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EFFECT OF VARIETY, TYPE OF CUTTING AND IBA CONCENTRATION ON ROOTING OF CROTON *(Codiaeum variegatum)* CUTTINGS

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ABSTRACT: The present experiment was conducted to find out the interaction effect of variety, type of cutting and IBA concentration on rooting in cuttings of croton. Overall performance of hardwood cutting of broad leaf variety treated with 400ppm IBA was found significantly superior in inducing the highest rooting percentage (82.34%), took lesser time for sprouting (10 days), survival percentage (80.04%) and sprouting percentage (88.66) than other treatments. The hot and humid condition were conducive for growing semi-hardwood and hardwood cuttings of broad leaf as well as narrow leaf variety of croton which were able to show good performance. Out of three type of cuttings, semi-hardwood cuttings and 200ppm IBA was found better in comparison to 400ppm IBA with broad leaf for rooting and establishment. Therefore, it is concluded that croton can be multiplied by cuttings under greenhouse condition with IBA treatments.

Keywords : *Croton, propagation, indole butyric acid, greenhouse.*

Codiaeum variegatum L. is a member of the family Euphorbiaceae and sub-family Crotonoidae. It is commonly called "croton" or variegated croton. It is an evergreen shrub of medium height (1.5-3 m) having striking beauty of its foliage, mainly grown as pot plant. The information on propagation of croton through cuttings is scanty. Looking its popularity amongst plant lovers, there seems to be greater demand of its planting material in near future. Since from single twig of croton we can have only one plant by traditional layering method. Treating the cuttings with IBA (100 ppm) for 24 hours prior to planting for callusing given better rooting as reported by Singh (8). Kamaruzzaman and Quadir (4) found that leafy cuttings root and grow better than non-leafy cuttings of china roses. The experiment was conducted to find out the optimum concentration of IBA for improving the rooting performance of cuttings of croton, when propagated through softwood, semi-hardwood and hardwood cuttings.

MATERIALS AND METHODS

The study was conducted at the Main Experimental Station, Horticulture, Narendra Dev University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) during the year 2009-10. Two varieties i.e. broad leaf (V_1) and narrow leaf (V_2) with three types of cuttings i.e.softwood (T_1), semi-hardwood (T_2) and hardwood cuttings (T_3) were taken for study. Different type of cuttings with average length of 10-15 cm were taken from fully matured woody shoots of previous year's growth and treated with various concentration of IBA i.e. 200 ppm (C_1) and 400 ppm (C_2) along with control (C_0) in which cuttings were treated with only distilled water. Thus, eighteen treatment cuttings were planted in the last week of July in polybags. Eighteen different treatment combinations were prepared in all possible combinations and replicated thrice in Complete Randomized Design. Potting mixture was prepared by mixing coarse sand, sand and FYM in the ratio of 1:1:1 which help to hold moisture and make the proper penetration of root in polybags. Polybags of 6 inches size were used to fill the rooting media having drainage holes around the wall of polybags. Basal portion of cuttings were dipped in respective solution having various concentration of IBA for 30 minutes. Two-third portion of each cutting was buried in that polybags.

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After planting of cuttings, polybags were kept under greenhouse condition and polybags were irrigated with watering cane fitted with fine nozzle to maintain the proper moisture in the soil. The observations on the performance of various attributes of croton were recorded at 15 days intervals and average data was analysed statistically.

RESULTS AND DISCUSSION

The interaction effect of variety, type of cutting and IBA concentration on the various attributes of croton (Table 1) revealed that the maximum per cent cuttings sprouted (88.36%), length of longest primary roots per cutting (20.16 cm), callusing per cent (76.66%), survival percentage (80.04%) as well as lesser days (10 days) in sprouting was in hardwood cuttings of broad leaf variety treated with 400ppm IBA which was significantly superior in comparison to semi-hardwood cuttings of narrow leaf variety treated with 200ppm IBA. The narrow leaf variety treated with 200ppm IBA recorded maximum number of sprouts per cutting (3.13), length of the longest sprout (0.43cm), and number of leaves/cutting (16.29), number of primary roots per cutting (25.11) followed by semi-hardwood cuttings of broad leaf variety. The increased rooting in cuttings treated with auxin has been considered partially due to enhanced hydrolysis of nutritional reserves under the influence of auxins, which is in conformity to earlier findings of Gregory and Samantarai (3) and Nanda *et al*.(6).

Softwood cutting performed poorly in comparison to semi-hardwood and hardwood when grown under green house condition. It might be due to level of maturity of wood and excess moisture level in rooting media. The rooting co-factor is a complex structure of high molecular weight and possibly is a condensation product between applied auxin and phenolic substance produced by the buds which formed indole phenol complex, which may

Table 1: Effect of variety, type of cutting and IBA concentrations on the performance of various attributes of croton.

