

INTERACTION OF NON-AUXINIC COMPOUNDS WITH NAA IN THE REGENERATION OF ROOTS IN STEM CUTTINGS OF WATER APPLE (*SYZYGIUM JAVANICA* L.)

Water apple (*Syzygium javanica* L.) is commercially propagated by means of seed; but this leads to immense variation. It cannot normally be raised from cuttings. Recent evidences indicate that a large number of non-auxinic compounds can synergize auxin-induced root formation on cuttings of various hard-to-root species of plants (Sadhu *et al.*, 1973; Sarker *et al.*, 1984). The present investigation was, therefore, carried out with a view to evaluating the role of auxin and non-auxinic compounds in root initiation of cuttings of water apple.

One year old healthy semi-hardwood shoots were selected from 10 year old plants of water apple cv. Creamy White. Shoots were ringed and etiolated with black alkathene sheets at a distance of 20-25 cm from the rip. After 20 days, etiolated shoots were detached from the mother plants and basal portions were first treated with non-auxinic compounds for 30 seconds. After drying, the cuttings were dipped in NAA for 30 seconds. Thus non-auxinic compounds namely *p*-hydroxybenzoic acid (PHB), ferulic acid (FA) and 2-chloro-ethyl-phosphonic acid (ethrel) each at 1000 ppm, were used separately and in combination with 1-naphthalene acetic acid (NAA) at 2500, 5000 and 10000 ppm (in 50% ethyl alcohol). The cuttings were planted in washed, sterile sand medium in pots inside the intermittent mist chamber. Only two leaves were retained in each cutting. Twelve cuttings were taken for each treatment and each treatment was replicated thrice. Rooted cuttings were removed carefully after 55 days of planting for recording different rooting parameters and survival percentage was recorded three months after planting of rooted cuttings. This experiment was conducted

twice each year i.e., in the month of May and July, during 1984 and 1985. Statistical analysis was done with pooled average data following RBD with factorial concept.

The maximum rooting successes of 96.2 and 98.3% were observed in cuttings taken during the month of May and July respectively with PHB 1000 ppm + NAA 2500 ppm, as against 40.3 and 46.2% rooting under control in the respective months, thereby indicating increase in rooting percentage over control by 138.7 and 112.7% respectively (Table 1). Higher degree of synergism was noticed when PHB, FA and ethrel were applied in combination with NAA at 2500 ppm. The cuttings treated with PHB 1000 ppm + NAA 10000 ppm recorded highest number of roots. The longest roots were obtained from cuttings treated with FA 1000 ppm + NAA 5000 ppm. The maximum survival percentages of 92.8 and 98.5% respectively were noticed in cuttings treated with PHB 1000 ppm + NAA 10000 ppm as against 45.6 and 52.7% in control cuttings taken in the respective months (Table 2). The cuttings taken during the month of July generally rooted better. Considering both rooting and survival, it may be concluded that the most effective treatment was FA 1000 ppm + NAA 5000 ppm followed by PHB 1000 ppm + NAA 10000 ppm and PHB 1000 ppm + NAA 5000 ppm. The results obtained from this experiment are in agreement with the observations of Sadhu *et al.* (1973) and Sarker *et al.* (1984). They obtained maximum rooting success in water apple when cuttings were treated with FA in combination with NAA. The root promoting effect of non-auxinic compounds may be through biogenesis of ethylene production and subsequent ethylene action. Abeles (1966) concluded

that the mechanism of action of auxin on enhancement of ethylene production was

the formation of enzymes involved in ethylene biogenesis.

