6378

Response of Various IBA Concentrations to Wild Fig (Ficus palmata Forsk.) Cuttings under Controlled Conditions

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Abstract

Wild fig (*Ficus palmata* Forsk.) is a very popular edible wild fruit plant, locally known as bedu, commonly found growing in different regions of Uttarakhand. Stem cuttings is the easiest method of multiplication of this plant and requires special treatments such as auxins (IBA). This experiment was aimed to evaluated response of auxin (IBA) concentrations to wild fig cuttings at Horticultural Research Center and Department of Horticulture, H.N.B. Garhwal University, Srinagar, Garhwal, during 2014-15 under Randomized Block Design with three replications. Semi-hard wood cuttings of pencil size thickness and 15cm length were prepared from one year old shoots in month of July and treated with different concentrations of IBA (3000, 6000, 9000 ppm and Control). These treated cuttings were then placed under mist chamber. During and after finishing the experiment traits such as number of sprouted cuttings, length of sprouts, percentage of rooted cuttings, number of roots/cutting, length of longest root and survival percentage of cuttings was measured. On the basis of evaluation of traits results it was observed that semi-hard wood cuttings of wild fig treated with 6000 ppm IBA treated performed best among all the other remaining treatment of the experiment.

Key words: *Hardwood, Cuttings, IBA, Wild and Fig.*

1. Introduction

Wild Fig (*Ficus palmate* L.) locally known as Bedu in Garhwal region of Uttarakhand, is among the top edible wild fruit plants which are commonly found growing wild in the Himalayan region. Wild fig belongs to family Moraceae and its plants are occasionally found in the forests, but grow well around the villages, in wastelands, fields, etc. (Parmar and Kaushal, 1982). In comparison with the cultivated figs, wild fig is same in taste and flavor but they differ in relation to size as they are rather small. Its whole fruit, along with the seeds can be eaten either in unripe stage by cooking as a vegetable or after ripening as fruit. When comes the matter of its use, it is one of those top edible wild fruits which posses both nutritional and medicinal properties.

Wild Fig of the Himalayas has almost the same quality as the superior cultivated type, however fruits are smaller in size. As the cultivated fig (*Ficus carica* L.) cannot be grown in all places due to its very exacting climatic requirements, the Himalayan wild fig can be suitable alternative to this fruit (Parmar and Kaushal, 1982). Plant propagation has been a useful tool since centuries, which has made possible that how possible generations will be produced and how they will perform in rest of their life cycle. Wild fig is commonly propagated by vegetative methods (Shah *et al.*, 2006), more specifically through cuttings. Cutting is one of the easiest and cheapest technique to mass propagation and production of plants more uniform and genetically similar to the genitors (Hartman *et al.*, 2011). As in most ornamental plants and fruit trees that are propagated by woody cuttings, physiological stage of the mother plant, time of cuttings taking and the type of growth regulators are very important factors for the success of rooting cutting (Elgimabi, 2008).

Auxins (IBA) has speeding up effect on rooting percentage and development of cuttings, that’s why after preparation of cuttings, they are treated with

auxins mostly IBA. Plants produce natural auxin in young shoots and leaves, but the synthetic auxin should be used for successful rooting to prevent cuttings death (Kasim and Rayya, 2009; Stefanic *et al.*, 2007). Several studies have reported beneficial effect of auxin application in promoting adventitious root development of cuttings. Indole butyric acid (IBA) has been successfully used to increase rooting of *Poinsettia pulcherrima L.* (Ramtin *et al.,* 2011), *Shores parvifolia* (Aminah *et al.*, 2006), *Camellia japonica* (Blythe *et al.,* 2004) and Stevia *rebaudiana* (Debnath, 2008).
Considering the positive roles of IBA on rooting, the present study response of various IBA concentrations to Wild Fig (*Ficus palmata* Forsk.) cuttings under controlled conditions was carried out.

