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Studies on Regeneration Capacity of *Hibiscus schizopetalous* L Cuttings Under Intermittent Mist as Influenced by Maturity of Wood and Indolebutyric Acid

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Regenerative capacity of maturity of *Hibiscus schizopetalous* cuttings was studied under intermittent mist with the aid of IBA at 4000 ppm.

Treated sub-terminal, semi-hardwood and hardwood cuttings induced 100 per cent rooting; it was 60 per cent in terminal cuttings. The natural regenerative capacity of semi-hardwood cuttings was highest. Treated cuttings of all the four types produced significantly very high number of roots than untreated ones. Treated terminal and sub-terminal cuttings produced smaller roots than those of untreated. However, treated and untreated hardwood cuttings produced longer roots. Untreated cuttings produced roots from their very basal cut portion whereas treated cuttings produced roots covering 12 to 40mm area in length on the cutting. Under intermittent mist, semi-hardwood cuttings proved superior even without IBA treatment to terminal, sub-terminal and hardwood cuttings. Terminal cuttings showed poor response to mist as well as IBA treatment.

Hibiscus schizopetalous is generally propagated by air layering and hardwood cuttings. Propagation by these methods takes long time and often gives low percentage of success. Only mature portion of a shoot is used for propagation and the immature portion of the shoot goes waste. With a view to utilize the entire shoot and to raise plants in a short time, propagation was attempted under intermittent mist using the entire shoot. Many plant species have also been reported to propagate easily under mist with or without aid of root-promoting substances (Base *et al*. 1973; Dorsman, 1957; Hartmann and Whisler, 1966; Singh 1976a, b and Singh and Motial, 1973).

MATERIAL AND METHODS

The present study was undertaken at National Botanic Research Institute, Lucknow. The shoots were collected from a vigorously growing plant and divided into four segments viz., terminal, sub-terminal, semi-hardwood and hardwood cuttings. Cuttings of each type were divided into two groups (1) treated with IBA at 4000 ppm concentration by quick dip method, and (2) untreated i.e. without IBA treatment. Fifty cuttings of each treatment were planted on July 22nd, 1976 in pots containing sterilized coarse sand and kept under intermittent mist for rooting. The experiment was laidout following com-

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pletely randomized design with 5 replications. Observations on rooting were recorded on August 22nd, 1976 i.e. 30 days after planting.

RESULTS AND DISCUSSION

Rooting : The data presented in Table show that maturity of wood and IBA treatment had significant effect on rooting of cuttings. The comparative results indicated that propagation of this particular species by semi-hardwood cuttings seemed superior to that by sub-terminal, terminal and hardwood cuttings under intermittent mist even without IBA treatment. Terminal cuttings without IBA treatment showed poor results. Treatment with IBA resulted in two-fold increase in rooting of terminal, sub-terminal and hardwood cutting compared with untreated ones (Table). The order of maturity of wood on rooting percentage in the presence of IBA was as terminal >sub-terminal = semihard-wood = hardwood cuttings.

Number of roots per rooted cutting : IBA had marked influence on the formation of roots in all the four types of cuttings under present study (Table). Untreated cuttings of any maturity showed non-significant differences in the number of roots per cutting. Maturity of wood in IBA treated cuttings gave highly significant differences with interaction effects in respect of the number of roots. The order of maturity of wood in the presence of IBA on root formation

TABLE. Rooting in different types of cuttings under intermittent mist

Type of cuttings	Percent rooting		Number of roots/cutting		Length of longest root (mm)		Thickness of longest root (mm)		Orientation of roots (mm/cutting)	
	T0	T1	T0	T1	T0	T1	T0	T1	T0	T1
Terminal	32.50	60.00	2.54	14.79	34.88	17.86	1.72	1.47	basal	12.12
Sub-terminal	50.00	100.00	2.35	20.05	34.00	27.45	1.78	1.61	basal	10.65
Semi-hardwood	80.00	100.00	2.43	37.05	35.14	40.50	1.67	1.56	basal	13.41
Hardwood	45.00	100.00	1.62	63.32	42.20	51.70	2.12	1.89	basal	40.05
C. D. for cuttings										
at 5%	5.92		4.37		7.54		NS		—	
at 1%	8.02		5.93		10.22		NS		—	
C. D. for treatments										
at 5%	4.18		3.09		5.33		NS		—	
at 1%	5.67		4.19		7.23		NS		—	
C. D. for interaction (Cuttings X Treatments)										
at 5%	8.37		6.19		NS		NS		—	
at 1%	11.35		8.39		NS		NS		—	

T0 = Untreated cuttings : T1 = Treated cuttings

was as hardwood>semi-hardwood> sub-terminal>terminal cuttings.

