

Annual Weeds Add to the Nutritional Level of Forage from Desert Rangelands

J.P. Singh, B.C. Mondal, M.L. Soni and R.K. Beniwal

Central Arid Zone Research Institute, Regional Research Station, Bikaner 334 004, India

Abstract: Annual weeds remain an integral part of the life support system for grazing animals during normal as well as in the feed scarcity periods. Forage samples of 12 annual weeds rated very high by local graziers were evaluated for various nutritional attributes. The crude protein and total carbohydrate contents ranged from 9.5 to 12.6% and 71.4 to 78.7% in the leguminous weeds and from 6.9 to 11.4% and 57.8 to 81.0% in the non-leguminous weeds. The crude protein of major range grasses hardly exceeds 7% and it comes down to 2 to 3% when grasses dry up. The annual weeds thus help in raising the nutritional level of range biomass.

Key words: Annual weeds, nutritive value, leguminous, non-leguminous, desert rangelands, small ruminants, therophytic vegetation.

The rangeland vegetation in the Thar Desert is predominantly therophytic and annual weeds constitute the bulk of vegetation particularly in the rainy season. Most annuals are able to tolerate long droughts and also provide soil cover (Bhandari, 1990). The annual weeds have high grazing value and are particularly preferred by small ruminants viz., sheep and goats. The *Indigofera linnaei* Ali is preferred by sheep over good range grasses (Patil, 1966). The pastoralists harvest important weeds during the post-monsoon and the sun-dried forage is utilized during the lean period.

Looking to the role of annual/seasonal weeds in the grazing-based livestock rearing, particularly small ruminants, their nutritive value was assessed. This paper reports on the nutritive value of 12 annual weeds from desert rangelands of Bikaner district in western Rajasthan.

Materials and Methods

Forage samples of annual weeds were collected towards the end of the rainy season

in October-November 2003 from Pugal, Bikaner and Kolayat tehsils of Bikaner district. Forage value ratings of the species were gathered from pastoralists during the field survey. The plant material was dried in hot air oven at $100\pm 1^{\circ}\text{C}$, ground to pass through 1 mm size sieve and analyzed for nutritional attributes (AOAC, 1990) and fiber fraction (Goering and van Soest, 1970).

Habitats

Dune complex at Pugal: One leguminous species *Indigofera argentea* Burm. f. was collected. The texture of soil was uniformly sandy with less than 6% silt and clay. The fertility of the soil was poor with very low soil organic carbon (SOC 0.10%).

Undulating inter-dunal plains at Pugal: These soils were deep to very deep and of sandy to loamy sand texture underlain by weakly developed CaCO_3 layer. Silt plus clay of these soils ranged from 14-18%. The soil had poor fertility and very low water retention capacity. Plant species viz. *Euphorbia granulata* Forsk., *Indigofera*

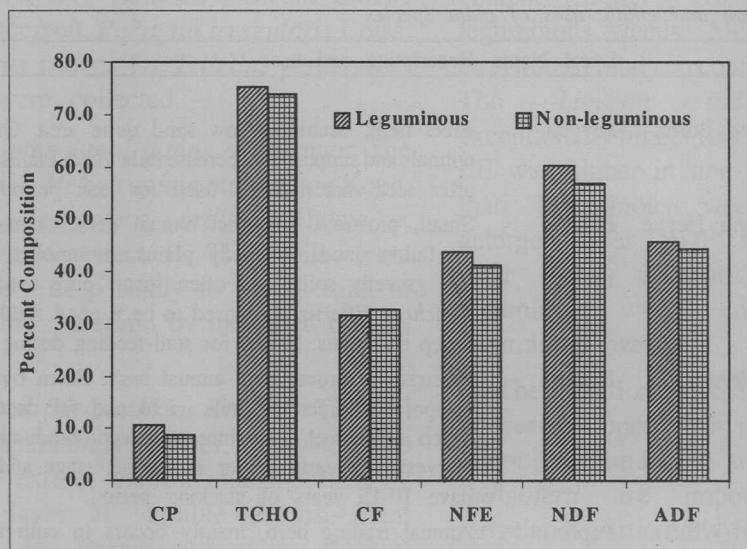


Fig. 1. Nutritive values of leguminous and non-leguminous weeds in arid Rajasthan.

The other species of *Corchorus* i.e. *C. depressus* (Syn. *C. anticorchorus*) is also reported to have 7.76% CP (Mathur and Karwasra, 1967). CP content in *Heliotropium marifolium* was 11.4%. Sethia *et al.* (1987) reported 13.68% CP in leaf and 5.05% in stem of *Heliotropium marifolium*. Our results in *Bergia sufruticosa* (8.2%) are different from those of Singh *et al.* (1987) who found CP content to be 5.31% in shoots and 7.86% in fruits.

