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Sorghum (Fodder) Cultivation in Punjab — An Economic Analysis[§]

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Abstract

The study has estimated the economics of production, processing and marketing of sorghum for fodder in Punjab. Sorghum is an important fodder crop during *kharif* season accounting for about one-fourth of the total fodder area in the state. The total variable cost for sorghum has been found to be ₹ 11946/ha and more than 60 per cent of it is being accounted for human labour. During the *kharif* season, paddy is the main competing crop with sorghum and the returns over variable cost from paddy are more than double of the returns from sorghum. More than 60 per cent volume of the total produce is directly sold to the forwarding/commission agent. Silage method of processing is practised during the *kharif* season by only less than 5 per cent fodder growers in the state. Supply of poor quality and un-recommended varieties of seed, shortage of labour especially for harvesting, lack of technical knowledge, low price, lack of market information and delayed payment for the produce by the commission agents have been identified as the major problems being faced by the sorghum fodder growers. The study has emphasized on the need of evolving high-yielding varieties, provision of short-term credit facilities, effective extension programme, establishment of regulated markets and popularization of processing of various fodder crops for broadening the base of fodder cultivation in the state.

Key words: Sorghum cultivation, fodder culture, fodder marketing, fodder economics, Punjab

JEL Classification: Q11, Q13

Introduction

Livestock comprises one of the important components of the economy of Punjab, contributing 14 per cent to the State Domestic Product and one-third to the gross value of agricultural output. The yield of dairy animals in the state, though higher than the national average, is much less than the levels attained in developed countries. The daily fodder availability in the state is 10-12 kg per animal, which is quite low

as compared to the optimum requirements of 40-50 kg per animal. Hence, the milch animals are under-nourished which affects their productivity level. About 5.68 lakh hectare area in the state is under fodder cultivation constituting about 7 per cent of gross cropped area. Sorghum is the important *kharif* fodder covering about 40 per cent of total fodder acreage during *kharif* season in the state. Sorghum as fodder crop has not been able to attract much attention of the researchers in the past for its comprehensive study encompassing production pattern, comparative economics vis-a-vis other competing commercial crops, marketing and processing, etc. Sparse literature is available on the of fodder crops (Basavaraja *et al.*, 2005; Nagpal, 1981; Sharma, *et al.*, 2009; Wylie, 2007). Though a few studies have touched production aspects

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of fodder crops in general and sorghum in particular, scarce efforts have been put to examine its relative profitability, marketing and processing dimensions. For its commercial cultivation, this fodder crop has to compete with paddy – the major challenging crop grown during the *kharif* season in the state. Through processing, the fodder can be fed to animals as green feed; as hay, i.e. crops harvested dry or left to dry if harvested green; or as silage products. Silage or ensilage is a method of preservation of green fodder through fermentation to retard spoiling and this method of processing is more popular in India as compared to hay making. The present study, therefore, has evaluated the cost and return structure associated with sorghum (fodder) along with marketing and processing practices prevalent in the state and has examined the relative profitability of fodder crops in the region.

Data and Methodology

The paper is drawn from a larger study on “Economics of Production, Processing and Marketing of Fodder Crops in Punjab” sponsored by the Ministry of Agriculture, Government of India (Grover *et al.*, 2011). Sorghum, which is one of the important fodder crops in the *kharif* season, was selected for the study. Three districts (Ludhiana, Hoshiarpur and Ferozepur) with the higher fodder acreage were selected purposively. From each selected district, two blocks — one nearer to and another distant from the periphery of district headquarters — were selected randomly. Further from each block, a cluster of 3 - 5 villages was randomly chosen. Finally, a sample of 25 fodder growers was selected randomly from each selected cluster in proportion of different farm-size categories, viz. marginal (< 1 ha), small (1-2 ha), semi-medium (2-4 ha), medium (4-10 ha) and large (>10 ha), making a total sample of 150 households. The primary data pertaining to the year 2008-09 were collected by the personal interview method with the help of a specially-designed schedule. Though fodder processing practices were not commonly prevalent in the region, the silage method of fodder processing was used by a few selected farmers. A sample of 4 fodder processors was randomly chosen from the selected blocks to understand the stages in processing and cost associated with each stage.

Marketing channels for the disposal of sorghum fodder were also studied to assess the cost and margins of different functionaries involved. Ten market

functionaries like forwarding agents/commission agents/chaff cutters/dairy owners/consumers, were selected from the local markets in the selected blocks for data collection. The data on area under fodder crops in Punjab were collected from the secondary sources such as *State Statistical Abstracts* and Director Land Records, Punjab.