Length of longest root : Length of the longest root was greater in the untreated cuttings than in the treated ones. However, differences in this respect due to type of wood among untreated cuttings were not significant. The treated terminal, sub-terminal cuttings produced shorter roots compared to those produced by untreated cuttings of identical maturity. There was no significant difference in length of longest root produced by treated and un-treated semi-hardwood cuttings. However, treated hardwood cuttings could produce longer roots and the difference between treated and untreated cuttings was significant. The interaction effect between cuttings and treatment on the length of longest root per cutting was not significant.

Thickness of longest root : The treated and untreated hardwood cuttings produced thicker roots than terminal, sub-terminal and semi-hardwood cuttings, though differences were non significant. Treated cuttings of all the four types viz., terminal, sub-terminal, semi-hardwood and hardwood cuttings produced comparatively thinner roots than the untreated cuttings of these types (Table).

Orientation of roots : Untreated cuttings of all the types produced roots from their basal portion. The average length of root orientation zone on per treated cutting was 12.12 mm in terminal, 10.65 mm in sub-terminal, 11.41mm in semi-hardwood and 40.05 mm in hardwood cuttings (Table).

Rooting substances are found efficacious in root formation of many plant species under intermittent mist. Of them, IBA is the most effective root promoting substance (Audus, 1959: Hartmann and Whisler 1966 and Singh and Motial, 1973). Treatment of cuttings with IBA and mist sprays separately will not always induce root initiation, but a good root system usually results when both are applied together in several plant species (Singh 1976 a, b; and Singh and Motilal 1973).

In the present study, semi-hardwood cuttings could take a lead in the formation of roots compared with other types of cuttings. Application of IBA doubled the percentage of rooting in terminal, sub-terminal and hardwood cuttings. Rooting extent was 100 per cent in sub-terminal, semi-hardwood and hardwood cuttings. It was 60 per cent in terminal cuttings. Treatment of IBA not only caused cent per cent rooting but also produced large number of roots (Table). These results are in quite agreement with those reported by (Singh, 1976b) in case of semi-hardwood cuttings of *Jasminum sambac* cv 'Motia' which produced highest number of roots when treated with IBA at 4000 ppm concentration under intermittent mist.

Maturity of wood play an important role in many plant species in respect to rooting. Schilletter and Richey (1940) reported that mature cuttings or those with a high carbohydrate-nitrogen ratio or a high starch reserve from roots sooner and in a greater number than do corresponding cuttings that are less mature or more succulent and that have a low carbohydrate-nitrogen ratio or a

ow starch reserve. However, physiological age of the plant parts as determined by bio-chemical factors other than carbohydrate and nitrogen have their influences on rooting (Mahlstede *et al.* 1957)

The average length of longest root per cutting was more in untreated terminal and sub terminal cuttings than that of treated ones. Semi-hardwood cuttings with or without IBA treatment had non-significant difference in length of roots. However, hardwood treated cuttings produced longer roots than untreated ones. It is recorded that the number of roots was not correlated with the length of longest root.

The poor performance of treated terminal cuttings indicates that for cuttings obtained from vigorous and juvenile shoots, as in the present case, there was no necessity for further stimulation IBA at 4000 ppm concentration probably could be higher concentration for terminal cuttings which resulted in overstimulation. Possibly, overstimulation prevented translocation of some naturally occuring factor or factors from leaves which are essential for root regeneration. However, the contributing role on rooting by kind of leaves retained on cuttings is not yet clearly understood.

In the present study, the differences in rooting ability of different type of cuttings were probably due to some physiological differences existing within and between the shoots. It is reported (Garner and Hatcher, 1957) that not only seasonal variation, preparation and treatment of cuttings, the physiological state of stock plant and planting environment, but also interplay of these factors play important role in regeneration of roots.

Taking the importance of above factors in regeneration of roots in view, the unsuitability of terminal cuttings of *Hibiscus schizopetalous* cannot be generalized at this stage.

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