

## EARLY GROWTH PERFORMANCE OF LATIN AMERICAN *PROSOPIS* SPECIES IN INDIAN ARID TRACT

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Six exotic *Prosopis* species, mainly of Latin American origin (i.e. *P. nigra*, *P. flexuosa*, *P. chilensis*, *P. alba*, *Prosopis* hybrid and *Prosopis* species-peruvian) were studied for their early growth performance. Moreover, these exotics are simultaneously compared with *P. juliflora* for early growth behaviour. *Prosopis* species-peruvian and *P. alba* have shown best over all growth performance. In general, *P. juliflora* could not attain better overall growth than these exotics. The high degree of adaptability and appreciable early growth performance of *Prosopis* species (peruvian) and *P. alba* make them a very suitable candidate for arid zone plantation forestry activities.

**Key words :** *Prosopis*, exotic, agro-forestry, silvi-pastoral

### INTRODUCTION

In the arid part of Indian sub-continent situation of fuel wood availability is highly alarming as the natural forest cover in the region is almost negligible. The tree/shrub species found in this region, are distributed sparsely and are slow growing by nature. Therefore, a massive afforestation programme using fast growing tree species is urgently required in order to bring such lands under good canopy cover. Evaluation of exotic tree species introduced from isoclimatic regions may be helpful in this context. *Prosopis juliflora* introduced in India in 1877 has been proved a suitable tree species for this region due to its very high degree of adaptability (Muthana and Arora 1983), but farmers in the region do not prefer it much due to thorny nature of the species and also due to some other apprehensions associated with this species, as agricultural crops are adversely affected by the establishment of this species. Besides *P. juliflora*, there are more than 40 species of genus *Prosopis* but till date not much work could be initiated on these species. Present paper summarizes the relative growth performance of six exotic *Prosopis* species and naturalised local *P. juliflora* in environmental condition of arid tract.

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### MATERIALS AND METHODS

Seeds of six *Prosopis* species of Latin American origin, viz., *P. nigra*, *P. chilensis*, *P. flexuosa*, *P. alba*, *Prosopis* hybrid and *Prosopis* species (peruvian) procured from Texas, USA and were evaluated for their early growth behaviour at Central Arid Zone Research Institute, Jodhpur, India. The growth performance of these exotics were compared with local *Prosopis juliflora*. Seeds of all the species were first sown in nursery in polythene tubes containing uniform rooting medium comprising of FYM, soil and sand mixed in 1:1:2 ratio. In March 1991 and after five months (in the month of July), seedlings were outplanted on the field. Planting was done at the spacing of 2.5 m × 4.0m in randomised block design with four replications. Plants were watered fortnightly in summer and once in a month during winter @ 15 litres/plant only in first year of planting. Two hoeing in each year were carried out to control the weeds. Data were recorded on survival, plant height, collar diameter and crown diameter by standard silvical procedures, and analysed using Duncan's multiple range test (DMRT) as given in Gomez and Gomez (1983).

### RESULTS AND DISCUSSION

Survival percentage of all the species (Table 1), showed that after 3-years maximum survival was in *P. nigra* followed by *P. chilensis*.

**Table 1. Survival percentage of different species**

Species	1-year	2-year	3-year
<i>P. nigra</i>	90.37	90.25	90.25
<i>Prosopis</i> hybrid	85.78	79.22	79.22
<i>P. flexuosa</i>	74.29	66.41	66.41
<i>P. alba</i>	83.34	80.48	80.48
<i>P. chilensis</i>	83.64	81.41	81.41
<i>Prosopis</i> species - peruvian	76.47	68.94	68.94
<i>P. juliflora</i>	85.00	70.00	70.00

and *P. alba* and minimum was recorded in *P. flexuosa*. Means of plant height and collar diameter recorded during three consecutive years (at yearly interval in the end of each growing season) and that of crown diameter at the end of third year only, of all the species are given in Table 2. In first recording (i.e. after first growing season), *Prosopis* species (peruvian) attained maximum average plant height which remained stable in next two successive years (i.e., after second and third recording, respectively). However, in last recording (i.e., after third year of growth) no statistical differences were found among *Prosopis* species (Peruvian), *P. alba*, *P. chilensis* and *Prosopis* hybrid. In first recording

(i.e., after first year growth), the performance of *P. juliflora* was poorest in respect of plant height but in successive recordings it improved a lot. In last recording it also found a place in the category of *P. alba*, *P. chilensis*, *P. flexuosa* and *Prosopis* hybrid.

