

STUDIES ON THE EFFECT OF VARIOUS PLANT EXTRACTS ON SPROUTING BEHAVIOUR OF CUTTINGS OF *COMMIPHORA WIGHTII* (ARNOTT) BHAND. AND *C. AGALLOCHA* ENGL.

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(Accepted March 1993)

In the present investigation the effect of extracts of whole shoots of *Portulaca suffruticosa*, *Bryophyllum calycinum*, *Coleus blumei* and *Ipomoea fistulosa* on the sprouting behaviour of stem cuttings of *Commiphora wightii* and *C. agallocha* was studied. In *C. wightii* cuttings treated with extract of *Portulaca* and *Ipomoea* rooted profusely and in *C. agallocha*, *Portulaca* and *Coleus* plant extract had promotory effect.

Key Words: Plant extracts, sprouting, *C. wightii*, *C. agallocha*.

Commiphora is generally propagated by cuttings which is the usual method of vegetative propagation employed in horticulture. *C. wightii* has been extensively tapped in Rajasthan and Gujarat states for its oleo-resin and the shrubs progressively die. This is because of the faulty techniques used by the worker i.e. they give several and deeper incision on stem to get the maximum amount of the gum. Further they apply a paste around the incision consisting of horse or wild ass urine, oleo-gum resin and copper sulphate. The latter causes an injurious effect. It is necessary to develop methods to significantly regenerate the species since natural regeneration is poor. Application of root promoting hormones for commercial production of 'guggal' plants is an expensive process and can be done only by skilled persons. Fuji and Mitsuhashi (1962, 1963) and Mitsuhashi Shibaoka and Shimokoriyama (1969) reported a root promoting substance in *Portulaca* leaves. In view of this besides the *Portulaca* plant extract, other plant extracts viz., *Bryophyllum calycinum*, *Coleus blumei* and *Ipomoea fistulosa* were tried to see their activity on the initiation of rooting on stem cuttings of *C. wightii* and *C. agallocha*.

MATERIAL AND METHODS

The cuttings were taken from one plant in order to maintain the age and nature of cuttings similar for all treatments. Proximal ends of the stem cuttings of *C. wightii* and *C. agallocha* were dipped separately in whole shoots extracts of *Portulaca suffruticosa*, *Ipomoea fistulosa*, *Bryophyllum calycinum* and *Coleus blumei*. The extract was prepared by

Table 1: Effect of plant extracts on sprouting and growth performance of stem cuttings of *Commiphora wightii*

S. No.	Name of Plant extract	Treatment in percentage	Cuttings sprouted out of nine	No. of roots per cutting	No. of shoot branches per cutting
1.	<i>Portulaca suffruticosa</i>	control	2	2	1
		10	1	2	2
		30	2	3	2
		50	3	2	1
		70	5	1	1
		100	3	2	1
2.	<i>Bryophyllum calycinum</i>	control	3	2	1
		10	1	2	2
		30	2	2	2
		50	1	2	3
		70	1	2	2
		100	1	2	2
3.	<i>Ipomoea fistulosa</i>	control	2	1	1
		10	6	1	1
		30	6	2	1
		50	5	3	3
		70	8	3	3
		100	6	2	2
4.	<i>Coleus blumei</i>	control	1	2	1
		10	2	1	1
		30	1	1	1
		50	2	3	3
		70	2	2	2
		100	2	2	2

meshing the whole shoot with 5ml of distilled water in a grinder. This was 100% extract. Lower percentages of the extract i.e. 70%, 50% 30% and 10% were prepared by mixing aliquottes of the 100% extract in

Table 2: Analysis of variance for Sprouting in *C. wightii*

Source of Variation	Degree of freedom	Sum of square	Mean sum of square	Variance Ratio 'F'
Replication	2	0.03	0.015	0.03
Control Vs Treatment	1	1.003	1.003	2.0549
Among concentration	5	2.24	0.448	0.9178
Among chemicals	3	21.38	7.126	14.599***
Interaction	15	9.033	0.6022	1.233
Error	45	21.967	0.4881	
Total	71	55.653	9.6823	

***Very highly significant

distilled water. For control the cuttings were dipped in distilled water. The treated cuttings without washing were planted in polythene bags (25 x 12 cms) filled with soil consisting of red soil, local sand and farm yard manure in the ratio of 1:3:1. Three replicates (21 treatments including the control for each species of *Commiphora*) of each treatment were set. Irrigation was done once in three days. Data in respect of sprouting and the growth performance of root, shoot, flower and fruit formation were recorded after three months of sprouting. The data was subjected to relevant statistical analysis.

