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Potential of *Desmanthus virgatus* (Hedge Lucern) as Rainfed Fodder

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In dry lands, we have a restriction with very narrow sowing window apart from land degradation and poor productivity. Thus, to reduce the risk of crop failure and to have a sustainable farming, the farmers often prefer intercropping rather than single crop. However, at least for six months in a year, there is no vegetal cover on cultivated soil. Even though dairy is an important component in dryland, availability of fodder from natural grasses or fodder crops are negligible. This paper attempts to bring out the attributes *Desmanthus* possess for its suitability as a rain fed fodder crop and its scope to bridge the fodder requirement gap.

Introduction

Even though India is ranked first in livestock population, there is tremendous pressure of livestock on available total feed and fodder, as land available for fodder production has been decreasing. During 1991, the gap between the availability and requirement of fodder was 67 and 137 million tonnes, respectively in terms of dry and green fodder. By 2020, this demand-supply scenario may be around 69 and 145 million tonnes, respectively in spite of raising the area exclusively under fodder cultivation, from the present 4% to at least 10% (Paroda, 1997). At present, the country faces a net deficit of 61.1% green fodder, 21.9% dry crop residues and 64% feeds. These pressures are more countenanced by dryland farmer as they have to totally depend upon rainfall for cultivation. Moreover, land availability and variation in the onset and distribution of monsoon rain further worsen the situation. Thus, the dryland farmers hardly pay any attention to fodder production. They depend upon the crop stover for their livestock, creating an inadequate fodder during lean period. If farm size is small and resources are limited, improvement of farmer welfare in rain fed agriculture may require emphasis different from what we have given in the past.

Table 1: Feed and Fodder Availability and Requirement in India (2005-06)

Feed	Requirement (mt)	Availability (mt)	Shortfall (%)
Concentrate	123	45	63.41
Green fodder	1025	390	61.95
Dry fodder	570	443	22.28

(Source: Hegde, 2006)

The major fodder crops cultivated in India are sorghum, maize, bajra, oats, hybrid Napier, Guinea grass, paragrass, lucerne, berseem, cowpea, velvet bean and others. Among these crops, sorghum, maize, oats, lucerne and berseem are more popular because of easy availability of seeds of improved varieties and well developed technology to increase the forage yield and

quality. However these crops require good quality land, assured source of water, higher doses of fertilizers and regular care, apart from good quality seeds from reliable sources. Cultivation of forage and regular harvesting almost on a daily basis, demands a large number of workforce which is very expensive.

Suitability of Desmanthus for rainfed areas

Plant characteristics: *Desmanthus virgatus* commonly known as hedge lucern belongs to the family Fabaceae (alt. Leguminosae) and subfamily: Mimosoideae. It is a Prostrate, decumbent or erect herbaceous perennial shrub, typically to 0.7 m, occasionally to 1.5 m tall. It is strongly branched from the base, with a taproot to 0.5 m depth. Young stems are green and hairless angular with golden corky ridges. Older stems look hairless, shiny red or brown. Its natural distribution ranges from Texas and Florida in southern USA, Veracruz and Chiapas in Mexico, south throughout Central America and the Caribbean islands to most countries of South America. It is preferred for grazing by herbivores in the native range. However, it is treated as exotic component of improved permanent pastures in northern Australia. In India it is grown in alley farming systems as a hedgerow species.

Soil requirements: It can come up in wide range of soil types from sandy and gravely soils to calcareous soils and rocky clays. *Desmanthus* spp. are generally selected for their persistence on duplex podzolics and cracking clays, including alkaline and sodic soils, but will grow productively on lighter soils of neutral to alkaline reaction.

Moisture requirement: Desmanthus can come up in wide range of rainfall environment from continually wet to those with extended dry seasons. Even though it requires moisture for flowering and spread, it can very well adapt to dry condition. Well adapted rainfall requirement ranges from 550-1000 mm.

