

## Studies on Firewood Yield from Singling of *Prosopis juliflora* Plants in the Aravalli Hills of Haryana

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**Abstract:** *Prosopis juliflora* is the main source of firewood for villagers in the Aravalli ranges where the soils are shallow. Therefore, the relationship between growth attributes of *P. juliflora* and soil depth on firewood yield was studied. The correlation studies revealed collar diameter to be a good indicator of firewood yield potential of *P. juliflora*. The firewood yield was also less in regions where the soil was shallow and it increased with the increase in soil depth.

**Key words:** *Prosopis juliflora*, growth attributes, firewood yield, Aravalli hills, soil depth.

Under the Project Rehabilitation of Common Lands in the Aravalli hills, Haryana, planting of different species over an area of 37,000 ha has been carried out since 1991. Plantation was undertaken to provide a green cover and to augment firewood availability to the villagers, who mostly depend upon the common lands for meeting biomass needs. In the Aravalli ranges, soil depth varies greatly due to varied topographic features. In areas which are refractory in nature, particularly where the soil is shallow (<60 cm deep), *Prosopis juliflora* is the main species that was planted.

There is paucity of information on firewood yield of *P. juliflora* as a result of

singling operation (i.e., removal of shoots in excess of the main stem). The present study was undertaken to determine, (i) the relationship between growth attributes of *P. juliflora* plants and its firewood yield, and (ii) the effect of soil depth on firewood yield.

### Materials and Methods

The relationship between growth attributes of *Prosopis juliflora* and its firewood yield from singling a random sample of 136 trees was studied in a three-year-old plantation of *P. juliflora* at Kasan. Each tree was measured for its height, number of shoots, collar diameter and fresh weight

Table 1. Mean growth attributes and firewood yield of *Prosopis juliflora*

Characters	Mean	C.V.
Collar diameter (cm)	10.64	53.6
Number of shoots	3.73	44.8
Height of tree (m)	3.15	42.3
Firewood yield per plant (kg)	5.54	86.8

Table 2. Correlation coefficients between growth attribute and firewood yield

Correlation between	Correlation coefficient
Firewood yield and collar diameter	0.76*
Firewood yield and number of shoots	0.14
Firewood yield and plant height	0.26
Plant height and number of shoots	0.06
Plant height and collar diameter	0.40
Collar diameter and number of shoots	0.07

\*Significant at 5%.

of firewood. The study on the effect of soil depth was conducted at four sites, viz., Kasan, Bandhwari, Garatpur Bans and Gawal Pahari having mean annual rainfall of 652 mm. The soil depth was < 60 cm at Kasan and Garatpur Bans, and > 60 cm at Bandhwari and Gawal Pahari. In each site a number of plots, each of 0.1 ha area, were laid out for carrying out the singling operation. Fifty percent of stems per plant were removed and the remaining healthy straight stems retained. The fresh weight of firewood per tree was recorded

and the mean weight of firewood per plot was calculated.

## Results and Discussion

### *Growth attributes for predicting firewood yield*

The data on collar diameter, number of shoots, height of tree and firewood yield per plant are presented in Table 1. Among the different plant characters studied, firewood yield per plant exhibited a high coefficient of variation, indicating of large

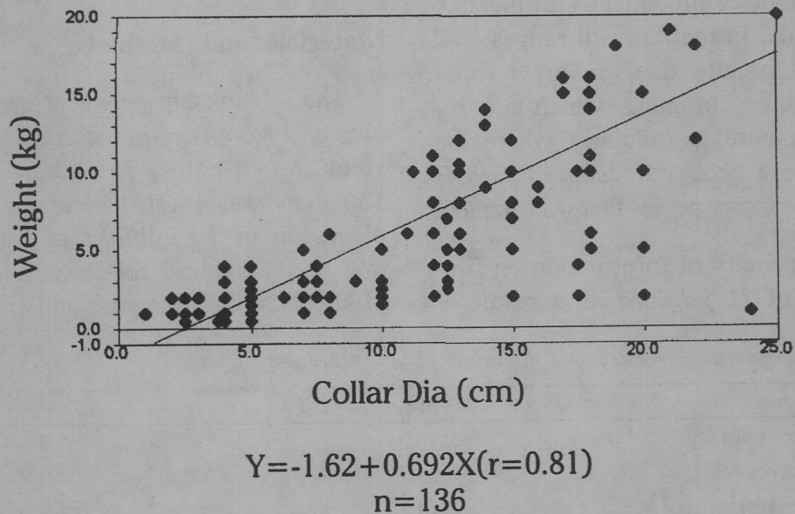


Fig. 1. Relationship between collar diameter and yield of *Prosopis juliflora*.

Table 3. Mean yield (kg) of firewood per plot (0.1 ha) from singling of *Prosopis juliflora*

Site	No. of plots	Soil depth	Range	SD	Mean yield	CV
Kasan	7	< 60 cm	82-1821	633.71	217.21	70.67
Bandhwari	8	> 60 cm	253-680	146.03	484.88	28.17
Garatpur Bans	10	< 60 cm	16.5-160	46.50	94.98	46.58
Gawal Pahari	5	> 60 cm	312-798	206.50	492.40	37.40

variation in this character from tree to tree in the population. Correlation coefficients between firewood yield and collar diameter, firewood yield and number of shoots, firewood yield and plant height, plant height and number of shoots and plant height and collar diameter and number of shoots are set out in Table 2.

The significant correlation between collar diameter (X) and firewood yield (Y), confirms that collar diameter of *P. juliflora* is a good indicator of its firewood yield. The regression equation (Fig. 1) for this works out to be:

$$Y = -1.62 + 0.692x \quad (r = -0.81) \quad n = 136$$

Therefore, it is evident, among the growth attributes studied, collar diameter can be taken as the only criterion for predicting firewood yield following the linear regression equation. This lends support to the conclusions already drawn by Kaul and Jain (1967), Felker *et al.* (1981) and Felker and Patch (1996) with respect to *Prosopis cineraria* and *Prosopis juliflora*, respectively.

#### Effect of soil depth on firewood yield

The data on firewood yield per plot (0.1 ha) obtained from singling of plants of *Prosopis juliflora* from four sites, each varying in soil depth, are presented in Table

3. The data on firewood yield per plot indicated a high coefficient of variation in the case of Kasan, which was due to variation in topography and consequent variation in soil depth. In Bandhwari and Gawal Pahari, where the soils were uniformly deep, the firewood yield per plot exhibited a low coefficient of variation. The data clearly reveal that firewood yield of *Prosopis juliflora* plants is affected by the soil depth. The firewood yield was the maximum (4924.0 kg ha<sup>-1</sup>) in Gawal Pahari and was the minimum (949.8 kg ha<sup>-1</sup>) in Garatpur Bans. The results confirm the earlier finding that soil depth is a critical factor, particularly in arid zone, affecting plant establishment, growth and development (Kaul *et al.*, 1966).

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