OBSERVATIONS

The observations alongwith the ANOVA table are given in table 1-4. It has been observed that extract of *Portulaca* promoted rooting as well as better growth performance for both the species of *Commiphora* (Table 1,3). The extract of *Ipomea* in all concentrations promoted root initiation in *C. wightii* to the extent of 55.5 to 88.8% in comparison to control. However the growth performance was inferior (Table 1). *Bryophyllum* plant extract inhibited initiation of rooting on stem cuttings of *C. wightii* but at certain concentrations it was promotory in *C. agallocha*. The extract of *Coleus* plant promoted sprouting in *C. agallocha*. In this species root shoot growth was optimum in stem cuttings treated with extract of *Bryophyllum* and *Coleus* (Table 3).

DISCUSSION

Several investigators have reported presence of naturally occurring root promoting substances in certain plant species, such as those of *Portulaca grandiflora* containing 'Portulal' and *Helianthus tuberoses* containing 'Heliangine'. Bouillenne and Went (1933) found that substances in the cotyledons, leaves and buds of plants could stimulate initiation of

Table 3: Effect of plant extracts on sprouting and growth performance of stem cuttings of *Commiphora agallocha*

S. No. extract	Name of	Treatment conc. in percentage	Cuttings sprouted out of nine	No. of roots per cutting	No. of shoot branches per cutting
1.	<i>Portulaca suffruticosa</i>	control	1	2	2
		10	2	3	3
		30	4	3	2
		50	3	3	2
		70	7	3	3
		100	7	2	3
2.	<i>Bryophyllum calycinum</i>	control	2	3	2
		10	1	3	2
		30	1	3	2
		50	2	4	3
		70	5	5	5
		100	5	7	7
3.	<i>Ipomoea fistulosa</i>	control	2	4	2
		10	1	2	1
		30	1	3	1
		50	1	4	2
		70	3	5	3
		100	1	5	4
4.	<i>Coleus blumei</i>	control	4	2	2
		10	1	3	3
		30	7	3	3
		50	5	3	3
		70	3	3	3
		100	3	4	2

rooting on stem cuttings. The substances was called as 'rhizocaline'. It was proposed by Bouillenne, and Bouillenne Walrand (1955) that 'rhizocaline' is a complex of three components (i) a specific rooting factor translocated from the leaves and buds and characterized chemically as an orthodihydroxy phenol (ii) a non-specific factor (auxin) also translocated from leaves and buds and (iii) a specific enzyme probably of polyphenol oxidase type, located in the cells of certain tissues, such as pericycle, phloem and cambium. According to hypothetical scheme proposed by them ortho-dihydroxy phenol reacts with the auxins whenever the enzyme is present giving rise to the complex 'rhizocaline' which then initiates the reaction leading to root formation.

Synergistic action of substances, occurring in 'rhizocaline' with IAA has been demonstrated by Kawase (1964) in studies with cuttings of *Salix alba*. Hess (1968) proposed a hypothetical scheme for root

Table 4: Analysis of variance for sprouting in *C. agallocha*

Source of variation	Degree of freedom	Sum of square	Mean sum of square	Variance Ratio 'F'
Replication	2	4.20	2.1	5.483**
Control Vs Treatment	1	0.9	0.9	2.349
Among concentration	5	9.33	1.866	4.872**
Among chemicals	3	8.11	2.70	7.049***
Interaction	15	15.22	1.014	2.647**
Error	45	17.24	0.383	
Total	71	55	8.963	

** Highly significant

*** Very highly significant

initiation, in which a number of rooting cofactors interact with IAA, giving cofactor IAA complex, which subsequently initiates reactions necessary for regeneration. In both these schemes, some sort of complex formation between auxin and phenolic compound has been postulated. Although existence of auxin-phenol complex had been reported earlier by some investigators (Leopold and Plummer, 1961; Fadl and Hartmann, 1967) but the evidence was inconclusive. Due to lack of experimental proof of its existence, 'rhizocaline' is still considered to be a hypothetical rooting hormone.

Hess (1962) isolated four root promoting substances other than auxins, from several plants which root easily or which are difficult to root. These naturally occurring substances react synergistically with IAA in promoting rooting. Because of their synergistic action with IAA (a natural auxin), these substances are called rooting cofactors. Generally, the easily rooted plants have a larger number of such cofactors. The present work supports this view.

Mitsubishi *et al.* (1969) reported the occurrence of 'Portulal' in the leaves of *Portulaca grandiflora* which initiated roots in the cuttings of *Azukia iris*, *Vigna catjang* var. *sinensis*, *Phaseolus mungo* and *Raphanus sativus* var. *acanthiformis*. In the present investigation pretreatment of stem cuttings with certain concentrations of whole plant extracts of *Portulaca suffruticosa*, *Bryophyllum calycinum*, *Coleus blumei* and *Ipomoea fistulosa* gave superior results in comparison to control in one or the other or both the species of *Commiphora*.

We are grateful to D.S.T., Rajasthan Government, Jaipur for financial assistance, Prof. Y. D. Tiagi of Udaipur University for guidance and to Prof. U. Kant, Head, Department of Botany, Jaipur for facilities.

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