Results and Discussion

Fodder Crops Cultivation

Fodder Acreage — In Punjab, on an average, about 5.83 lakh hectare area was under fodder crops during the period 2005-09, covering about 7 per cent of the state gross cropped area. The area under fodder crops has declined continuously from 7.8 lakh hectares during the period 1990-94. The shrinkage in fodder acreage may be attributed to the declining livestock population and increasing yields of fodders during this period. Besides, the fodder crops are grown not for commercial purpose but for meeting the requirements of their own herd. Non-availability of regulated markets for the sale of fodders in the state and these crops being less remunerative as compared to other competing crops, might have contributed towards the decline of area under fodder crops. The fodder crops occupied about 2.64 lakh hectares during *kharif* season and about 2.97 lakh hectares during the *rabi* season. Maize fodder was also cultivated during summer season covering about 0.22 lakh hectares. Sorghum, bajra/ pearl millet (*Pennisetum typhoides*) and guara (*Cyamopsis psoralides*) were the important *kharif* fodders covering around 24 per cent, 14 per cent and 3 per cent of the total area under fodder cultivation in the state. Berseem and oats were the important *rabi* fodders, sharing about 34 per cent and 12 per cent of the total area under fodder cultivation. Maize fodder was also cultured during summer season covering about 4 per cent of the total area under fodder cultivation (Table 1).

Growth Trends — The growth rates in area under fodder crops were calculated for the periods 1990-91 to 1999-00 (Period I) and 2000-01 to 2008-09 (Period II); and also for the entire period. The total area under fodder crops in the state was found to have been dwindled over time. During the period 1990-91 to 2008-09, most of the fodder crops showed a declining trend in area, except guara during *kharif* season and oats during *rabi* season. During *kharif* season, maize

Table 1. Area under major fodder crops, Punjab, 1990-91 to 2008-09 (Five years average)

Crop	(hectares)			
	1990-94	1995-99	2000-04	2005-09
	Kharif			
Sorghum	234293 (30.24)	205281 (29.12)	182340 (27.88)	137894 (23.66)
Bajra (Pearl millet)	93849 (12.11)	96921 (13.75)	108518 (16.59)	83216 (14.28)
Guara	16315 (2.11)	9138 (1.30)	9881 (1.51)	18946 (3.25)
Maize	26986 (3.48)	16643 (2.36)	7906 (1.21)	4670 (3.23)
Others	39658 (5.12)	22132 (3.140)	14505 (2.22)	18799 (45.22)
Sub-total	411101 (53.06)	350115 (49.67)	323150 (49.41)	263525 (45.22)
	Rabi			
Berseem	255010 (32.92)	227037 (32.21)	220397 (33.70)	195226 (33.50)
Oats	57010 (7.36)	65725 (9.32)	63984 (9.78)	68279 (11.72)
Others	30675 (3.96)	42821 (6.07)	29768 (4.55)	34456 (5.91)
Sub-total	342695 (44.23)	335583 (47.60)	314149 (48.04)	297961 (3.64)
	Summer			
Maize	20940 (2.70)	19241 (2.73)	16674 (2.55)	21228 (3.64)
Total fodder	774736 (100.00)	704939 (100.00)	653973 (100.00)	582714 (100.00)

Note: Figures within the parentheses show the percentage to total in each column.

fodder showed the highest reduction in area (-11.74%/ annum) during 1990-91 to 2008-09, while during *rabi* season, berseem (*Trifolium alexandrium*) showed the highest decline in area (-2.0%/ annum) during the same period. Maize fodder area has recorded an increase during the recent years (2000-01 to 2008-09), but also showed the maximum inter-year variations in fodder area during this period as depicted in Table 2.

Economics of Sorghum Fodder Production

The analysis of costs and returns in cultivation of fodder crops in the state revealed that the total variable cost on per hectare basis varied from ₹ 9956 on small

Table 2. Average annual compound growth rates of area and coefficient of variation (CVs*) in acreage of major fodder crops, Punjab: 1990-91 to 2008-09

