



Fodder potential of Lana (*Haloxylon salicornicum*) in hot arid region

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Received : 20th October, 2008

Accepted: 10th April, 2009

Abstract

Optimum and sustainable utilization of indigenous arid shrubs play an important role as source of variety of economic products besides their ecological role. Among arid shrubs, *Haloxylon salicornicum* (Moq.) Bunge ex Boiss. locally called as *Lana* is an important shrub of western Rajasthan. It remains green during the lean period and resists grazing by animals. Its fruiting tops are traditionally harvested at fruiting stage and utilized as animal feed by mixing with other local feeds. Results of the feeding trial conducted have shown that conventional concentrate can be replaced by 25 and 50% with Lana seeds with perianth in the ration of cattle and goats. The present study aimed at drawing attention on the potential of this arid shrub focusing mainly on its potential as browse shrub and to supply nutritious feed to livestock in hot arid region.

Key words: Desert, Drought, Fodder, *Haloxylon salicornicum*, Shrubs

Introduction

The hot arid region of Rajasthan is characterized by extremely high temperature, low and erratic rainfall, high evaporation rate, intense solar radiation and strong wind regime. Due to adverse edapho-climatic conditions, the crop production is quite risky and in such conditions animal husbandry is an integral component of production system and important source of livelihood. Deficit fodder availability due to less and erratic rainfall coupled with degrading grazing land is major constraint for sustainable livestock production in western Rajasthan. Indigenous shrubs accompanied with local grasses have vital role in animal production.

Acacia, *Calligonum*, *Haloxylon*, *Salsola*, *Suaeda*, *Ziziphus* etc are sources of variety of products and service to mankind. *Haloxylon* species inhabit arid environments

in the continents of Africa and Asia (Nicolai and Elliott, 2002) and produce sustained amount of palatable biomass throughout the year. A single stand of *Haloxylon ammodendron* on the Chu River east of the Aral Sea covers 6000 km² (Goodall, 1982). *Haloxylon salicornicum* (Moq.) Bunge ex Boiss. locally called as "*Lana*" is a succulent dwarf chenopod shrub of Indian Thar desert. It is distributed in India, Pakistan, Baluchistan, Sindh and Afganistan. This succulent, palatable, semihalophytic shrub is well adapted to endure the severe environmental stress in desert areas (Clor *et al.*, 1976). In India it is distributed in Bikaner, Jaisalmer and Sriganganagar districts of western Rajasthan. It grows naturally in sandy undulating hummocky plains, dune-interdunes and in the river courses of the ancient river Saraswati (Shankar and Kumar, 1984). Traditionally, its seeds are used as food during famine for making breads along with pearl millet (Shankar, 1988; Singh *et al.*, 2003, Dagla and Shekhawat, 2005). *H. salicornicum* received attention world over for alkaloids (Gibbons *et al.*, 2000; El-Shazly *et al.*, 2005), lipxygenase inhibiting steroidal glycosides and naphthene derivatives (Ferheen *et al.*, 2005), hypoglycaemic activity (Shabana *et al.*, 1990) and heavy metals accumulation (Al-Khateeb and Leilah, 2005). In western Rajasthan, its importance is mainly due to its browse value (Shankar, 1988; Kaul, 1986 and Singh *et al.*, 2005). However, much work has not been done on its growth parameters, production, palatability, nutritive value and its seeds as a source of concentrate feed. The present article is an attempt to report these important aspects of *H. salicornicum* in hot arid ecosystem.

Materials and Methods

The information of fodder value was gathered from the inhabitants of Bikaner, Jaisalmer and Sriganganagar districts of western Rajasthan of *Lana* during 2001-2002. Growth performance and fruit/seed yield of 50 accessions of *H. salicornicum* was evaluated at the research farm of

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Fodder Potential of Lana

Central Arid Zone Research Institute, Regional Research Station, Bikaner. The plant samples were analyzed for its proximate principles (AOAC, 1990) and fibre fraction (Goering and VanSoest, 1970).

Results and Discussion

Fodder value

Natural stands of *H. salicornicum* are important for browsing the animals. It is important component of fodder of the Thar desert in hyper arid region. It is mainly browsed by camels. In the absence of other green forages, animals like goat, donkey and sheep also browse it. During the lean period (November to March) when grasses dry up, its green twigs along with seeds fulfill mineral as well as water requirement of the animals. The green twigs of Lana' locally called as "kanti" are not much liked by cattle but they selectively browse it, when there is deficiency of minerals and salt in their body. Its flowering tops ("fuli" in local dialect) are harvested in month of November-December and stored for using in lean period. Traditionally, it has been exploited as forage supplement since very long time for camels by mixing with other feeds. Generally it is fed to animals after mixing with "guar phalkati" or guar (*Cyamopsis tetragynoloba*) bhusa and "Lasu" dried phylloclades of Phog (*Calligonum polygonoides* L.). The proper feeding of Lana mixed with other fodder improves quantity and quality of milk. However, its sole feeding to milch animal might result in salty taste of milk.

