ISAH-INDIAN JOURNAL OF ARID HORTICULTURE
2020, Vol. 2 (1&2):51-53

Effect of IBA concentrations on semi-hard wood cuttings of phalsa cv. Thar Pragati

Sanjay Singh*, D.S. Mishra, A.K. Singh and V.V. Appa Rao
Central Horticultural Experiment Station (ICAR-CIAH), Vejalpur-389 340, Godhra, Gujarat
*Corresponding author's e-mail: sanjaysinghicar@gmail.com
(Received: 01.02.2021; Accepted: 11.03.2021)

Abstract

An experiment was conducted at Central Horticultural Experiment Station (ICAR-CIAH), Vejalpur on vegetative propagation of phalsa through semi hardwood stem cuttings in the month of July. The cuttings were treated with different concentrations of IBA (100, 150, 500, 1000, 2000, 3000, 4000 and 5000 ppm) along with control and the experiment was replicated thrice. Treated cuttings were planted in poly bags containing soil, sand and FYM in equal proportion and kept in open conditions. Semi hardwood cuttings when treated with IBA 2000 ppm resulted in the highest survival percentage (50.20 %), length of sprout (76.30 cm), number of primary roots (16.30) number of secondary roots (32.20), number of leaves/plant (15.21), number of sprout/plant (3.90) and girth of sprout (1.90 cm) 150 days after treatment, it was followed by IBA 1000 ppm. Whereas control recorded the minimum survival percentage (22.12 %), length of sprout (40.20 cm), number of primary roots (6.20) and number of secondary roots (17.00), number of leaves/plant (7.0), number of sprout/plant (1.70) and girth of sprout (1.20 cm) 150 days after treatment.

Key words: Phalsa, semi hard wood cutting, IBA concentration, sprout

Introduction

Phalsa (*Grewia subinaequalis* D.C.), a member of family Tiliaceae, is one of the oldest fruits of India. Phalsa has been mentioned in Vedic literature as having certain medicinal properties. It is capable of growing under neglected and water scarce conditions. Besides, it is an important arid fruit crop in commercial orcharding (Mishra *et al*., 2016). The mildly acidic fruits are rich in vitamin A, C and minerals. It is mainly propagated by seeds, which leads a different degree of variation among the population. Seeds have less viability too when stored under ambient condition (90-120 days). However, stem cuttings and air layers which are means of clonal multiplication of phalsa did not root easily. However, treatments with auxins like IBA and NAA may improve rooting of difficult-to-root hardwood cuttings of phalsa (Mishra *et al*., 2019). Effect of auxins has been found to be positive for induction of rooting and for longer roots in phalsa stem cuttings. A treatment with auxins like IAA, IBA and NAA improve rooting of difficult-to-root hardwood cuttings of phalsa (Joshi *et al*., 2020), ground layering and air-layering (Mohammed and Chauhan, 1970) and stooling (Singh and Kumar, 1967). Srivastava *et al*. (1994) reported that 2000 ppm IBA gave best results for growth and survival of phalsa cutting. However, Kathrotia and Singh (1995) obtained the best rooting (82.5%) when they treated hardwood cuttings with IBA at 200 ppm. However, studies on effect IBA concentrations on rooting and survival of semi-hardwood cutting are lacking under semi-arid ecosystem of western India. Therefore, the present experiment was undertaken to study the effect of IBA on semi-hardwood cuttings.

Materials and Methods

The present work was carried out at Central Horticultural Experiment Station (ICAR-CIAH), Vejalpur during 2020. The experiment was laid out under CRD with 9 treatments and 3 replications. The experimental material consisted of 20 cm long stem cuttings with three nodes obtained from the middle portion of six months old shoots for semi-hardwood cuttings. The cuttings were collected during the month of July from three year old healthy mother plant of phalsa cv Thar Pragati. The cuttings were treated with different concentrations of IBA (100, 150, 500, 1000, 2000, 3000, 4000 and 5000 ppm) through quick dip method along with untreated control. Treated cuttings were planted in 1.5 kg capacity poly-bags containing growing media of soil, FYM and sand in equal proportion. Overhead water sprinkling over the cuttings was done daily in the morning hours. Subsequently, the stem cuttings were carefully maintained and examined during the experimental period. There were 40 cuttings per treatment per replication. The different root and shoot growth parameters were measured 90 and 150 days after treatment. Further, survival percentage, length of sprouts, number of sprouts and leaves/plant, and root length were also recorded. The data were statistically analyzed as per method suggested by Gomez and Gomez (1984).