Crop	(per cent per annum)		
	1990-91 to 1999-00 (Period- I)	2000-01 to 2008-09 (Period- II)	1990-91 to 2008-09
	Kharif		
Sorghum	-3.17 (11.05)	-5.44 (21.03)	-4.03** (22.36)
Bajra/ Pearl millet	0.98 (9.91)	-4.02* (15.29)	-0.36 (13.15)
Guara	-14.65** (33.22)	3.55 (21.64)	1.55 (29.19)
Maize	-6.79 (31.62)	-8.30 (30.90)	-11.74 (65.94)
Others	-16.62* (47.33)	5.56 (62.22)	-8.10 (63.18)
Sub-total	-3.70 (12.46)	-4.10** (12.80)	-3.17 (17.86)
	Rabi		
Berseem	-1.90 (8.27)	-2.90** (8.72)	-2.0 (11.54)
Oats	3.11** (7.62)	-0.24 (9.35)	1.06 (9.73)
Others	0.92 (36.32)	6.60 (26.77)	0.38 (32.53)
Sub-total	-0.70 (6.14)	-1.52* (5.44)	-1.19** (7.75)
	Summer		
Maize	-1.14 (19.32)	4.19 (37.84)	-0.80 (30.15)
Total fodder	-2.25 (8.77)	-2.59** (7.40)	-2.15** (12.08)

Notes: Figures within the parentheses are coefficients of variation

* and ** denote significance at 5 per cent and 1 per cent levels, respectively

farms to ₹ 13823 on the medium farms, with ₹ 11946 on all farms. The variation was due to difference in human labour use, which shared more than 71 per cent of the variable cost. It shows that sorghum cultivation is highly labour-intensive. Expenses on machine labour, FYM, fertilisers and seed were the other important components of the variable cost. Across different farm-size categories, on per hectare basis, large farms had

Table 3. Cost of cultivation of sorghum fodder crop, Punjab: 2008-09

Particulars	Farm-size					Overall
	Marginal	Small	Semi-medium	Medium	Large	
1. Human labour						
Hired	205 (1.9)	78 (0.8)	248 (2.4)	8437 (61.0)	8493 (65.8)	4673 (39.1)
Family	6795 (64.0)	6869 (69.0)	7137 (70.4)	1781 (12.9)	484 (3.8)	3890 (32.6)
2. Machine labour	1437 (13.5)	1433 (14.4)	1265 (12.5)	1253 (9.1)	1511 (11.7)	1352 (11.3)
3. Seed	331 (3.1)	282 (2.8)	250 (2.5)	281 (2.0)	242 (1.9)	270 (2.3)
4. FYM	513 (4.8)	215 (2.2)	484 (4.8)	1054 (7.6)	1222 (9.5)	788 (6.6)
5. Fertilizer	616 (5.8)	483 (4.8)	477 (4.7)	646 (4.7)	614 (4.8)	573 (4.8)
6. Plant protection measures	-	-	-	18 (0.1)	-	6 (0.05)
7. Irrigation	491 (4.6)	387 (3.9)	58 (0.6)	61 (0.4)	59 (0.5)	142 (1.2)
8. Interest on working capital	225 (2.1)	211 (2.1)	215 (2.1)	293 (2.1)	274 (2.1)	253 (2.1)
Total variable cost	10613 (100.0)	9958 (100.0)	10134 (100.0)	13824 (100.0)	12899 (100.0)	11947 (100.0)

Note: Figures within the parentheses show per cent to the total variable cost

to incur the highest expenses on machine labour (₹ 1510), while the expenses on seed were the highest on marginal farms (₹ 331). The expenses on FYM varied between ₹ 215/ha on small farms and ₹ 1222/ha on large farms, which may be due to more availability of FYM on large farms due to bigger herd size. The average farm was found to incur ₹ 573/ha on fertiliser, and there was not much variation across different farm-size categories. No plant protection measures were adopted for the production of sorghum crop. This shows that the attack of insect, pest and diseases was minimal in this crop, as presented in Table 3.

The economics of sorghum fodder was compared with paddy — the most important competing crop during *kharif* season and the relative profitability has been depicted in Table 4. The results showed that the returns over variable cost from paddy on per hectare basis were more than double on all farms irrespective to farm-size categories, except the semi-medium farms.

Most of the farmers were growing fodders to meet requirements of their livestock. Only a few farmers were growing fodder on a commercial scale. Those farmers either wanted to put the area under cultivation for a short duration or desired to cultivate low cost/input consuming crops for commercial purpose.

Marketing System for Sorghum Fodder

There are only unregulated markets for the disposal of crops like fodder in the state, and the markets are highly volatile to their arrivals as the prices drop tremendously whenever there is glut of these crops in the market. Only a few marketing channels/market functionaries exist for the marketing of these crops but all are grossly inefficient and act as damper to their expansion. Only a meagre quantity of fodder is processed in the state by a few farmers.

