Prosopis Vegetative Propagation through Cuttings

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Introduction

P. juliflora (Sw) DC is the only species used in the Brazilian semi-arid zone for afforestation programs with financial incentives from the Federal Government. This species, as a result of being cross-pollinated and auto-incompatible, shows extreme variation in shape, presence of thorns and fruit output.

The propagation of plants through cuttings contributes to the establishment of populations that are homogeneous in terms of resistance against pests and disease, fruit output, timber production, or any other characteristic desired. To obtain greater pod output in afforestation efforts with *P. juliflora,* planting of seedlings raised from cuttings is a good alternative.

Vegetative propagation methods have shown that material collection time, auxine type and dosage, temperature, environmental moisture, substratum, phytosanitary treatments, sprouting, size of cuttings and fertilizing all have influence on callosity formation, rooting rate and rooting intensity in cuttings.

Hartney (1980) found variations in the rooting capacity of *Eucalyptus* spp. cuttings linked to collection time. Campinhos and Ikemort (1983) used the intermediate part of *Eucalyptus* shoots as cuttings for rooting, leaving two pairs of leaves in each cutting. Ikemori (1975, 1976), with the purpose of finding a method for rooting of *Eucalyptus* spp. found an effect produced by type of cutting, hormone and combined action of both, as well as by the substratum used and greenhouse conditions.

Gislerød (1983) observed influence of temperature and relative humidity in development of *Euphorbia pulcherrina* roots, in propagation through cuttings. Borba and Correa (1983) described the importance of environmental control in rooting of *Eucalyptus* spp. cuttings.

For the genus *Prosopis,* Felker and Clark (1981) obtained a success rate of over 70% in rooting of *P. alba, P. articulata, P. chilensis, P. glandulosa* var. *torreyana, P. pallida* and *P. velutina,* using a mixture of hormones and covering the pots containing the cuttings with polyethylene bags. Their attempts to propagate cuttings of *P. velutina* in and outside the greenhouse did not succeed outside, even with the added hormone mixture.

Souza and Nascimento (1984), using material from basal sprouts of *P. juliflora,* obtained 70% rooting rate in cuttings 10 to 15 cm in length and 2.37 to 4.39 mm in diameter. Nascimento *et al.* (1985) obtained up to 95% rooting rate with three sprouts, leaving 2 sprouts in the aerial portion. Cuttings with 100% foliar area were used, treated with indolbutiric acid (IBA) at a concentration of 2,000 ppm.

This paper presents the rooting rates obtained with *P. alba, P. chilensis* and *P. pallida* in free outdoor growth, and with *P. juliflora* cuttings taken from plants undergoing vegetative propagation, raised in pots in a greenhouse.

Material and Methods

The trial was carried out at the Agriculture and Livestock Research Center for the Semi-Arid Tropic (CPATSA) in Petrolina, Pernambuco, in a greenhouse with 30° C-35° C temperature and 70%-80% relative humidity.

The layout used was randomized blocks with ten replications, five cuttings per plot, using shoots of 12-month-old *P. alba, P. chilensis* and *P. pallida* growing freely outdoors, and from 18-month-old *P. juliflora* plants undergoing vegetative propagation, cultivated in pots in greenhouse. All cuttings of each species were taken from the same plant.

The cuttings, with 10 cm in length, 3-5 mm in diameter and 4 sprouts, after application of 2,000-ppm indolbutiric acid (IBA), were planted in black polyethylene bags, 6 cm in diameter and 20 cm

long, containing a 4:1 sand-vermiculite mix. Two sprouts were left in the cutting's aerial portion, with 100% of the leaves. As fungal treatment, 2.0 g of 4% Captan per liter of water were applied. Foliar fertilization was performed at planting, with 2.0 ml/liter of water for 420 cuttings, and weekly during the first three weeks. Thereafter, fertilization with NPK (5–17–3), at a dosage of 0.3 g per plant, was applied weekly with irrigation water until 60 days after planting. After 150 days, rooting percentage, callosity, sprouting, root dry weight and presence of nodulation were evaluated.