Results and Discussion

Different root, shoot growth characters and survival percentage of phalsa semi-hardwood cuttings were significantly influenced by IBA concentrations. Significantly higher number of sprouts/plant (3.0), sprout length (62.30

cm), girth of sprout (1.70 cm) and number of leaves (12.10) were observed with 2000 ppm IBA closely followed by 1000 ppm, 500 ppm and 150 ppm concentrations of IBA 90 days after treatment of cuttings. However, untreated cuttings recorded the minimum length of sprout (28.21 cm), number of leaves/plant (5.20), number of sprout/plant (1.60) and girth of sprout (1.0 cm) 90 days after treatment of cuttings. In case of 150 days after treatment of cuttings, IBA 2000 ppm recorded the highest sprouts/plant (3.90), sprout length (76.30 cm), girth of sprout (1.90 cm) and number of leaves (15.21) while control cuttings recorded the minimum length of sprout (40.20 cm), number of leaves/plant (7.0), number of sprout/plant (1.70) and girth of sprout (1.20 cm). (Singh and Tomar (2015) also observed the highest length of sprout, diameter of sprout, number of leaves and number of sprout per cutting in phalsa cuttings treated with IBA 2000 ppm concentration. Similar kind of observations were made by Singh *et al*. (2015) in phalsa. Application of auxin which might have caused hydrolysis and translocation of carbohydrates and nitrogenous substances at the base of cuttings and resulted in accelerated cell division and cell elongation in suitable environment (Singh *et al*., 2015). Whereas 150 days after treatment, survival percentage decreased in all the treatments but there was increase in all vegetative and root growth characters irrespective of treatments. The highest survival percentage of cutting (50.20), number of primary (15.30) and secondary roots (28.10) were observed in phalsa semi-hardwood cuttings treated with 2000 ppm IBA solution 90 days after treatment of cuttings. Whereas control recorded the minimum survival percentage (24.20 %) number of primary (5.12) and secondary roots (15.00). However, in case of 150 days after treatment of cuttings, the maximum survival percentage of cutting (50.10), number of primary (16.30) and secondary roots (32.20) were observed in phalsa semi-hardwood cuttings treated with 2000 ppm IBA solution while control cuttings recorded the minimum survival percentage (22.12 %), number of primary (6.20) and secondary roots (17.00). Rooting and survival of cutting in phalsa depends on various factors such as type of cutting, pre-treatment of cutting, environmental factors, time of planting, method of planting etc. which effects on survival ability of cuttings (Joshi *et al*., 2020). These findings are in complete agreement with the findings of Singh and Tomar (2015) and Singh *et al*. (2015) in phalsa. In conclusion, phalsa can be successfully propagated through semi-hardwood cuttings in the month of July by treating them with IBA 2000 ppm through quick deep methods.

Table 1. Effect of IBA concentrations on semi hard wood cutting of Phalsa Cv. Thar Pragati

Treatments *	Survival (%)	Length of sprout (cm)	No. of leaves per plant	No of sprouts per plant	Girth of sprout (cm)	No. of primary roots	No. of secondary roots
100 ppm	38.10	55.12	10.20	2.00	1.30	10.10	25.00
150 ppm	40.30	57.10	11.40	2.50	1.40	11.20	26.10
500 ppm	42.20	58.23	10.42	2.68	1.50	12.00	26.50
1000 ppm	44.20	59.20	10.20	2.80	1.55	12.50	27.20
2000 ppm	52.10	62.30	12.10	3.00	1.70	15.30	28.10
3000 ppm	32.21	42.30	8.30	2.00	1.30	8.20	22.10
4000 ppm	30.11	37.10	7.10	1.90	1.20	7.10	18.00
5000 ppm	28.30	31.00	7.00	1.80	1.15	7.00	17.00
Control	24.20	28.21	5.20	1.60	1.00	5.12	15.00
CD (P=0.05)	1.20	1.10	0.51	0.11	0.10	0.53	1.11