Table 1. Effect of season and plant growth regulators on percentage of rooting in stem cuttings of water apple

Treatments, ppm	May			July			Mean
	Rooting %	% I or D	S (+) or A (-)	Rooting %	% I or D	S (+) or A (-)	
NAA 2500	52.5	30.2		62.3	34.8		57.4
NAA 5000	71.2	76.6		74.1	60.3		72.6
NAA 10000	52.3	29.7		56.2	21.6		54.2
PHB 1000	47.2	17.1		58.3	26.1		52.7
FA 1000	42.1	4.4		55.2	19.4		48.6
Ethrel 1000	37.1	-7.9		50.6	9.5		43.8
PUB 1000 + NAA 2500	96.2	138.7	+36.8	98.3	112.7	+23.9	97.2
PIIB 1000 + NAA 5000	93.1	131.0	+15.0	92.4	100.0	+6.1	92.7
PHB 1000 + NAA 10000	78.4	94.5	+19.2	87.5	89.3	+19.2	82.9
FA 1000 + NAA 2500	91.3	126.5	+36.9	94.3	104.1	+23.0	92.8
FA 1000 + NAA 5000	86.4	114.3	+13.3	98.2	112.5	+15.1	92.3
FA 1000 + NAA 10000	71.5	77.4	+17.3	83.5	80.7	+18.3	77.5
Ethrel 1000 + NAA 2500	69.8	73.2	+20.4	87.3	88.9	+20.6	78.5
Ethrel 1000 + NAA 5000	68.5	69.9	+0.4	72.5	56.9	-5.9	70.5
Edirel 1000 + NAA 10000	55.4	37.4	+5.9	60.1	30.0	-0.4	57.7
Control	40.3			46.2			43.2
Mean	65.8		73.5				

I or D indicate increase or decrease over control. S (+) or A (-) indicate synergism or antagonism

$SE_{m\pm}$ for treatment (T), season (S) and T x S were 2.32, 0.82 and 3.29 respectively. CD(0.05) for treatment (T) and season (S) were 6.45 and 2.28 respectively. Angular transformed values were used for analysis

Table 2. Effect of season and plant growth regulators on number of roots, length of roots and survival percentage in cuttings of water apple

Treatments, ppm	Mean no. of roots			Mean length of roots (cm)			Survival percentage		
	May	July	Mean	May	July	Mean	May	July	Mean
NAA 2500	4.7	7.4	6.0	2.4	3.2	2.8	51.2	57.5	54.3
NAA 5000	8.3	10.2	9.2	4.6	5.8	5.2	61.5	68.3	64.9
NAA 10000	17.3	25.6	21.4	4.1	5.1	4.6	85.3	92.3	88.8
PHB 1000	3.8	4.2	4.0	3.1	3.3	3.2	45.7	51.7	48.7
FA 1000	5.6	6.4	6.0	4.9	6.7	5.8	57.3	64.5	60.9
Ethrel 1000	3.5	3.8	3.6	5.9	7.2	6.5	42.6	44.1	43.3
PI-IB 1000 + NAA 2500	8.2	11.2	9.7	3.7	5.8	4.7	64.4	72.5	68.4
PIIB 1000 + NAA 5000	14.2	15.8	15.0	6.2	8.0	7.1	83.2	86.1	84.6
PIIB 1000 + NAA 10000	27.1	33.6	30.3	5.2	6.2	5.7	92.8	98.5	95.6
FA 1000 + NAA 2500	9.2	16.1	12.6	6.2	9.1	7.6	73.2	90.3	81.7
FA 1000 + NAA 5000	16.3	21.5	18.9	9.8	11.4	10.6	84.3	95.3	89.8
FA 1000 + NAA 10000	19.4	25.6	22.5	8.2	7.5	7.8	91.7	96.7	92.2
Ethrel 1000 + NAA 2500	12.2	14.9	13.5	3.4	6.6	5.0	74.2	76.5	75.3
Ethrel 1000 + NAA 5000	16.3	19.6	17.9	6.2	6.7	6.4	89.4	94.3	91.8
Ethrel 1000 + NAA 10000	11.2	14.5	12.8	3.9	6.4	5.1	81.3	88.1	84.7
Control	4.2	6.5	5.3	5.2	6.3	5.7	45.6	52.7	49.1
Mean	11.3	14.8		5.1	6.5		17.2	76.8	
SEm± (treat)			0.87			0.29			3.12
" (season)			0.30			0.10			1.10
" (T x S)			1.23			0.42			4.41
CD(0.05) (treat)			2.41			0.82			8.65
" (season)			0.85			0.29			3.06
" (T x S)			3.41			1.17			NS

Angular transformed values were used for analysis

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