Results and Discussion

The data presented in Table 1 show low rooting rate for *Prosopis,* with 20% for *P. juliflora.* The highest indices were obtained for *P. chilensis* and *P. pallida,* with 54%, not diferring statistically from *P. alba,* with 44% rooting rate.

The number of unrooted cuttings without callosity observed with *P. juliflora* suggests that the type of material used influences rooting rate, since Souza and Nascimento (1983), using the same method, obtained up to 70% rooting with cuttings from adult *P. juliflora.*

For *P. alba* and *P. chilensis,* Balboa (undated) suggests application of low-strength IBA in doses of 6.25 to 100 ppm. Felker and Clark (1981) obtained over 80% rooting with *P. chilensis, P. pallida* and *P. alba* using a mixture of several hormones and covering the pots with plastic bags. In uncovered pots, the rates obtained were 30% for *P. alba* and 100% and 80% for *P. pallida* and *P. chilensis,* respectively.

Sprouting was observed only in rooted cuttings. *P. pallida* and *P. chilensis* showed the highest indices, with 54% and 48%, respectively. *P. alba* showed the highest rate of rooted cuttings without sprouts. In unrooted cuttings, the highest callosity indices found were with *P. chilensis.*

TABLE 1

Rooting Rate, Sprouting and Callosity Observed in Cuttings from Different Species of *Prosopis*

Species	Rooted cuttings (%)			Non-rooted cuttings (%)		
	With sprouting	Without sprouting	Total	With callosity	Without callosity	Total
P. alba	32	12	44 a*	2	54	56
P. chilensis	48	6	54 a	24	22	46
P. juliflora	16	4	20 b	2	78	80
P. pallida	54	0	54 a	4	42	46

* Figures followed by the same letter do not differ from each other as per Tukey's test at 5% probability level.

TABLE 2

Values Found for Root and Sprouting in cuttings from Different Species of *Prosopis*

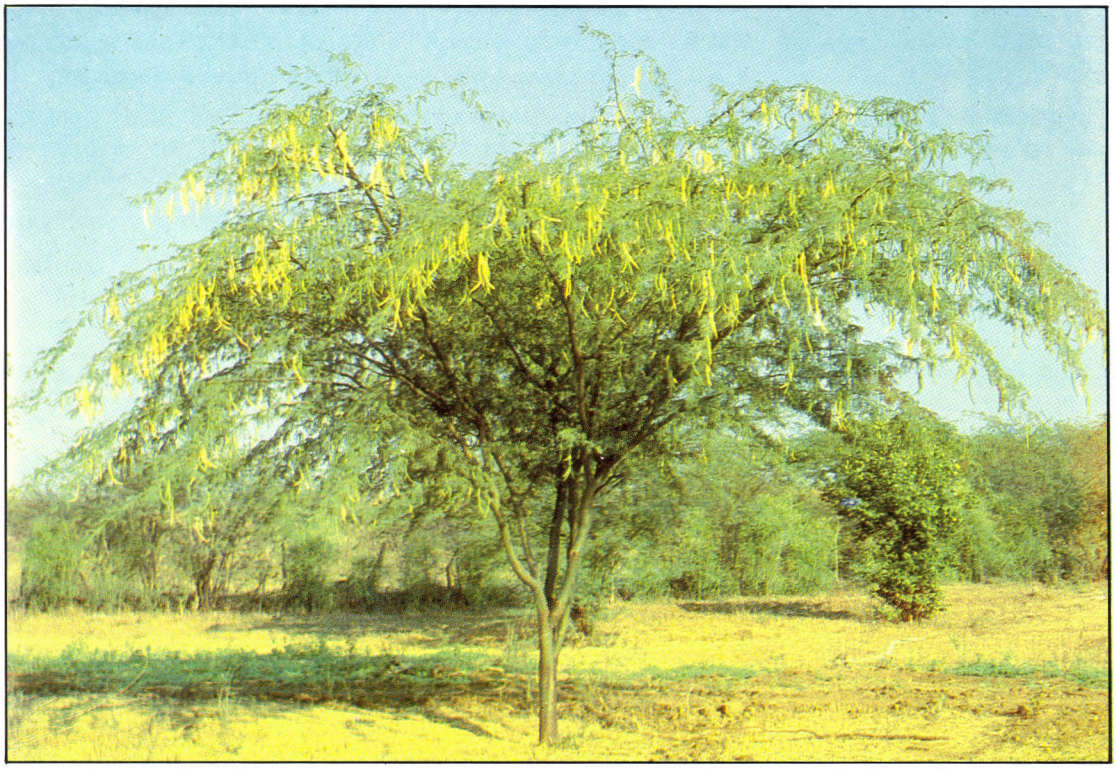
Species	Root		Sprouting		
	Dry weight (g)	Nodulation (%)	Length (cm)	Dry weight (g)	No. sprouts
P. alba	0.41	4	32.1 ± 15.9	1.66	1.3
P. chilensis	1.06	71	32.9 ± 14.8	2.34	1.8
P. juliflora	0.51	61	27.7 ± 20.1	1.01	1.0
P. pallida	1.35	94	46.8 ± 15.7	3.71	1.3