H. salicornicum is also a source of feed to wild animals like deer, blue bull and rabbit etc. It is also the feeding material of Houbara bustard (Launay *et al.*, 1997; Nadeem *et al.*, 2004) in the United Arab Emirates and Pakistan. Being a succulent shrub, its green twigs also fulfill the water requirement of wild herbivorous particularly during acute scarcity of water in hot summer months.

Plant growth

In natural condition, it normally grows to about one meter with crown spread of 1.0-2.0 m. Fast growth of its root at

the time of germination helps in early establishment of the plant in arid situation. Considerable variation in plant growth among various accessions of *H. salicornicum* was recorded. After 18 months of growth plant height among 50 accessions varied from 52 - 115 cm with an average of 86.1cm. Canopy area ranged from 0.38 - 2.24 m² and number of branches varied from 4.0 - 31.7 (Table 1).

Seed yield

H. salicornicum starts fruiting in the second year of growth and considerable variation with respect to seed yield (with perianth) per plant was recorded among different accessions. Maximum seed yield per plant (3.2 kg) was recorded with the accessions CZBHS-46 collected from Jaisalmer district followed by CZBHS-15 Pugal, Bikaner (2.4 kg) with an overall average of 173 g per plant in the third year of planting.

Nutritional value

Several workers (Al-Ani *et al.*, 1971, Al-Ani and Jawad, 1974) have reported high nutritive value of *H. salicornicum* as a forage plant. The analysis showed that fruiting tops contain higher protein (14-19 %) and minerals (21-24%) as compared to twigs (Mondal *et al.*, 2006). Korobkova (1994) also reported higher lysine content at fructification stage in *H. persicum*.

The seeds of *H. salicornicum* with perianth are rich source of nutrients with dry matter-93.0, crude protein-18.9, crude fibre-13.89, ether extract-1.80, ADF-35.91, NDF-71.08 and ash 24.70 percent.

In order to utilize its seeds as a source of concentrate feed, the feeding trial were conducted on goat and cattle at CAZRI, RRS, Bikaner. The results revealed that *H. salicornicum* seeds with perianth can replace the feed concentrates to the extent of 25 and 50% in cattle and goats. In Rathi breed of cattle, the study showed that Lana (*H. salicornicum*) seeds with perianth feeding in concentrate replacing with 25% of Til (*Sesamum indicum*) seed cake of the concentrate in the ration of lactating

Table 1 : Growth parameters of different accessions of *H. salicornicum*

Parameters		Months after planting (MAP)				
		6	12	18	24	30
Plant height (cm)	Range	14.3-61.0	21.2-98.7	52.0-115.0	56.0-112.2	50.0-108.0
	Average	30.2	53.7	86.1	88.0	82.0
	S.D.	8.95	14.53	13.27	14.0	13.2
Number of branches/ plant	Range	2.0-5.3	2.0-16.7	4.0-31.7	8.0-38.3	10.7-37.7
	Average	2.3	7.2	15.3	18.5	21.2
	S.D.	0.97	3.94	5.86	6.45	6.34
Canopy area (m ²)	Range	-	0.03-1.15	0.38-2.24	0.59-2.94	0.70-3.08
	Average	-	0.44	1.24	1.69	1.80
	S.D.	-	0.24	0.48	0.51	0.49

cattle and also increase the milk production, fat, protein and solid not fat (SNF). In Marwari goats, the replacement of 50% of conventional concentrate with Lana seeds showed increasing trend for growth rate and milk production. Its feeding to goats does not effect pregnancy and related features. This establishes the value of *H. salicornicum* as a supplement to normal feed of animals.

Conclusion

H. salicornicum is an important browse shrub for hot arid region. The species apart from all its quality is a good soil binder and does not require much moisture. It can also be used for stabilizing shifting sand dunes. Shankar (1988) also emphasized that in hot arid zone, three browse species viz., Khejri (*Prosopis cineraria* (L.) Druce), Bordi (*Ziziphus nummularia* (Burm.f.) Wight. & Arn.) and Lana (*Haloxylon salicornicum*) together with the predominant grass cover of Sewan (*Lasiurus indicus* Henr.) make a productive silvi-pastoral system. Introduction of elite genotype *H. salicornicum* in suitable habitat can provide the fodder and fuel wood supply during normal and prolonged drought. Lana seeds can also be utilized as a source of concentrate feed for cattle and goats for optimizing animal production in arid region.

Acknowledgements

The authors are grateful to Director, Central Arid Zone Research Institute, Jodhpur for providing the necessary facilities.

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Fodder Potential of Lana

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