

# Performance of Species of the Genus *Prosopis* at 24 Months of Age in Petrolina

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## Introduction

The medium and long-term afforestation efforts with *P. juliflora* in the Brazilian Northeast, using *P. juliflora* seeds produced in the region itself, must take into account potential restrictions due to inbreeding problems, as pointed out by Pires and Kageyama (1985). These authors, in studies conducted on a population in Soledade and included elsewhere in this book, found low heritability and genetic variability coefficients for height and DBH among families, in open-pollinated progeny trials.

The need of enlarging the genetic base and gathering data on the performance of other species of *Prosopis* in the Brazilian semi-arid region prompted the National Forestry Research Program (PNPF), through the Agriculture and Livestock Research Center for the Semi-Arid Tropic (CPATSA), to introduce other species of this genus into the region. This paper describes the initial performance of *P. alba*, *P. chilensis*, *P. pallida*, *P. velutina*, *P. glandulosa* var. *torreyana*, *P. tamarugo* and *P. juliflora* in Petrolina, Pernambuco, 24 months after planting, with the purpose of selecting those species which seem promising for firewood and/or fodder production.

## Material and Methods

The trial was established in a "caatinga" property belonging to the Agriculture and Livestock Research Center for the Semi-Arid Tropic (CPATSA), in Petrolina, Pernambuco, at an altitude of 365 m, latitude 09° 09' south, and longitude 40° 22' west. Table 1 shows rainfall and mean temperature recorded at the site during the trial. The rainy season begins in December/January and ends in April/May.

TABLE 1  
Meteorological Data of the Experimental Site

Year	Temperature °C		Mean	R.H. %	Rainfall (mm)	No. of Rainy days
	Maximum	Minimum				
1984	33.8	20.4	29.5	68	611.4	57
1985	31.6	19.7	27.3	72	1,075.6	105
1986*	32.3	29.7	27.8	68	339.0	41
Mean	32.6	23.3	28.2	69	675.3	68

\* Data for January to June.

The soils were classified by Pereira and Souza (1968) as red-yellow latosol. The chemical analysis showed a pH of 5.3, and low availability of phosphorus, calcium and organic matter. Magnesium and potassium content are in the mid-range. Aluminum content is low.

The experimental layout adopted was randomized blocks, with seven treatments and a varying number of replications, as described in Table 2. The plots were square, with 25 plants at 6 m × 6 m spacing. The nine central plants in each plot were considered for the survival, height, DBH, crown diameter and fruit output analyses.

**TABLE 2**  
Species, Provenances and Number of Replications

Treatment	Species	Provenance	No. Replications
1	<i>P. alba</i>	Fundo Refresco, Chile	4
2	<i>P. chilensis</i>	Santiago, Chile	4
3	<i>P. glandulosa</i> var. <i>torreyana</i>	Texas, USA	3
4	<i>P. juliflora</i>	Petrolina, Brazil	4
5	<i>P. pallida</i>	Piura, Peru	4
6	<i>P. tamarugo</i>	Fundo Refresco, Chile	4
7	<i>P. velutina</i>	Texas, USA	3

The seedlings were produced by direct sowing in black polyethylene bags, 8 cm in diameter and 15 cm long. The seeds were inoculated with *Rhizobium* selected specifically for *P. juliflora*. At the time of planting, February 1984, a 100-g/plant dosage of 5-14-3 NPK was applied. During the first year of establishment, hoeing was carried out on three occasions to prevent weeds from competing with the seedlings. Weeding was performed on three occasions during the second year, and a 1-m-radius space was cleared around each plant.

## Results and Discussion

As shown in Table 3, with the sole exception of *P. tamarugo*, which at 12 months of age presented 100% mortality, all species exhibited survival rates in excess of 75%, 24 months after establishment. *P. juliflora* of local provenance showed 100% survival, differing statistically only from *P. alba* from Chile.

*P. alba* exuded a reddish sticky fluid, its leaves started yellowing and then the plants died.

