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# EFFECT OF DIFFERENT IBA CONCENTRATIONS AND PLANTING TIME ON STEM CUTTINGS OF WILD FIG (*FICUS PALMATA* FORSK.)

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## Abstract

Wild fig (*Ficus palmata* Forsk.) is a very popular and commonly occurring edible wild fruit plant found in different regions of Uttarakhand. Propagation through stem cuttings is the easiest method of multiplication of this plant and requires special treatments such as of auxins and appropriate planting time. In order to test the suitable auxin (IBA) concentration and planting time, an experiment was carried out based on randomized block design with three replications. Experiment consisted of different concentrations of IBA (3000, 6000, 9000 ppm and Control) and planting time (February and July). Number of sprouted cuttings, number of sprouts per cutting, length of sprouts, percentage of rooted cuttings, number of roots/ cutting, length of longest root and survival percentage of cuttings was evaluated. Based on the results 6000 ppm IBA during the month of July performed the best in all aspects and survival percentage of cuttings was also recorded highest.

***Key words:*** IBA, Planting time.

## Introduction

Western Himalayan region of India comprises of Jammu and Kashmir, Himachal Pradesh and Uttarakhand which have favorable climate for growing a large number of fruits such as apple, pear, peach, plum, apricot, and cherry. In addition to these cultivated fruit crops there are large number of edible wild fruit plants which are found growing naturally in the region. Uttarakhand due to its varied eco-geographical and eco-climatic conditions is one such state which is highly enriched with its vegetation including wild edible fruits such as Wild Fig, Kaphal, Wild Apricot, Wild Pomegranate, Wild Raspberry etc. (Saklani and Chandra, 2011), and these are utilized by rural and urban people, specially urban poor people for nutritional and medicinal purpose. Among these edible wild plants, Wild Fig commonly known as Bedu is a herbaceous perennial mostly found growing around the villages in the wastelands and in the cultivated fields of Uttrakhand. It is a very tasty fruit which can be used for making various products such as squash, jam and jelly (Saklani and Chandra, 2012). Besides the fruit, the newly-emerging leaves and young fruits are used as a vegetable in India. This plant is also used in curing various diseases e.g. gastrointestinal, hypoglycemic, insulinase, anti-tumour, anti-ulcer, anti-diabetic, lipid lowering and antifungal activities. Wild Fig of the Himalayas has almost the same quality as the superior cultivated type of the Mediterranean region. The fruits are, however, 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 may prove to be a suitable alternative to this fruit (Parmar and Kaushal, 1982) But with the rapid speed of urbanization and most specially negligence of care and maintenance Wild Fig plants are depleting rapidly day by day, therefore there is need of special attention for conservation and sustainable utilization which can be possible only by detailed propagation study. Keeping all this in view the present investigation was done to evaluate the effect of different IBA concentrations and planting time on stem cuttings of Wild Fig .

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## Material and Methods:

The present investigation was carried out at Horticultural Research Center of the Department of Horticulture, School of Agriculture and Allied Sciences, HNB Garhwal University (A Central University), Srinagar Garhwal, Uttarakhand during the year 2014-15.

Semi hardwood stem cuttings of pencil size thickness

were prepared in the month of July, 2014 and then treated with different concentration of IBA (3000, 6000 and 9000 ppm) and one set was left as control (no IBA). Treatments were given by quick dip method. Statistical procedure used for this experiment was Randomised Block Design with three replication of each treatment. Each replicate contained ten cuttings of 15 cm length, planted in root trainers and placed inside mist chamber for further study. Observations on sprouting of aerial part of cuttings were recorded at ten days interval and observations on rooting were recorded three month after planting of cuttings in the root trainers. This experiment was again repeated in February, 2015 to see the seasonal difference in the rooting behavior of cuttings.

## Results and Discussion

The result obtained 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 shown in table 1.

