

EFFECT OF DIFFERENT CONCENTRATIONS OF INDOLE BUTYRIC ACID (IBA) AND AGE OF SHOOT ON AIR LAYERING OF MANGO (*Mangifera indica* Linn.)

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Abstract: The experiment was conducted at Faiz-e-Chamman Mango Orchard, Khanewal Road, Multan. The research was conducted to standardize the method of air layering in mango under climatic conditions of Multan. Different concentrations of IBA, 1000, 2000, 3000, 4000, 5000ppm and control (0.000ppm), were applied on one, two and three years old shoots of mango variety- Sindhri. The data were collected on number of roots and length of roots. The results showed maximum number of roots in two years old shoot treated with IBA concentration @ 2000ppm, whereas one year old shoot failed to produce roots with the application of different concentrations of IBA except 2000ppm IBA concentration. There were no significant differences in length of roots among shoots treated with IBA concentrations of 1000, 2000, 3000ppm and control, which produced maximum length of roots. Shoots treated with IBA concentration of 5000ppm resulted in minimum length of roots.

Keywords: Age of shoot, air layering, indole butyric acid (IBA), mango (*Mangifera indica* Linn.), number and length of roots.

INTRODUCTION

Mango (*Mangifera indica* Linn.) belongs to the family Anacardiaceae. The *Mangifera* is native to South East Asia and consists of 69 species out of which 16 have edible fruits [Kostermans and Bompard 1993]. In Pakistan, mango is the second major fruit crop both in term of area and production in Pakistan. Pakistan stands 4th among mango growing countries of the world and comes after India, Mexico and China [FAO 2001].

Mango is propagated both sexually and asexually. Sexually propagated mangoes are called seedlings or 'desi' mangoes. There is immense variation in mango seedlings, raised even from a single tree due to highly cross-pollinated nature of mango. Although seedling trees produce heavy crop but fruit size and quality is inferior and does not fetch good return in the market. The seedling trees have long juvenile period and have more vigorous habit compared to asexually propagated ones, which creates difficulty in plant protection measures and harvesting of fruits. To obtain uniformity in height and health, mango varieties should be propagated through asexual or vegetative method of propagation. Generally in mango, non-descriptive seedlings are used as rootstocks for propagation. Therefore, it is needed to use clonally propagated standard rootstocks in place of non-descriptive types. This is only possible through air layering, a vegetative method of propagation. Ram and Sirohi [1989] reported that air layered trees gave the largest fruits compared to grafting and stooling. Rajan *et al.* [1989] found that rooting percentage and number of roots were increased when IBA (0.0735M) applied to two years old shoot of

mango. Air layering was successful in two years old shoot with IBA @ 4000ppm [Feungelan *et al.* 1992]. Elisea *et al.* [1992] reported that root development was improved in two to three years old branches with 2% NAA (Naphthalene acetic acid).

The objective of the present research was to standardize the method of air layering in mangoes and to determine the effect of different concentrations of IBA under climatic conditions of Multan, which occupies the highest area of mango in Pakistan, this may be useful for both the multiplication of clonal rootstocks and the propagation of different varieties, in future.

MATERIALS AND METHODS

The experiment was carried out at Faiz-e-Chamman Mango Orchard, Khanewal Road, Multan during June 1998. Eighteen trees of mango variety- Sindhri were selected. The trees were 10-12 years, of uniform height and health. A bark ring of 2.5 cm was removed from one, two and three years old shoots of each tree. The ringed portion was treated with 0, 1000, 2000, 3000, 4000 and 5000ppm IBA concentrations and covered with moistened soil and farmyard manure. Moist media was immediately wrapped with jute strings on both sides. Nine layers were made on each tree of Sindhri. At 10 days interval, layers were checked for moisture and water was injected through polythene without opening, if the moisture was less. The layers were opened after 12 weeks. Data on number of roots and length of roots were recorded. The experiment was conducted in RCB split plot design having three replications. The data collected were analyzed statistically using Analysis of variance and the treatment's means were compared at 0.05 probability level using Least Significant Differences [Steel and Torrie 1984].

