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Propagation of *Cordia mixa* L. by Stem Cuttings

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Abstract: The present study aimed at investigating the cutting propagation of *Cordia mixa*, a valuable timber and shade tree of very poor seed propagation and no literature were found concerning its vegetative establishment. In completely randomized experiments, soft and semi-hard wood cuttings (20 cm long) were taken early in the morning during spring and winter and planted in the common soils used in the educational farm at King Saud University. IBA and NAA auxins at 500 and 2000 ppm each were also checked for their influence on the cuttings. Shoot flushes were counted on weekly basis and number of roots was checked randomly after 2 months while the experiment was harvested, for final assessment, after five months. Results of the present study showed that autumn cuttings performed better than spring ones that did not root at all. Moreover, softwood cuttings rooted better than semi-hardwood cuttings especially in the peat moss and agricultural soils (averaging 40% each). However, auxins, may be due to their low concentrations adopted, did not affect roots, but affected on flushes as they significantly increased average number of buds and petiole length. For number of buds, NAA at 500 ppm concentration gave best results being highest in semi-hardwood cuttings (averaging 22.5). Whereas, there were no real differences between the auxins or the cutting types in case of petiole length.

Key words: *Cordia mixa*, stem cutting, propagation

INTRODUCTION

Cordia mixa is a member of *Boraginaceae* family that comprises 100 genera and 2000 species and characterized by helicoidcyme arrangement of flowers and indehiscent ovoid fleshy drupes[1]. *Cordia* is one of the important genera of woody nature that characterized by persistent calyx enveloping the fruit. In Saudi Arabia there are five local species of this genus, namely *C. subcordata, C. sebestena, C. Africana* and *C. sienensis* and one growing exotic, *C. mixa*[2].

Most of the cordia species, including *Cordia mixa* are trees or shrubs highly esteemed for their valuable timber of good properties[3].

Cordia mixa is a semi-evergreen tree of shining green foliage and drooping branches. It is an ornamental, shading, as well as timber tree. It was noted as highly resistant to drought and high temperature in Riyadh area, especially King Saud University campus. Preliminary experiments on seed propagation[4] indicated that *Cordia mixa* is of very low seed germination (less than 20%) and sluggish seedling growth (about 20 cm height after 16 moths).

Moreover, no literature was found concerning its vegetative propagation. Accordingly, the present study aimed at investigating the vegetative regeneration of the tree by stem cuttings. The specific objectives set were to check roots and subsequent growth of soft and semi-hard wood cuttings taken during spring and autumn and planted in different media. Moreover, IBA (Indole butyric acid) and NAA (Naphthalene acetic acid) which are auxins commonly used for improving cutting propagation are used at low concentrations.

MATERIALS AND METHODS

The experiments of the present study were carried out in the glass house of King Saud University. Stem cuttings of the present study were collected from the trees growing in the University campus in 2004 and 2005. It was decided to check rooting of soft and semi-hard wood cuttings that taken during spring and winter and planted in the common soils used in the educational farm. Cuttings about 20 cm long were taken early in the morning during both seasons and planted in the different soils, namely a mixture of peat moss and red sand (1:1 by volume), a mixture of peat moss and white sand (1:1 by volume) and agricultural soil (a mixture of sand and clay), in a completely randomized design. Twenty cuttings were taken from each cutting type and planted in each soil for the two seasons resulting in 240 cuttings with two replicates for the whole experiment in 2004. In addition, the experiment was

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repeated in 2005 by dipping the base of cuttings in solutions of IBA and NAA auxins with 500 and 2000 ppm each to check their effects in hastening rooting in the cuttings used.

Shoot flushes were counted on weekly basis and rooting was checked randomly after two months while the experiment was harvested, for final assessment, after five months. Data on shoot and root parameters were subjected to statistical analysis and means were separated according to the LSD method.

RESULTS AND DISCUSSION

The results of the present study fulfilled its primary objective by getting reasonable rooting percentage on the cuttings of *Cordia mixa* that differ according to the cutting type and season. Moreover, type of medium did affect the root length and auxins applied increased the flushing.

It was clear that autumn is better than spring as in the latter there was no roots at all, this is in accordance with study on *Ficus carica* under exactly same conditions[5]. It was also obvious that softwood cuttings rooted better than semi-hardwood cuttings as far as percentage of roots was concerned especially in the peat moss and agricultural soils, giving 40% (Table 1). This finding agree with previous works, for instance[6,7], on vegetative propagation of tropical trees. However, the mixture of peat moss and white sand was the best medium for root length, averaging 20 cm (Table 2). This might be attributed to the physical properties, as this soil mixture was the easiest for root penetration. N either IBA nor NAA (at 500 and 2000 ppm did improve rooting of *Cordia mixa* cuttings (Results were too poor to be analysed statistically). Such results had also been found by some researchers[8,9] on propagation of tropical trees. However, more rooting might be obtained by applying higher levels of the auxins concerned.

Table 1: Rooting % of *Cordia mixa* cuttings taken in autumn

Soil	Soft wood	Semi hard wood
P+RS	40a	*
Agr.	40a	*
P+WS	20b	10c

Means of the same small letter at the same row or column are not significantly different (p = 0.05), P+RS = Peat moss+ Red sand, P+WS = Peat moss + White sand, Agr. = Agric soil, * means the rooting is approaching zero

Table 2: Root length (cm) in *Cordia mixa* cuttings after 5 months from planting in different media

Soil	Soft wood	Semi-hard wood
P+WS	20a	10b
P+RS	5b	6b
Agr.	4b	12b

Means of the same small letter at the same row or column are not significantly different (p = 0.05), Agr. = Agric soil, P+RS = Peat moss + Red sand, P+WS = Peat moss + White sand

Table 3: Average number of buds in the cuttings of *Cordia mixa*

Treatments	Soft wood	Semi-hard wood
NAA (500 ppm)	15.0c	22.5a
IBA (500 ppm)	14.5c	19.0b
IBA (2000 ppm)	14.5c	14.0c
NAA (2000 ppm)	11.0c	7.5d
Control	7.5d	7.5d

Means of the same small letter at the same row or column are not significantly different (p = 0.05)

Table 4: Average petiole length (cm) in the cuttings of *Cordia mixa*

Treatments	Soft wood	Semi-hard wood
NAA (2000 ppm)	0.5a	4.1a
NAA (500 ppm)	2.4b	5.0a
IBA (500 ppm)	2.7b	5.0a
IBA (2000 ppm)	2.5b	4.5a
Control	2.0b	2.0b

Means of the same small letter at the same row or column are not significantly different (p = 0.05)

Table 5: Average Leaf diameter (cm) in the cuttings of *Cordia mixa*

Treatments	Soft wood	Semi-hard wood
IBA (500 ppm)	4.3a	3.4a
IBA (2000 ppm)	3.0a	4.5a
NAA (500 ppm)	2.0a	3.5a
NAA (2000 ppm)	3.5a	4.2a
Control	2.0a	2.0a

Means of the same small letter at the same row or column are not significantly different (p= 0.05)

As far as shoot parameters are concerned, the auxins applied significantly increased average number of buds (Table 3) and petiole length (Table 4) but did not affect leaf diameter (Table 5). For number of buds, NAA at 500 ppm concentration gave best results being highest in semi-hardwood cuttings (Table 3). Whereas, there were no real differences between the auxins or the cutting types in case of petiole length (Table 4).

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