Shoot length and root dry weight are shown in Table 2 above. *P. pallida* showed the greatest difference in shoot length, with standard deviation of 20.1 cm from the mean. *P. chilensis* presented a mean of 1.8 sprouts per cutting. The lowest index was observed in *P. juliflora,* with one sprout per cutting.

Conclusions

In general terms, the rooting rates obtained with the species studied were low. No conclusions may be derived regarding the use of *P. juliflora* cuttings taken from plants undergoing vegetative regeneration and placed in greenhouse, as no trial was made with cuttings obtained from adult plants under the same conditions.

It is necessary to carry out further studies on hormone mixture and dosage, plant age and cutting quality in order to develop successful techniques for vegetative propagation with *Prosopis*.



Planting of seedlings raised from cuttings is a good alternative for obtaining higher pod output in afforestation efforts with *P. juliflora*.

References

BALBOA, O.: "Prospects and constraints for propagating *Prosopis*," Facultad de Ciencias Biológicas, P. Univ. Católica, Santiago, Chile, 3 p., undated, mimeographed.

BORBA, A. M. de, and CORREA, R. M., 1983: "Control ambiental para enraizamento de estacas en clima subtropical," Silvicultura, 8(32): 760-61.

CAMPINHOS, Jr., E. and IKEMORI, Y. K., 1983: "Produção massal de *Eucalytus* spp. através de estaquia," Silvicultura, 8(32): 770-75.

FELKER, P. and CLARK, P. R., 1981: "Rooting of mesquite *(Prosopis)* cuttings," Journal of Range Management, 34(6): 466-68.

GISLERØD, H. R., 1983: "Physical conditions of propagation media and their influence on the rooting of cuttings, III. The effect of air content and temperature in different propagation media on the rooting of cuttings," Plant and Soil, 75(1): 1-14.

HARTNEY, V. J., 1980: "Vegetative propagation of the *Eucalyptus*," Aust. For. Res., 10(3): 191-211.

IKEMORI, Y. K., 1975: "Resultados preliminares sobre enraizamento de estacas de *Eucalyptus* spp.," Aracruz-ES. Centro de Pesquisas Florestais da Aracruz, 12 p., illust. (Centro de Pesquisas Florestais da Aracuz, Informativo Técnico, 1).

IKEMORI, Y. K., 1976: "Resultados preliminares sobre enraizamento de estacas de *Eucalyptus* spp.," Aracruz-ES, Centro de Pesquisas Florestais da Aracruz, 9 p., illust., (Centro de Pesquisas Florestais da Aracruz, Informativo Técnico, 2).

NASCIMENTO, C. E. de; LIMA, P. C. F. and SILVA, H. D. da, 1985: "Influencia do número de gemas no enraizamento de estacas de algaroba," Petrolina-PE., EMBRAPA/CPATSA, 3 p., (EMBRAPA/CPATSA, research in progress, 39).

SOUZA, S. M. de, and NASCIMENTO, C. E. S., 1984: "Propagação vegetativa de algaroba por estaquia," Petrolina, EMBRAPA/CPATSA, 3 p., (EMBRAPA/CPATSA, research in progress, 27).