**TABLE 3**  
Survival Rates up to 24 Months of Age at Petrolina

Species	Months		
	3	12	24
<i>P. alba</i>	98 a	96 a	75 b
<i>P. chilensis</i>	98 a	94 a	89 ab
<i>P. glandulosa</i>	94 a	94 a	94 ab
<i>P. juliflora</i>	100 a	100 a	100 a
<i>P. pallida</i>	100 a	100 a	97 a
<i>P. tamarugo</i>	53 b	0 b	—
<i>P. velutina</i>	100 a	100 a	100 a

5% probability level. The values in percentage were transformed into arc sen  $\sqrt{\%}$  for the effects of statistical analysis.

As shown in Table 4, *P. juliflora* was the species with the best height growth, crown diameter and DBH. Its values of 5.38 m and 4.57 cm for crown diameter and DBH, respectively, did not differ statistically from the 4.95 m and 3.42 cm found for the same parameters in *P. pallida*. The lowest height (1.44 m), crown diameter (1.92 m), and DBH (1.13 cm) were observed in *P. glandulosa* var. *torreyana*.

**TABLE 4**  
**Height, DBH, and Crown Diameter for the Various Species in Petrolina**

Species	Height (m)			DBH (cm) 24 months	CDiam (m) 24 months
	3 months	12 months	24 months		
<i>P. alba</i> . . . . .	0.74 ab	1.88 ab	2.87 b	2.70 bc	3.25 b
<i>P. chilensis</i> . . . . .	0.76 ab	1.70 b	2.56 b	1.75 cd	2.39 bc
<i>P. glandulosa</i> . . . . .	0.53 b	1.11 c	1.44 c	1.13 d	1.92 c
<i>P. juliflora</i> . . . . .	0.95 a	2.27 a	4.10 a	4.57 a	5.38 a
<i>P. pallida</i> . . . . .	0.76 ab	1.59 bc	2.78 b	3.42 ab	4.95 a
<i>P. tamarugo</i> . . . . .	0.10 c	—	—	—	—
<i>P. velutina</i> . . . . .	0.70 ab	1.52 bc	2.27 bc	1.50 cd	2.78 bc

Mean values followed by the same letter in the same column do not differ statistically as per Duncan test at 5% probability level.

**TABLE 5**  
**Pod Output of Various Species of *Prosopis* at 21 months of age**

Species	Trees bearing pods %	Mean pod output / tree (g)	Output range
<i>P. juliflora</i> . . . . .	67	428.84	0 – 2,454.0
<i>P. pallida</i> . . . . .	31	232.09	0 – 2,162.1
<i>P. velutina</i> . . . . .	11	9.64	0 – 147.1

*P. juliflora*, *P. velutina* and *P. pallida* started bearing fruit at 21 months of age, with average outputs, respectively, of 428.84 g; 232.09 g, and 9.64 g of pods per tree, as shown in Table 5 above. The variation from 0.0 to 2 kg in fruit output per tree in *P. juliflora* was the same as that observed for *P. pallida*. The percentage of *P. juliflora* trees bearing fruit (67%) was twice that for *P. pallida*. Azevedo (1955) found an average output of 2.22 kg of pods/year, in 15 *P. juliflora* trees in Rio Grande do Norte, with ages ranging from 14 to 24 months.

A scant 11% of *P. velutina* trees produced fruit, varying from 0.0 to 147 g of pods per tree. Felker found, in 5-year-old populations of this species, outputs ranging from 0.0 to 12.645 kg per tree. No fruit bearing was observed in *P. alba*, *P. chilensis* and *P. glandulosa* until 24 months of age.

## Conclusions

*P. tamarugo* did not adapt to the ecological conditions prevailing in Petrolina, with 100% mortality at 12 months of age. The remaining species showed over 75% survival up to 24 months of age.

The development observed in *P. juliflora* underlines its potential for the region both for wood and pod production, basing on its height, DBH, crown diameter and fruit bearing observed up to 24 months of age.

*P. juliflora*, *P. pallida* and *P. velutina* started to bear fruit as from their second year.

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