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# Effect of Different Concentrations of IBA on Rooting of Litchi (*Litchi chinensis*) in Air Layering

Noor Rahman[1], Ijaz Hussain[1], Mohammad Imran[2] Taslim Jan[1] and Azmat Ali Awan[2]
[2]NWFP Agriculture University, Peshawar, [1]A.R.I Tarnab, Peshawar, Pakistan

**Abstract:** The ringed shoots of litchi were treated with different concentrations of IBA for 2-5 seconds. According to the experimental results, maximum number of roots/plant (9.94), root length (10.94 cm), number of leaves/plants (10.55) and percent plants survival (77.77%) were recorded in layers treated with 2500 PPM of IBA, while minimum number of roots/plants (5.33), root length (5.49 cm), number of leaves/plants (6.11) and percent plants survival (33.33) were recorded in control treatment. Likewise layers treated with 2500 ppm of IBA rooted earlier (31.33 days) than control treatment (36 days).

**Key words:** IBA, Litchi, Layering

## Introduction

Propagation of litchi by seed is not usually recommended, since litchi seedlings are genetically diverse and most are characterised by a long juvenile period. Air layering is, and will probably continue to be most widely used commercial method of propagation of litchi. The propagation of *Anthocephalus chinensis* (Sonn) by air layering with the aid of indole butyric acid which were air layered in the last week of July using sphagnum moss as a rooting medium and IBA (2500-5000 PPM) in lanolin paste was applied to the upper side of the girdled portion. All layers showed callusing but only those treated with IBA showed rooting (23.33-76.67% with the best treatment 5000 PPM IBA). Radnab (1985) studied the improvements in the air layering for litchi and macadamia trees, It was observed that 90-100 percent rooting was obtained in litchis within 2-3 months and in macadamia with 4-5 months when girdled shoots were airlayred with a damp peat ball enclosed in a plastic bag. Treating the layers with 1 percent KIBA (IBA potassium) had no advantage over the control of both species. Ram (1984) stated that in stooling method of propagation plants are pruned to 25 cm above the ground level about two and half years after planting and new shoots are allowed to grow after which a ring of bark is removed from each new shoot. Lanolin paste containing 2500-PPM IBA is applied and 10 days later the plant is earthen up to cover 10-15 cm of stem above the rings. After 2 months the rooted shoots are removed and planted between the stooling plants. Plants prepared thus showed 82.2 to 94.3 percent survival compared with 45.8 percent with conventional air layering.

Ram and Majumdar (1983) conducted a trial in which stock plants were headed back to 25 cm above ground in mid February and the stool shoots were ringed in mid June and left for 1 week of the callus to form. IBA at 500-5000 PPM was applied to the upper part of the ring and the shoots were earthen up. Rooting (97.1%) and plant survival (94.3%) were best with IBA at 2500 PPM. Chatterjee and Rao (1980) studied the effect of different concentrations of growth regulators and their combinations on air layers of phalsa (*Grewla asiatica*). They had removed a ring of bark (1 cm in diameter and 1.5 cm wide) from the vigorous terminal shoot about 25 cm long during the autumn. The upper part of the ring was treated with lanolin paste containing IBA (5000, 10000 PPM) or NAA (5000 10000 PPM) and moist sphagnum + soil (1:1) was applied and wrapped with polythene. The shoots were then detached from mother plant when roots appeared 30 days after treatment. Treatments with IBA at 5000 or 10000 PPM or with NAA at 5000 PPM all gave 100 percent rooted layers compared with 50 percent in the control. The IBA/NAA combination gave 80-90 percent rooted layers.

Kadman and Slor (1974) observed that in marcotting experiments rooting began after 6 weeks. It was improved by girdling and IBA treatment and by the use of a peat moss substrate rather than vermiculite or wood chips. In one experiment rooting was 85 percent on 9 years old trees and 50 percent on 30 years old trees. Morevil (1973) conducted research on litchi propagation. Marcotting was 98 percent successful when the rooting medium consisted of 2 parts damp moss and 1 part soil from the foot of old litchi trees and the rooting was best when marcots were treated with IBA. Sharfuddin and Husain (1973) studied the effect of growth regulators and wrapping materials on the success of air layering in litchi. Marcots of litchi cv. China No.3 were treated with IAA or IBA at 500 PPM and wrapped with sawdust and plastic film of soil/dung mixture and plastic film or soil/dung mixture and gunny cloth. Rooting was 100 percent where either growth compound had been used, irrespective of the wrapping material. Sawdust and plastic film was the best wrap for the untreated marcots, giving 83.33 percent rooting, it also interacted with the growth compounds in the promotion of earlier rooting. Sadhu *et al*. (1972) observed that p-Hydroxy benzoic acid greatly synergized the root promoting effects of IBA in marcots of guava and litchi. In cashew the chemical was effective alone and in combination with IBA also gave additive effects. Salicylic acid was applied to guava and cashew marcots but did not synergies IBA induce rooting. Ferculic acid showed synergism with IBA in litchi marcots.