Table 1: Effect of different ages of shoots (years) and IBA concentrations (000ppm) on number of roots of mango variety- Sindhri.

Age of shoot	IBA concentrations					
	0	1	2	3	4	5
1	1.00aB	0.00aC	1.67aC	0.00aB	0.00aC	0.00aA
2	28.00bA	25.67bA	38.67aA	30.33abA	22.00bA	8.00cA
3	14.67aA	14.67aB	13.33abB	5.67abB	11.33abB	4.00bA

Means followed by the same letter in rows (upper case) and columns (lower case) are not significantly different at 0.05 probability level.

RESULTS AND DISCUSSION

EFFECT OF DIFFERENT CONCENTRATIONS OF INDOLE BUTYRIC ACID WITH DIFFERENT AGES OF SHOOT ON NUMBER OF ROOTS

When number of roots for different concentrations of IBA were compared within different ages of mango shoots, there were no significant differences in number of roots among different concentrations for one year old shoot (Table 1). When IBA was used @ 2000ppm with two year old shoot, maximum number of roots (38.67) were recorded followed by

shoots treated with IBA concentration of 3000ppm, which produced less number of roots (30.33) compared to shoots treated with IBA concentration of 2000ppm, but more (28.00) than control (0.00ppm IBA), and any other shoots treated with IBA concentration. Shoots treated with IBA concentrations of 1000, 4000ppm and control resulted in non significantly different number of roots, which were higher than shoots treated with IBA concentration of 5000ppm and lower than shoots treated with all other concentrations of IBA tested. Shoots treated with concentration of IBA @ 5000ppm resulted in minimum number of roots. With three years old shoot, control and 1000ppm IBA concentration produced highest number of roots and shoots treated with IBA concentration of 5000ppm resulted in lowest number of roots. Shoots treated with IBA concentrations of 2000, 3000 and 4000ppm resulted in lower number of roots than the control and concentration of 1000ppm and higher than IBA concentration of 5000ppm. The difference in number of roots was non significant among shoots treated with concentrations of 2000, 3000 and 4000ppm. The results show that one-year-old shoots of Sindhri failed to produce roots even in combination with different concentrations of IBA. Increase in number of roots in two years old shoots has also been reported by Rajan *et al.* [1989] and Feungelan *et al.* [1992] by treating with IBA.

EFFECT OF DIFFERENT AGES OF SHOOT WITH DIFFERENT CONCENTRATIONS OF INDOLE BUTYRIC ACID (IBA) ON NUMBER OF ROOTS

When number of roots for different ages of shoots were compared within different concentrations of IBA, there were no significant differences in number of roots between two and three years old shoot when no IBA was used (Table 1). Two and three years old shoots produced maximum number of roots where IBA was not applied. One-year-old shoot produced minimum number of roots. There were significant differences among one, two and three years old shoots for 1000, 2000, 3000 and 4000ppm IBA treatment. Two years old shoots treated with IBA @ 1000, 2000 and 4000ppm resulted in maximum number of roots followed by three years old shoot and one-year-old shoots formed no roots. Two years old shoot treated with 3000ppm IBA concentration produced maximum number of roots and three years old shoot produced minimum number of roots, whereas one-year-old shoot produced no roots. Non-significantly different number of roots was produced among one, two and three years old shoot with IBA concentration of 5000ppm. Two to three years old shoot with 1500ppm IBA was effective in promoting rooting in air layered plants. Failure in air layering was recorded in the absence of plant growth hormones [Singh and Baghel 2001].