*Data recorded 90 days after treatment

Table 2. Effect of IBA concentrations on semi hard wood cutting of Phalsa Cv. Thar Pragati

Treatments #	Survival (%)	Length of sprout (cm)	No. of leaves per plant	No. of sprouts per plant	Girth of sprout (cm)	No. of primary roots	No. of secondary roots
100 ppm	37.00	68.20	12.12	2.00	1.50	12.00	27.10
150 ppm	38.34	70.11	13.00	2.50	1.60	12.50	28.30
500 ppm	39.21	72.32	13.20	2.80	1.65	13.00	28.60
1000 ppm	40.12	73.14	14.32	2.90	1.70	13.50	29.30
2000 ppm	50.20	76.30	15.21	3.90	1.90	16.30	32.20
3000 ppm	30.12	55.30	10.23	2.20	1.45	9.60	24.50
4000 ppm	28.00	50.10	9.12	2.10	1.40	8.50	21.00
5000 ppm	26.00	42.31	9.00	2.00	1.30	8.20	20.11
Control	22.12	40.20	7.00	1.70	1.20	6.20	17.00
CD (P=0.05)	1.21	1.11	0.50	0.12	0.11	0.54	1.12

#Data recorded 150 days after treatment

References

Gomez, K.A. and Gomez, A.A. 1984. Statistical Procedure for Agricultural Research (2nd Edn.), John Wiley and Sos Inc., New York.

Joshi, N.K., Thakar, C.J. and Parmar, D.L. 2020. Propagation of phalsa by cutting: A review. *J. Pharmaco. Phytochem.*, 9(4): 389-391.

Kathrotia, R.K. and Singh, S.P. 1995. Regeneration of roots in

phalsa (*Grewia asiatica* Mast.) stem cuttings as influenced by maturity of wood and root promoters. *Adv. Hortic. Fores*., 4:35-41.

Mishra, D.S., Saxena, D. and Chand, S. 2016. Phalsa (*Grewia subinaequalis* D.C.). In: Underutilized Fruit Crops: Importance and Cultivation Part II (Eds.) Ghosh, S.N., Singh, A. and Thakur, A., Jaya Publ. House, Delhi. pp. 1029-1043.

Mishra, D.S., Singh, S., and Singh, A.K. 2019. Plant growth regulators in phalsa. In: S.N. Gosh et al. (eds.) Plant growth regulators in tropical and sub-tropical fruits, part II. Jaya Publ. House, New Delhi, pp. 520-526.

Mohammed Shafat and Chauhan, K.S. 1970. Vegetative propagation of phalsa (*Grewia asiatica* L.). *Indian Journal Agricultural Sciences*, 40: 581-586.

Singh, K.K., Tomar, Y.K. 2015. Effect of planting time and indole butyric acid levels on rooting of woody cuttings of phalsa (*Grewia asiatica* L.). *HortFlora Resesearch Spectrum*, 4(1):39-43.

Singh, K.K., Chauhan, J.S., Rawat, J.M.S., Rana, D.K. 2015. Effect of different growing conditions and various concentrations of IBA on the rooting and shooting of hardwood cutting of phalsa (*Grewia asiatica* L.) under valley condition of Garhwal Himalayas. *Plant Archives,* 15(1):131- 136.

Singh, S.M. and Kumar, H. 1967. Influence of ringing source shoot and concentrations of indole-3-butyric acid on the performance of phalsa (*Grewia asiatica* L.) stem cutting. *Indian Journal Agricultural Sciences* 37: 151-154.

Srivastava, S.R., Mahajan, S., Nema, B.K. and Chandra, A. 1994. Effect of IBA, sugar and captam on shoot growth of phalsa (*Grewia subinaequalis* D.C.). *JNKVU Research Journal,* 28-29 (1-2): 80-82.

Singh, V.P., Mishra, D.S., Mishra, N.K. and Rai, R. 2015. Effect of growing season, PGRs and rooting media on survival of hard wood stem cuttings of lemon (*Citrus limon* Burm.) cv. Pant Lemon-1. *HortFlora Resesearch Spectrum*, 4(4): 347-350.