Treatment	First bud sprout (day)	Cuttings sprouted (%)	Number of sprouts per cutting	Length of the longest sprout (cm)	Diameter of thicker sprout (cm)	Number of leaves/ cutting	Rooting (%)	Number of primary roots/ cutting	Length of longest primary root (cm)	Callusing (%)	Survival (%)	Establishment (%)
$V_1T_1C_0$	22.66	51.81	1.05	2.17	0.10	4.96	40.00	8.14	11.50	33.33	37.29	57.34
$V_1T_1C_1$	35.33	38.60	0.15	0.97	0.05	0.44	10.66	2.52	2.31	3.18	3.89	12.33
$V_1T_1C_2$	36.33	26.85	0.09	0.69	0.02	0.06	4.00	0.04	0.58	0.79	2.55	6.00
$V_1T_2C_0$	29.33	27.37	1.62	2.08	0.32	7.26	34.00	6.93	9.19	32.66	21.17	43.00
$V_1T_2C_1$	23.00	66.45	2.02	4.26	0.41	8.70	56.66	10.13	13.22	57.20	59.16	59.34
$V_1T_2C_2$	37.00	40.90	1.55	1.28	0.27	5.10	29.00	6.08	6.11	22.34	29.48	41.40
$V_1T_3C_0$	48.33	16.13	0.10	0.62	0.03	0.09	10.00	0.41	0.82	1.08	2.60	11.00
$V_1T_3C_1$	28.00	49.13	1.10	1.92	0.14	3.22	37.66	6.65	10.17	25.00	46.58	50.00
$V_1T_3C_2$	10.00	88.36	1.81	5.30	0.42	9.17	82.34	16.01	20.16	76.66	80.04	88.66
$V_2T_1C_0$	17.66	43.94	1.06	1.28	0.08	2.55	36.67	6.49	4.21	14.82	35.20	45.53
$V_2T_1C_1$	29.00	38.13	1.03	0.40	0.02	1.28	29.34	3.85	7.88	5.55	30.85	38.43
$V_2T_1C_2$	62.33	34.23	0.05	0.05	0.01	0.05	10.50	0.52	0.56	0.79	2.14	7.09
$V_2T_2C_0$	42.66	46.77	1.41	1.64	0.29	5.24	37.66	10.08	10.26	46.67	41.94	63.00
$V_2T_2C_1$	23.66	71.56	3.13	6.15	0.43	16.29	70.33	25.11	14.00	68.86	78.30	82.34
$V_2T_2C_2$	37.33	61.43	2.40	4.16	0.32	10.80	42.33	13.57	11.47	58.20	56.57	47.34
$V_2T_3C_0$	52.34	42.23	1.41	1.50	0.21	6.20	32.67	5.80	9.53	36.20	42.37	39.34
$V_2T_3C_1$	58.67	24.76	0.56	1.08	0.15	3.98	23.34	1.45	3.37	25.66	22.09	4.00
$V_2T_3C_2$	72.40	18.14	0.02	0.10	0.05	0.19	10.66	0.54	0.40	0.77	2.58	6.29
CD (P=0.05)	8.71	11.69	1.34	0.88	0.07	1.83	8.05	3.44	2.92	6.85	10.99	

react at the base of cutting with specific enzyme (Hartmann and Kester, 2; Thimann and Went, 10). Thus, it results in cell division and initiation of root primordial which may clear the ways for developing the adventitious roots more quickly. Hardwood cuttings of broad leaf variety and semi-hardwood cutting of narrow leaf variety of croton produced satisfactory roots, may be due to enhanced hydrolysis of nutritional reserves under the influence of exogenous auxin that made able to establish in field.

The performance of hardwood cuttings of broad leaf variety treated with 400ppm IBA concentration was significantly superior with maximum rooting percentage and maximum establishment (82.34% and 88.66%). It was followed by semi-hardwood cuttings of narrow leaf variety treated with 200ppm IBA in respect of 7.33% rooting and 82.34% establishment. Further, Mhamood (5) also confirmed the effect of planting and method of cut on propagation of *Bougainvillea glabra* by stem cuttings. Nagaraja *et al*. (7) reported that IBA at 4000 ppm proved most effective for the propagation of *Jasminium grandiflorum* by hardwood, semi-hardwood and softwood cuttings under intermittent mist with respect to rooting, number of roots and survival percentage. Similar, beneficial effects of IBA were also reported by Bose *et al.(*1) in *Bougainvillea* cv. Mahara and Million Dollar and Singh *et al*. (9) in *Thuja* cuttings propagated with the aid of IBA under mist.

It may be concluded from above findings that broad leaf variety can be propagated easily by hardwood cuttings with 400ppm IBA while narrow leaf variety of croton can be propagated by semi-hardwood cuttings with 200ppm. It can be concluded from the present study that semi-hardwood cuttings croton rooted significantly more in comparison to other two types of cutting. 200ppm IBA treatment proved as one of the best treatment for inducing rooting and total growth made by cuttings.

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