The foregoing studies on the chemical composition of various weeds of arid region show their importance in the feeding and nutrition of animals as a scarcity feed. The present study is an attempt to survey for scarcity feeds for small ruminants like goats and sheep in grazing lands. Among range legumes particularly the species of *Indigofera* are rich source of nutrients as they grow on wide range of habitats under low rainfall conditions. The species like

I. cordifolia, sets a lot of seed on maturity, and spread under natural condition (Natrajan *et al.*, 2002). The other leguminous species like *Rhynchosia aurea* provides good foliage and needs proper attention. Among forbs, species like *Corchorus tridens*, *Euphorbia granulata*, *Heliotropium marifolium* and *Limeum indicum* are important to optimize livestock production from less rainfall events. Further, they also have potential ability to grow under sub-normal rainfall. Nutritional attributes of annual weeds indicate that these species are adequate to improve quality of range biomass leading to better health, growth and productivity, particularly during lean period. However, research is needed to assess their agronomic potential. Since most of these species are fed to animals after mixing with other feeds, there is a need to workout the feed ratio of these species with other feeds/feed ingredients.

Table 2. Chemical composition of forage weeds (%)

Plant species	Ash	OM	CP	EE	TCHO	CF	NFE	NDF	ADF
Legumies									
<i>Indigofera argentea</i>	9.4	90.6	10.8	1.2	78.7	41.3	37.4	70.6	56.2
<i>Indigofera cordifolia</i>	17.3	82.7	9.9	1.4	71.4	33.7	37.7	59.7	49.7
<i>Indigofera sessiliflora</i>	13.8	86.2	9.5	1.0	75.7	32.7	43.0	56.8	44.9
<i>Rhynchosia aurea</i>	10.0	90.0	12.6	2.6	74.9	18.6	56.3	53.9	31.2
Mean	12.6	87.4	10.7	1.6	75.2	31.6	43.6	12.6	87.4
CV (%)	29.1	4.2	12.9	46.4	4.0	30.0	20.3	12.1	23.3
Non-legumes									
<i>Bergia suffruticosa</i>	11.6	88.4	8.2	1.6	78.6	32.9	45.7	52.6	35.9
<i>Corchorus tridens</i>	12.6	87.4	7.4	2.2	77.9	33.9	44.0	65.8	47.7
<i>Euphorbia granulata</i>	13.7	86.3	7.8	3.3	75.2	20.0	55.2	39.9	30.6
<i>Heliotropium marifolium</i>	17.4	82.6	11.4	1.9	69.3	27.7	41.6	50.0	34.8
<i>Limeum indicum</i>	34.4	65.6	6.9	0.9	57.8	22.6	35.2	64.8	49.3
<i>Polygala irregularis</i>	7.4	92.6	10.6	1.0	81.0	48.4	32.7	69.6	57.4
<i>Pulicaria crispa</i>	11.9	88.1	7.7	3.0	77.5	40.7	36.8	53.5	50.8
<i>Tribulus pentandrus</i>	14.6	85.4	9.9	1.7	73.8	35.4	38.4	58.7	48.3
Mean	15.4	84.6	8.7	2.0	73.9	32.7	41.2	56.9	44.3
CV (%)	49.6	9.0	17.9	40.2	9.4	26.7	16.3	16.1	19.8

OM = Organic matter, CP = Crude protein, EE = Ether extract, TCHO = Total carbohydrate, CF = Crude fibre, NFE = Nitrogen free extract, NDF = Neutral detergent fiber, ADF = Acid detergent fiber.

References

- AOAC 1990. *Official Methods of Analysis* (15th Ed). Association of Official Analytical Chemists, Washington, DC.
- Bhandari, M.M. 1990. *Flora of Indian Desert* (Revised Edition). MPS Repros, Jodhpur.
- Goering, H.K. and van Soest, P.J. 1970. *Forage Fibre Analysis (apparatus, reagents, procedures and some applications)*. Agriculture Handbook No. 379, ARS, USDA, Washington, DC.
- Mathur, C.S. and Purohit, G.R. 1979. Nutritive value of bekaria (*Indigofera cordifolia*). *Annals of Arid Zone* 18: 267-271.
- Mathur, C.S. and Karwasra, R.S. 1967. Some nutritive aspects of cham-ghas (*Corchorus anticorchorus* Recuschi). *Indian Veterinary Journal* 44: 525-527.
- Mathur, C.S., Nag, T.N. and Goyal, S.C. 1977. Nutritive status of Gokhru as livestock feed in the arid zone of Rajasthan. *Food Farming and Agriculture* 9: 11-13.
- Natarajan, S., Mitra, J. and Jain, R.K. 2002. Species description and soil seed bank of *Indigofera cordifolia*. In *Proceedings of National Symposium on Grassland and Fodder Research in the New Millennium*, pp. 35-37. IGFR, Jhansi.
- Nath, K. and Malik, N.S. 1970. Chemical composition and nutritive value of *Tribulus terrestris* L. *Indian Journal of Animal Sciences* 40: 434-437.
- Patil, B.D. 1966. Bekaria: Sheep grass for eastern Rajasthan. *Indian Farming* 16: 37-41.
- Sethia, M., Mathur, K., Singh, V. and Nag, T.N. 1987. Nutritive status of *Heliotropium* spp. growing in arid zone of Rajasthan: Chemical composition. *Oikoaassay* 4: 25-27.
- Singh, V., Mathur, K., Sethia, M. and Nag, T.N. 1987. Nutritional aspects of dried terrestrial plants growing in arid zone of Rajasthan: Chemical composition. *Geobios* 14: 274-276.