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Note on the Role of Plant Growth Inhibitors in Sprouting of *Capparis decidua* Cuttings

Rakesh Bhargava, Vishal Nath and O.P. Pareek
National Research Centre for Arid Horticulture, Bikaner 334 003

ABSTRACT

Investigation on the factors responsible for poor rooting and survival of cuttings of *Capparis decidua* revealed that the application of aqueous extract of cuttings inhibited rooting as well as root growth in the cuttings of Nerium and pregerminated seeds of clusterbean suggesting the presence of root inhibiting substance in the cuttings. Bioassy for the detection of ABA-like substances showed presence of high level of ABA in the cuttings.

Capparis decidua is a prominent component of the arid zone ecosystem. At present its systematic cultivation is not done which is possible if the identified highly productive plant types giving quality produce can be vegetatively multiplied to provide true-to type planting material. This calls for standardisation of an appropriate vegetative propagation technique. Attempts to propagate *Capparis decidua* by vegetative means have been made but so far the method could not be standardised (Vashishtha, 1987). The species has proved to be very hard to root and has not even responded to the application of growth regulators. This may be on account of internal factors such as growth inhibitors (Harman and Kester, 1983). Therefore, the present investigation was carried out to identify the endogenous factors, which inhibit root growth in the cuttings of *Capparis decidua*.

Three experiments were conducted using the cuttings of *Capparis decidua*.

Application of growth regulators to induce sprouting

Uniform cuttings of 15-20 cm length and 1-1.5 cm diameter were taken from healthy branches during the month of November. These were treated with the solutions of 3,000, 5000 and 7000 ppm IBA alone or in combination with 1000 ppm thiamine (Table 1). Prior to treatments, the cuttings were divided into two groups: one set to be dipped overnight in distilled water before giving treatments, and the other set to be treated without dipping in distilled water. The experiment was replicated twice using 12 cuttings in each replication. Untreated cuttings served as controls. Observations were recorded 15 and 25 days after planting.

Table 1. Effect of plant growth regulators on sprouting of *Capparis decidua* cuttings

Treatment	Sprouting (%), days after planting	
	15	25
HBA (3000 ppm)	-	-
IBA (5000 ppm)	-	-
IBA (7000 ppm)	-	-
IBA + Thiamine (1000 + 1000 ppm) DIP	-	8.5
IBA + Thiamine (1000 + 1000 ppm) 3 min	-	8.5
IBA + Thiamine (1000 + 1000 ppm) 5 min	-	-
Distilled water drip + IBA (5000) ppm)	25	25
Distilled water dip + Serasdex	-	-
Control	-	-

Detection of growth inhibitory factors

The cuttings of *Capparis decidua* (200 g) were dipped in distilled water for 20 hrs at room temperature. Thereafter, the cuttings were removed and the eluted aqueous extract was filtered in which the presence of growth inhibiting substances was studied by employing the following two tests:

a) Cuttings of *Nerium* were planted in polythene tubes filled with sand-soils medium. Keeping one set as control, the other set was irrigated with the eluted aqueous extract from *Capparis* cuttings. The treatments were replicated twice using 12 cuttings in each replication. Observations were recorded on number of roots and average root length 15 days after the treatment.

b) Pregerminated seeds of clusterbean were placed a petridish containing the eluted extract of the Capparis. The root length was recorded daily upto days after sowing.

Bioassay for ABA-like substances

The method of Wurr *et al.* (1980) was adopted to estimate the ABA like substance in cuttings. For this 10g of cuttings of Capparis decidua were fixed in methanol. These were then crushed and purified by first partitioning with petroleum ether and later against ethyl acetate. The ethyl acetate fraction was reduced to dryness under vacuum at 40°C. The residue was redissolved in small aliquot of methanol and loaded on Whatman No.1 chromatographic paper. The paper was developed, in one direction, using solvent system n Butanol, acetic acid water in the ratio of 4:1:5. The bioassay was done by mustard seed germination test as described by Sukumaran *et al.* (1978).

The data on the sprouting percentage of cuttings presented in Table 1 revealed that in general the sprouting in the cuttings was very poor. At 25 days after plating, sprouting occurred only in treatments IBA + thiamine (1000 + 1000 ppm) dip, IBA + thiamine (1000 + 1000 ppm) 3 min. dip and distilled water dip + 5000 ppm IBA. The maximum sprouting (25%) occurred in the cuttings, which were dipped in distilled water followed by treatment with 5000 ppm IBA. The striking feature encountered in the present study was that the rooting potential of the cuttings was extremely low and could be the main reason for the poor success in our study. Presuming that this might be because of some inhibitory substances in cuttings, the aqueous extract of the cuttings was studied by using two tests to identify such endogenous factors.

The results of the first test, using *Nerium* cuttings demonstrated that the average number of roots per cuttings in treated cuttings was only 2 as compared to 16 in the control ($p < 0.01$). Similarly, the average root length in treated cuttings was 5.5 mm as compared to that in the control (26.5 mm). The differences were highly significant ($p < 0.01$).

The results of the second test using the pregerrminated seeds of clusterbean show marked difference in the root length between the treated and control group of cuttings. The average root length was 2.37 mm in treated set as compared to 4.71 mm in the control. From the foregoing account, it is evident that some inhibitory substances are present in the aqueous extract of cuttings of *Capparis decidua*, which inhibit not only rooting but also the root growth.

Since ABA is one of the plant metabolites postulated to inhibit root growth in plants, studies were made to quantify ABA-like substances in the cuttings of *Capparis decidua* by using mustard seed rmination test. The results demonstrated the presence of ABA-like substances to the level of 3.2 µg per g in the aqueous extract of the-cuttings of *Capparis decidua*. It is therefore, possible that the presence of fairly high level of ABA-like substances has a role to play in the sprouting success of the cutting of *Capparis decidua*. The seasonal variation in the levels of such inhibitory compounds in the growing bushes of *Capparis decidua* must, however, be studied.

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