**Number of sprouted cutting:** IBA and time of planting of cuttings significantly affected number of sprouted cuttings in wild fig as shown in table 1, among the four treatment maximum sprouting (9.33) was observed in $M_2$ $C_2$ (6000 ppm of IBA in July) whereas minimum number of cuttings sprouted (5.66) in $M_1$ $C_0$ (February, control.). This 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 fig, the table 1. indicates that maximum number of sprouts per cutting (4.66) was observed on cuttings of $M_2$ $C_2$ (6000 ppm of IBA in July) treatment. The minimum sprouts per plant (1.88) were recorded in $M_1$ $C_0$ (February, control). Concentration of IBA and planting time had a significant influence on number of sprouts per cutting. Our findings are similar to that obtained by Barbosa *et al*. (1978) which 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 may 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 and time of planting of cuttings, the table 1. reveal that maximum of length of sprouts (13.73 cm) was recorded in cuttings of $M_2$ $C_2$ (6000 ppm of IBA in July) treatment whereas minimum length (7.93 cm) of sprouts was observed in $M_1$ $C_0$ (February, 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:** Results shown in the table 1. revealed that $M_2$ $C_2$ (6000 ppm of IBA in July) treatment proved best in relation to percentage (83.33%) of rooted cuttings in wild fig., while lowest percentage of rooted cuttings was observed in cuttings of $M_1$ $C_0$ (February, 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). 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 have significant effect on number of roots per plant. Maximum number of roots per cutting (35.66) was recorded in cuttings of $M_2$ $C_2$ (6000 ppm of IBA in July) treatment and minimum number of roots (16.66) was recorded in $M_1$ $C_0$ (February, 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 reason behind the 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:** Treatments $M_2$ $C_2$ (6000 ppm of IBA in July) recorded significantly maximum root length (12.13 cm) while $M_1$ $C_0$ (February, control) treatment have minimum root length (3.86 cm). In this study, the maximum length of roots was observed in 6000 ppm IBA during July month. 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 significantly maximum survival percentage of cuttings (86.66 %) were recorded in cuttings of $M_2$ $C_2$ (6000 ppm of IBA in July) treatment on the other hand minimum survival percentage of cuttings (28.33%) was recorded in cuttings of $M_1$ $C_0$ (February, control) treatment which 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. contact area of the roots with the soil has also increased. Thus, the roots absorb more water and nutrients and increase the survival rate. Whereas Fathi and Ismailpor (2000) 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.

**Table 1:** Effect of different IBA Concentrations on various parameters of stem cuttings of Wild Fig.

| Treatments | Number of sprouted cutting | Number of sprouted per cutting | Length of sprouts (cm) | Percentage of rooted cuttings | Number of roots/ cutting | Length of longest root (cm) | Survival percentage of cuttings |
|---|---|---|---|---|---|---|---|
| $M_1$ $C_1$ | 7.00 | 2.77 | 9.88 | 60.00 | 23.00 | 5.53 | 53.33 |
| $M_1$ $C_2$ | 9.00 | 4.55 | 11.91 | 80.0 | 33.66 | 11.86 | 80.00 |
| $M_1$ $C_3$ | 7.66 | 3.32 | 11.43 | 66.67 | 28.66 | 9.66 | 73.33 |
| $M_1$ $C_0$ | 5.66 | 1.88 | 7.93 | 46.67 | 16.66 | 3.86 | 28.33 |
| $M_2$ $C_1$ | 7.33 | 3.10 | 11.37 | 63.33 | 24.00 | 5.86 | 60.00 |
| $M_2$ $C_2$ | 9.33 | 4.66 | 13.73 | 83.33 | 35.66 | 12.13 | 86.66 |
| $M_2$ $C_3$ | 8.33 | 3.99 | 12.93 | 73.33 | 31.33 | 9.93 | 80.00 |
| $M_2$ $C_0$ | 6.00 | 2.55 | 8.67 | 50.00 | 18.66 | 4.10 | 33.33 |
| **Mean** | **7.54** | **3.35** | **10.98** | **65.42** | **26.46** | **7.87** | **61.87** |
| **Sem** | **0.27** | **0.26** | **0.50** | **2. 67** | **0.65** | **0.73** | **5.09** |
| **C.D. at 5%** | **0.81** | **0.80** | **0.15** | **8.10** | **1.98** | **0.22** | **15.45** |
| **Significance** | ** | ** | ** | ** | ** | ** | ** |

$M_1$ = February, $M_2$ = July , $C_1$ = 3000 ppm IBA, $C_2$ = 6000 ppm IBA, $C_3$ = 9000 ppm IBA, $C_0$ = Control

## Conclusion

As per results of this experiment, different concentrations of IBA and time of taking cuttings had a large impact on the success of rooting, growth and survival of cuttings of Wild fig. Cuttings planted in July and treated with 6000 ppm IBA gave maximum rooting, survival percentage and significant results in all the parameters. Therefore on the basis of above conclusion, it is recommended that 6000 ppm IBA and planting time July is suitable for success of wild fig semi hardwood cuttings.

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