2. Material and Methods

The investigation was carried out under the mist chamber of Horticultural Research Center, Department of Horticulture, HNB Garhwal University, Srinagar Garhwal, Uttarakhand during the year 2014-15. The experimental design adopted for present investigation was completely randomized block design with three replications with 20 cuttings each. Semi- hardwood cuttings of pencil size thickness and 15 to 20 cm in length were prepared from one year old leafy shoots with 3-4 leaves in the month of July, 2014 for the experiment. The treatments included four concentrations of IBA (0, 3000, 6000 and 9000 ppm). Treatments were given by quick dipping the basal end of the cuttings in the prepared solutions for 5-10 seconds. Observations on of aerial part of cuttings like number of sprouted cuttings and number of sprouts per cuttings and length of sprouts were recorded at ten days interval where as rooting observations such as percentage of rooted cuttings, number of roots per cutting, length of longest roots and survival percentage of cuttings were recorded three month after planting of cuttings in the root trainers.

3. Results and Discussion

The result obtained after analysis of data on number of sprouted cutting, number of sprouts per cutting, length of sprouts (cm), percentage of rooted cuttings, number of roots/ cutting, length of longest root (cm), and survival percentage of cuttings are presented in Table 1.

Number of sprouted cutting: IBA significantly affected number of sprouted cuttings in wild fig as shown in table 1. Among the four treatment, maximum number of sprouting cuttings (18.67) was observed in treatment of 6000 ppm IBA whereas minimum number of cuttings sprouted (11.67) in control. Data clearly indicates that by increasing the concentration of IBA there is an increase in number of rooted cuttings which in turn absorbed more nutrients along with moisture and lead to highest number of sprouts per cutting. The results confirms the findings of Pirlak (2000) who obtained significant increase in number of sprouted cuttings in Cornelian Cherry cuttings with increasing IBA concentrations.

Number of sprouts per cutting: Significant variations were observed regarding number of sprouts per cutting in wild fig, table 1. clearly indicates that maximum number of sprouts per cutting (3.93) was observed in cuttings of 6000 ppm IBA treatment. The minimum sprouts per plant (2.93) were recorded in control. Concentration of IBA has significant influence on number of sprouts per cutting. Our findings are similar to that obtained by Barbosa *et al*. (1978) who reported maximum number of sprouts per cutting at 6000 ppm IBA concentration in semi-hardwood pear cuttings**.** Possible reason behind increase in number of sprouts per cutting of Wild fig can be the planting time, as during July month there is more suitable environmental and climatic conditions for growth of shoots (more light and high photoperiod).

Length of sprouts: Length of sprouts was significantly affected by IBA, table 1. reveal that maximum of length of sprouts (13.93) cm was recorded in cuttings treated 6000 ppm IBA treatment whereas minimum length (8.60) cm of sprouts was observed in control treatment. The present investigations get support from the findings of Hussain (2008) and Shirzad *et al.,* (2011) who reported, that auxin promoted root formation in *Thunbergia grandiflora* and *Ficus benjamina* which in turn resulted in maximum length of sprouts in both these plants at 6000 ppm concentration. The possible reason behind such results may be attributed to the well developed root system in such cuttings which might have tended to promote shoot growth by ensuring adequate mobilization of water and nutrients from the soil or substrate to the growing apices and consequently lead to faster growth rate of the newly emerged shoots

Percentage of rooted cuttings: It is evident from the results shown in the table 1. that 6000 ppm IBA treatment proved best in relation to percentage (88.33%) of rooted cuttings in wild fig, while lowest percentage of rooted cuttings (53.33%) was observed in cuttings of control treatment. The results are in line to the findings of Rana *et al*., (2004) who reported that Kiwifruit (*Actinidia deliciosa*) cuttings prepared during the active growth stage (July- Aug) give better results than those prepared during the dormancy stage (January).