## Materials and Methods

The experiment was conducted at the Agricultural Research Institute, Tarnab, Peshawar, during the year 1998. Litchi layered branches were treated with seven different concentration of IBA i.e O PPM, 500 PPM, 1000 ppm, 1500 ppm, 2000 ppm, 2500 PPM and 3000 PPM of IBA. Stock solution of IBA were prepared by dissolving two grams of IBA in 500 ml of water having a strength of 8000 PPM of IBA. This stock solution was diluted to different concentration of IBA by the formula:

$$C1\ V1 = C2V2$$

where, C1 and V1 are the concentration and volume of the stock solution and C2 and V2 is the concentration and volume of the desired solution. In order to initiate rooting in litchi, branches of 1/2 diameter were wounded by complete removal of ring of bark just below the buds in the month of June. After the bark removal, a nail was hammered in the injured portion. The nail not only delay the healing process but also keep the media tight in place and prevent,

Table 1: Effect of different concentration of IBA on days to appearance, number of root /plant, root length, number of leaves per plant and percent plant survivals

| IBA (PPM) | Days to root Appearance | No. of root/ plant | Root length | No. of leaves | Percent means Survivals |
|---|---|---|---|---|---|
| 0 | 36,77 A | 5.33 E | 5.49 E | 6.11 E | 33.33 D |
| 500 | 35,10 B | 6.33 CDE | 6.44 DE | 7.28 CD | 49.97 BCD |
| 1000 | 34.44 B | 7.38 BCD | 7.49CD | 8.05 C | 61.10 ABC |
| 1500 | 33.27 C | 8.05 BC | 8.94BC | 9.22 B | 66.66 ABC |
| 2000 | 32.27 D | 9.05 AB | 9.72 AB | 9.55 B | 72.22 AB |
| 2500 | 31.33 DE | 9.94 A | 10.94 A | 10.65 A | 77.77 A |
| 3000 | 30.33 | 5.71 E | 6.44 DE | 6.55 DE | 44.44 CD |
| Standard Deviation | 0.503 | 0.94 | 0.70 | 0.47 | 11.20 |

Means followed by the same letter are not significantly different from each other at 5 percent level of significance.
LSD values for Days to root appearance, No. of root/plant, Root length, No. of leaves and percent means survivals at 5% are 1.007, 1.885, 1.460, 0.9498 and 22.39 respectively.

it from being disturbed. The injured portion were treated with above concentration of IBA and were then surrounded by media (sand, silt and F.Y.M (1:1:1) and held in place by wrapping with plastic sheet. When a good ball of roots were formed and the roots appeared in plastic sheet, then the branches were cut off below the media and were planted in pots. The plants were partially defoliated and were kept in a plastic sheet in a partial shade condition for three week.
In the experiment there will be five layers per treatment and 45 layers in one replication. The experiment was laid out in Randomized complete block design with three replications.
The data was recorded on number of days to root appearance, root length (cm), number of roots per plant, number of leaves per plant and percent plant survival.

## Results and Discussion

The mean value for number days to root appearance shows that maximum days (36.77) to root appearance were taken by layering in control treatment while minimum days taken by layer treated with 2000 PPM of IBA. Table 1 indicate that increasing IBA concentration accelerated the rooting in layerings. The mean value for number root in the table shows that maximum Number (19.94) of root were produce in layering treated with 2500 PPM of IBA and minimum number of root (5.33) were produced in control treatment. However increase in IBA come beyond 2500 PPM decreased the rooting. The since IBA increase cell wall elasticity which accelerate cell division and in turn increase root up to a certain level. The IBA treatment plus leaf removal result in the production of profuse number of rooting. From mean value table it is clear that IBA greatly enhanced the root length from 5.949 cm at o PPM to 10.94 cm at 2500 PPM of IBA, however increasing concentration beyond 2500 inhibited root length. Since IBA accelerate root initiation, therefore the treatment received higher concentration of IBA 2500 produced earlier, which gave different time for root grown as compared to control treatment. Similarly large Number of Leaves (10.55) were recorded in treatment received 2500 PPM of IBA and small Number of leaves (6.11) was observed in control treatment. The layer treated with 2500 with 2500 produce more roots more number of roots and thus absorbed more nutrient which in turn produced more number of leaves. The mean values regarding percent plant survival show that maximum percent plant survival (77.77%) were recorded in layer treated with 2500 PPM of IBA and minimum percent plant survival (33.33) were noted in control treatment. However increasing IBA concentration beyond 2500 PPM decrease the rate of survival percentage. The results confirm the findings of Sharma *et al.* (1990) who treated 50 percent of layer shoot of Cv. china and shah after a week of rains with 250 PPM of IBA and obtained highest survival in all china (74%) cultivars treated with 2500 PPM of IBA.

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