**Table 2. Means of plant height of seven *Prosopis* species over three years**

Species	Plant height (cm)			Collar diameter (cm)			Crown diameter (cm)
	1991	1992	1993	1991	1992	1993	1993
<i>P. nigra</i>	43.75d	78.25d	134.25c	0.59d	1.16d	1.79c	273.75ab
<i>Prosopis</i> hybrid	50.50bcd	92.75bc	185.25ab	0.80b	1.47c	2.40b	282.50ab
<i>P. flexuosa</i>	58.50b	101.25b	171.75b	0.69c	1.29d	2.27bc	261.25b
<i>P. alba</i>	49.00cd	89.75c	188.00ab	0.93a	1.81b	3.39a	321.751b
<i>P. chilensis</i>	53.00bc	100.00bc	183.00ab	0.92a	1.79b	2.84 ab	292.75ab
<i>Prosopis</i> species-Peruvian	89.25a	160.00a	212.25a	0.88a	2.16a	3.10a	328.00a
<i>P. juliflora</i>	39.50a	89.75a	166.60b	0.40e	1.28d	2.83ab	284.25ab

Note: Means having a common letter within a column are not significantly different at  $p < 0.05$ .

Collar diameter in first recording was found to be maximum for *P. alba* followed by *P. chilensis* and *Prosopis* species- peruvian and minimum was in case of *P. juliflora*. It remained maximum till last recording for *P. alba* (3.39 cm/plant), however, statistically differences were not found significant with *P. chilensis*, *Prosopis* species (peruvian) and *P. juliflora*. Minimum collar diameter was recorded in *P. nigra*.

The crown diameter was found to be maximum in *Prosopis* species-peruvian and minimum in *P. flexuosa*. Mean annual increment in plant height and collar diameter for all the species studied are given in Table 3. The total increment between first and last recording was found to be maximum in *P. alba* for both plant height and collar diameter and minimum was in case of *P. nigra*.

From the data collected and analysed for early growth behaviour of introduced exotic *Prosopis* species, it was discernible that all of them are quite adaptable to environmental conditions of hot Indian arid tract, however, the over all performance of *Prosopis* species (peruvian) was highly appreciable, and closely followed by *P. alba* and *P. chilensis*. As far as relative performance of local *P. juliflora* with these exotic *Prosopis* species is concerned *P. juliflora*, in general, could not attain the over all growth better than the exotics. The

**Table 3. Mean annual increment of seven *Prosopis* species over three years for plant height and collar diameter**

Species	Plant height (cm)			Collar diameter (cm)		
	1991-92	1992-1993	Total	1991-1992	1992-1993	Total
<i>P. nigra</i>	34.50	56.00	90.50	0.57	0.63	1.20
<i>Prosopis</i> hybrid	42.25	92.00	134.75	0.67	0.93	1.60
<i>P. flexuosa</i>	42.75	70.50	113.25	0.60	0.98	1.58
<i>P. alba</i>	40.75	98.25	139.00	0.88	1.58	2.46
<i>P. chilensis</i>	47.00	83.00	130.00	0.87	1.05	1.92
<i>Prosopis</i> species-Peruvian	70.75	52.25	123.00	1.28	0.94	2.22
<i>P. juliflora</i>	50.25	76.85	127.10	0.88	1.55	2.43

thorny nature of *P. juliflora* is main constraint for non-adoption of this species by rural masses in plantation forestry and agro-forestry programmes. On the other hand, exotic *Prosopis* species (peruvian) and *P. alba* are non-thorny in nature and as such can be successfully introduced in place of *P. juliflora*. Singh and Singh (1993) reported that some of the above discussed exotic *Prosopis* spp. (*viz.*, *P. alba*, *P. pallida* and *P. chilensis*) are very suitable for silvi-pastoral plantations (*Leptochloa* grass as herbaceous component) in salt affected soils.

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