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www.ijasrm.com
ISSN 2455-6378

Table 1: Response of Various IBA Concentrations on various parameters of Wild fig Cuttings

Treatments	Number of sprouted cutting	Number of sprouts per cutting	Length of sprouts (cm)	Percentage of rooted cuttings (%)	Number of roots/ cutting	Length of longest root (cm)	Survival percentage of cuttings (%)
3000 ppm IBA	18.33	3.73	13.31	86.67	31.87	10.61	79.33
6000 ppm IBA	18.67	3.93	13.93	88.33	36.00	12.43	93.33
9000 ppm IBA	17.33	3.49	11.37	81.67	25.33	5.80	60.00
Control	11.67	2.93	8.60	53.33	20.00	4.37	53.33
Mean	16.50	3.52	11.46	77.50	28.33	8.30	70.00
Sem±	0.35	0.10	0.74	1.73	0.39	0.14	3.33
C.D. at 5%	0.49	0.35	2.55	6.00	1.36	0.47	11.53

The possible reason behind the increase and decrease in percentage of rooted cuttings of wild fig as observed during this experiment can be attributed to two main thing first one is suitable time of the year which resulted increased hydrolysis of carbohydrates and in turn result into increased percentage of rooted cuttings and second one is auxin which is either present internally or applied externally is necessary for root formation on stem and division of the first cell of root primordia (Hartman *et al*., 2011).

Number of roots/ cutting: The data pertaining to number of roots per cutting (table 1.) shows that higher concentrations of IBA significantly affected number of roots per cuttings. Cuttings treated with 6000 ppm IBA recorded maximum number of roots per cutting (36.00) whereas minimum number of roots (20.00) was recorded in control treatment. The results are in conformity with the results of Babaie *et al*., (2014), Siddiqui and Hussain (2007) and Tewfik (2002), who stated that increasing IBA concentration, increases rooting percentage, number of roots and roots' length in *Ficus binnendijkii*, *Ficus hawaii* and Nemaguard peach, respectively. The possible reason behind such results in number of root per cutting may be attributed to enhanced tissue sensitivity due to increased internal free auxin, time of the year which is a potential factor in determining the maximum effect of growth substances, partially due to physiological state and greatly due to the environmental conditions.

Length of longest root: Data pertaining to length of longest root are presented in table 1. which reveal that IBA significantly affected length of longest root in wild fig cuttings. Among the various treatments maximum root length (12.43) cm was observed in cuttings of 6000 ppm IBA treatment, while control treatment have minimum root length (4.37) cm. The results get support from the findings of Babaie *et al*., (2014) who recorded maximum root length in *Ficus binnendijkii* cuttings at 6000 ppm IBA. This increase in root length may be due to the effect of growth regulators IBA on the metabolites translocation and carbohydrates metabolism which may be involved in the role of hormones on root length. Another possible reason can be the action of auxin activity, which might have caused hydrolysis and translocation of carbohydrates and nitrogenous substances at the base of cuttings, and this resulted in accelerating cell elongation and cell division in suitable environment.

Survival percentage of cuttings: Table 1. reveal that maximum survival percentage of cuttings (93.33%) were recorded in cuttings of 6000 ppm IBA treatment on the other hand minimum (53.33%) was recorded in cuttings of control treatment. These results corresponds to the findings of Mobli and Baniansab (2009) and Nair *et al.*, (2008) who reported maximum survival percentage of cuttings in *Pisticia* spp and *Stewartia pseudocamellia* at 6000 ppm IBA. Possible reason behind such results of survival percentage can be increase in contact area of the roots with the soil due to which roots absorb more water and nutrients and increase the survival rate. On the other hand Fathi and Ismailpor (2000) has a separate reason behind this, they believe that auxin increases the number of rooted cuttings and reduce the mortality rate of cuttings in the nursery that's why such results in survival percentage of wild fig cuttings were observed.

4. Conclusion

On the basis of above results Wild fig cuttings treated with 6000 ppm IBA responded well and recorded maximum results in all the rooting and shooting parameters studied under this experiment. Therefore, on the basis of above presented results, it can be recommended that 6000 ppm IBA treatment is suitable for success of wild fig semi-hardwood cuttings.

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