Temperature: This fodder crop is well adapted to a wide range to temperature ranging from coastal to sub-montane environments to even frost

Defoliation: Desmanthus is highly tolerant of regular cutting and grazing by ruminants hence, highly suitable in rainfed areas. After cutting to certain height either 0.5 m or 1.0 m, it re-grows rapidly producing numerous fine stem. It tends to shed its leaves during the dry season, but this forms mulch which releases nitrogen after decomposition.

Reproduction: From the age of 6 months its can flower and produce seed. However, it depends on the moisture regime. In one harvest approximately 110 kg/ha of seeds can be collected. Even the pods can be used as fodder especially during the lean months when there is scarcity of fodder.

Pests and diseases: Occasionally, minor damage by psyllid insects (*Accizia* spp.) is reported in northern Australia. The psyllids cause more serious damage in seed crops. Several seed-eating bruchid beetles (5 *Acanthoscelides* spp. and 1 *Stator* sp.) are known to infest *Desmanthus*. It is recorded as a host for alfalfa mosaic virus. No other reports of serious pests and diseases were cited. It is reported to be highly competitive with weeds too due to its growing and spreading habit.

Nutritive value: Crude protein content of the entire plant ranged from 10.5-15.5%, with leaves averaging 22.4% and stems 7.1%. A study of 18 accessions grown in India reported an average CP content of 21% (range 15-27%), and average NDF and ADF contents were 42 and 35%, respectively.

Palatability/acceptability: It is reported to have high acceptability to grazing ruminants. *Desmanthus* has been observed to be less palatable than leucaena (*Leucaena leucocephala*) but more readily eaten than *Stylosanthes scabra*

Toxicity: No toxicities to ruminant livestock were reported in the literature. *Desmanthus* spp. do not cause bloat in ruminants because they contain 2-3% (of total drymatter as tannic acid equivalent) condensed tannins.

Dry matter: On an average *D. virgatus* produced an average 2.0-2.4 t/ha/year in rain-fed, 600-750 mm rainfall environments. In low-rainfall (300-400 mm/year), drought prone environments in northern Australia, *D. virgatus* was one of the very few species that persisted under grazing over a 14 year period.

Strategies to introduce Desmanthus into the system

Intercropping: Desmanthus is fairly shade tolerant, hence could be intercropped with suitable crops or other fodder. Since it is a leguminous fodder crop, intercropping with a grass fodder in appropriate spacing is advisable. The advantages of introducing desmanthus as an intercrop includes:

- the possibility of nitrogen accretion from the legumes to cereal crop
- maintenance of a continuous feed supply during the dry season
- more efficient utilization of low quality cereal residues through the addition of high-potential forages
- Reduced soil and nutrient loss
- increased crop productivity, and
- greater security of return compared to sole cropping

Suitable food crops and fodder crops need to be identified to improve its suitability within the system.

Introducing in waste land: Eroded, infertile land could provide significant additional forages. Initial establishment may found difficult, however, once established they can substantially improve upon the provision of fodder during the lean months. The planting method and suitability of suitable species needs to be assessed for its successful implementation.

Ley farming: It is rotation in a cropping system in which two or more crops are grown in affixed sequence. In other words it is a mixture of grass-legume or ley as a farm crop which becomes an integral part of cropping pattern. Here, the benefits are double; the grass apart from providing fodder improves the soil structure, while the legume enriches the soil. This system meets the fodder demand of cattle, in addition to food needs. It also helps in soil conservation, improves the soil fertility and reduces the cost of input and thus the cost of cultivation. However the inclusion of forage legume leys in the cereal crop rotation means that some land is taken out of food crop production for at least one or more season Hence research is needed to determine this

loss in production is balanced by enhanced production from the cereal crops following the legumes.

Conclusion

In present situation where there is scarcity of land, water and labour, farmers find it difficult to allocate resources to growing forage crops. Once the benefits from forage legumes in providing nitrogen for increased livestock and crop production are realized, we may overcome this barrier. As the supply of forage and feeds determine the profitability of livestock husbandry and livestock being the major source of livelihood for the rural poor, we need to set our priority to address the needs of small farmers by developing various forage production systems, suitable for arid lands. A fodder legume crop with many advantages over other fodder crops demands more focus on research to develop suitable technologies and systems to meet the current fodder demand.

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