EFFECT OF DIFFERENT CONCENTRATIONS OF INDOLE BUTYRIC ACID (IBA) ON LENGTH OF ROOTS

When length of roots in shoots treated with different concentrations of IBA were compared, there were no significant differences among the shoots treated with IBA concentrations of 1000, 2000, 3000ppm and control, which produced maximum length of roots followed by shoots treated with IBA concentration of 4000ppm, which produced lesser length of roots than in concentrations of 1000, 2000, 3000ppm and control and more than shoots treated with IBA concentration of 5000ppm (Fig. 1). Shoots treated with IBA concentration of 5000ppm resulted in minimum length of roots. These results agree with the findings of Prasad [1989] who reported that application of low concentration of IBA (2500ppm) increased rooting and root length when compared with higher concentration of IBA (5000ppm), but our results do not agree with the findings of Reddy and Singh [1987]. They found higher concentration effective for producing maximum length of roots.

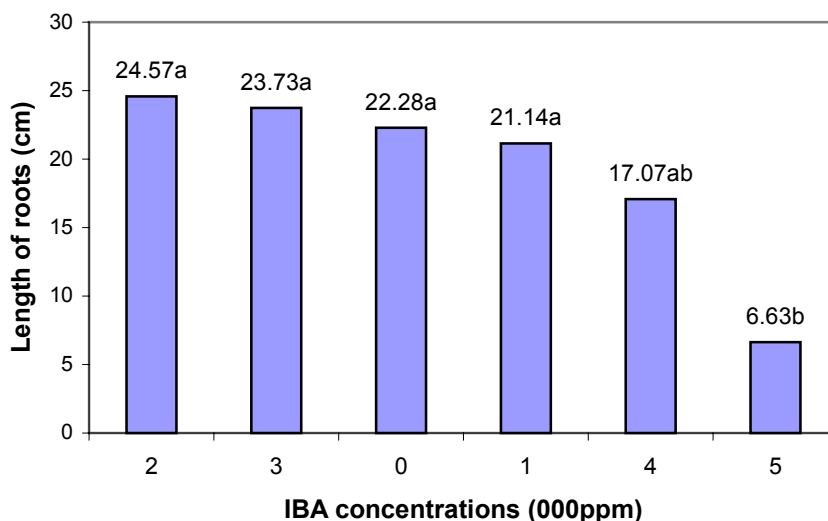


Fig. 1: Effect of different concentrations of IBA on length of roots of mango variety-Sindhri.

EFFECT OF DIFFERENT AGES OF SHOOTS ON THE LENGTH OF ROOTS

The results presented in Fig. 2 show significant differences for length of roots among different ages of shoots. Maximum length of roots was observed in two years old shoot followed by three years old shoot, which produced less root length than three years old shoot and more than one-year-old shoot. One-year-old shoot resulted in minimum root length. These results agree with the findings of Singh and Baghel [2001].

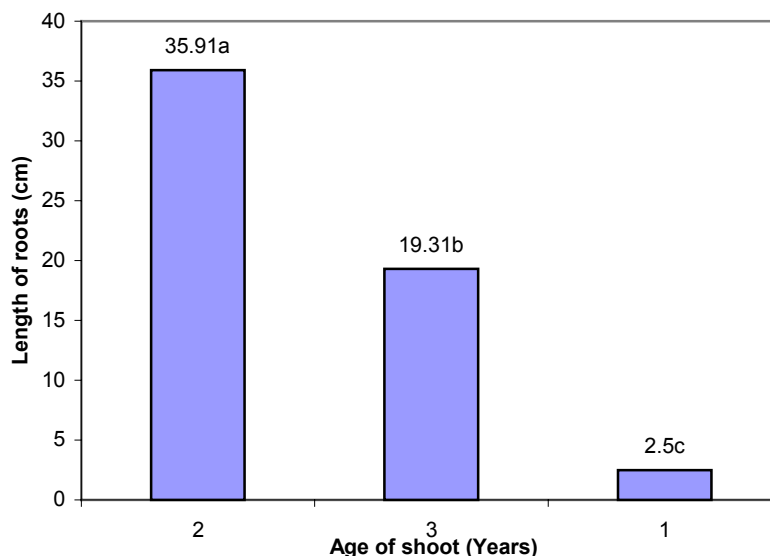


Fig. 2: Effect of different ages of shoots on the length of roots of mango variety-Sindhri.

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