There were two marketing agencies in the study area. These were forwarding/commission agent and

Table 4. Economics of *kharif* fodder crop (sorghum) vis-à-vis competing crop (paddy), Punjab: 2008-09

(₹/ha)

Farm-size	Sorghum				Paddy			
	Yield (q/ha)	Price (₹/q)	Gross returns	Return over variable costs	Yield (q/ha)	Price (₹/q)	Gross returns	Return over variable costs
Marginal	358	55	19698	9085	57	775	44175	28899
Small	427	56	23929	13973	55	775	42625	27235
Semi-medium	494	54	26676	16545	62	775	48050	31682
Medium	420	57	23934	10111	64	775	49600	32768
Large	482	55	26491	13592	67	775	51925	34371
Overall	448	56	25082	13136	59	775	45725	30090

dairy owners (ultimate buyers). As there were unregulated markets for the disposal of fodder, the produce was directly taken by the producer to the forwarding/commission agent, who in turn forwarded the produce to big dairy owners (ultimate buyers) through the owners/operators of chaff cutter. Some of the produce was directly disposed of to dairy owners in the villages. Only medium and large farmers sold sorghum to the marketing agencies. More than 60 per cent volume of total produce was directly sold to the forwarding/commission agent by more than 23 per cent of the sorghum growers (Table 5).

Table 5. Marketing of sorghum crop through different agencies, Punjab: 2008-09

Particulars	Medium farms	Large farms
Forwarding/commission agent		
Number of sample households selling produce	3 (23.0)	4 (25.0)
Quantity (q)	1871 (60.0)	976 (80.0)
Dairy owner (ultimate buyer)		
Number of sample households selling produce	10 (77.0)	12 (75.0)
Quantity (q)	87 (40.0)	132 (20.0)
Total No. of households selling produce	13 (100.0)	16 (100.0)
Quantity (q)	1958 (100.0)	1104 (100.0)

Note: Figures within the parentheses show percentages to total number and total quantity

The following three major marketing channels were found for disposal of sorghum fodder.

Channel-I: Producer-Forwarding agent/Commission agent-Dairy owner (ultimate buyer)

Channel-II: Producer-Forwarding agent/Commission agent-Chaff cutter- Dairy owner (ultimate buyer)

Channel-III: Producer – Dairy owner (ultimate buyer)

In channel I, the produce was taken to the forwarding/commission agent, who in turn forwarded it to big dairy owners keeping in view their demand for fodder. The forwarding/commission agent charged his commission from the producer as well as from the dairy owner/buyer. In channel II, the owners/operators of chaff cutter purchased the produce from forwarding/commission agent, and provided different services like, chaffing, weighing, packing, loading/unloading, transportation etc. and the produce was ultimately supplied to the dairy owner. In channel III, the produce was directly disposed of to the dairy owners.

The marketing efficiency analysis of different marketing channels has brought out that the producer's share in consumer's rupee was about 74 per cent in channel-I, 70 per cent in channel-II and 100 per cent in channel-III (Table 6). The marketing cost incurred by farmers and dairy owners in channel-I was about ₹ 9/q and ₹ 8/q, respectively. The marketing cost incurred by producer and chaff cutter was ₹ 9/q and ₹ 6/q, respectively and the margins fetched by the chaff cutter were about ₹ 5/q in channel II. In channel III, the produce was sold to the consumers at farm gate, where no marketing cost was involved. However, the farmers got least price for their produce on disposing it through

Table 6. Marketing costs, margins and price spread analysis of sorghum fodder crop during peak season in different channels, Punjab, 2008-09

(₹/q)

Particulars/channels	Medium farms			Large farms			Overall		
	Channel-I	Channel-II	Channel-III	Channel-I	Channel-II	Channel-III	Channel-I	Channel-II	Channel-III
1. Net price received by the producer	48.0 (73.6)	48.0 (69.5)	46.0 (100.0)	46.6 (70.6)	46.6 (70.6)	43.0 (100.0)	47.4 (73.8)	47.4 (70.5)	44.0 (100.0)
2. Marketing costs of producer									
(i) Weighing charges	0.4 (0.6)	0.4 (0.6)	-	0.5 (0.8)	0.5 (0.8)	-	0.4 (0.6)	0.4 (0.6)	-
(ii) Loading/unloading	2.6 (4.0)	2.6 (3.8)	-	2.1 (3.2)	2.1 (3.2)	-	2.3 (3.6)	2.3 (3.4)	-
(iii) Transportation	4.9 (7.5)	4.9 (7.1)	-	4.7 (7.1)	4.7 (7.1)	-	4.8 (7.5)	4.8 (7.1)	-
(iv) Commission charges	1.1 (1.7)	1.1 (1.6)	-	1.1 (1.7)	1.1 (1.7)	-	1.1 (1.7)	1.1 (1.6)	-
Sub-total	9.0 (13.8)	9.0 (13.0)	-	8.4 (12.7)	8.4 (12.7)	-	8.6 (13.4)	8.6 (12.8)	-
3. Selling price of Producer	57.0 (87.4)	57.0 (82.5)	-	55.0 (87.0)	55.0 (83.3)	-	56.0 (87.2)	56.0 (83.3)	-
4. Purchase price of chaff cutter		57.0 (82.5)	-	-	55.0 (83.3)	-	-	56.0 (83.3)	-
5. Costs incurred by chaff cutter									
(i) Chaffing, weighing, etc.	-	4.1 (5.9)	-	-	4.0 (6.1)	-	-	4.0 (5.9)	-
(ii) Commission charges	-	2.2 (3.2)	-	-	2.2 (3.3)	-	-	2.2 (3.3)	-
Sub-total	-	6.3 (9.1)	-	-	6.2 (9.4)	-	-	6.2 (9.2)	-
Net margins of chaff cutter	-	5.8 (8.4)	-	-	4.8 (7.3)	-	-	5.0 (7.4)	-
6. Costs incurred by dairy owners (ultimate buyer)									
(i) Chaff cutter charges*	6.0 (9.2)	-	-	6.0 (9.5)	-	-	6.0 (9.3)	-	-
(ii) Commission charges	2.2 (3.4)	-	-	2.2 (3.5)	-	-	2.2 (3.4)	-	-
Sub-total	8.2 (12.6)	-	-	8.2 (13.0)	-	-	8.2 (12.8)	-	-
7. Dairy owner's (ultimate buyer's) price	65.2 (100.0)	69.1 (100.0)	46.0 (100.0)	63.2 (100.0)	66.0 (100.0)	43.0 (100.0)	64.2 (100.0)	67.2 (100.0)	44.0 (100.0)

Note: *Includes chaffing, weighing, packing, loading/unloading, transportation, etc charges

Figures within the parentheses show percentage of consumer's price

Channel-I: Producer-Forwarding/commission agent-Dairy owner

Channel-II: Producer-Forwarding/commission agent-Chaff cutter-Dairy owner

Channel-III: Producer-Dairy owner

Table 7. Problems related to production and marketing of sorghum, Punjab: 2008-09

(% multiple response)

Particulars	Marginal farms	Small farms	Semi-medium farms	Medium farms	Large farms	All farms
Seed quality	37	24	29	36	27	33
Technical knowledge	24	15	26	27	18	26
Access to credit	24	34	25	31	18	27
Availability and cost of labour	-	-	9	19	36	13
Market information	-	-	-	33	25	29
Output price related problems	-	-	-	33	50	43
Role of intermediaries	-	-	-	33	33	33

this channel. But very small quantities were marketed through channel-III.

Fodder Processing and Costs Involved

The practice of fodder processing – silage/hay making — was not common in the state, less than 5 per cent of the fodder growers were found following such preparations. The green fodder in the state is available throughout the year as multi cut varieties of fodder have prolonged the harvesting season of fodder crops. Besides, the dry fodder (mostly wheat straw) is easily and cheaply available in the state due to the predominance of wheat crop during the *rabi* season. Therefore, when green fodder is in short supply, dry fodder is available. Even the farmers who were involved in fodder processing were of the view that the processed fodder imparts smell to the milk. Silage or ensilage is practised during the *kharif* season when sorghum and bajra are mixed, chaffed and put in an underground pit. The average storage capacity of the pit was found to vary from 1500 quintals for medium-size farms to 3000 quintals for large-size farms. The storage period was up to one year (July to August). Sometimes, a part (<1%) of the produce gets spoiled as rain water enters from the corners of the sheets used. The post-harvest operational cost involved in silage making was about ₹ 11/q. About 74 per cent of the operational cost was incurred during chaffing, followed by transportation (18%) and pit making (6%).

Problems Faced by Sorghum Fodder Growers

The production and marketing problems being faced by the fodder growers in the state were identified and are presented in Table 7. More than 31 per cent of

the farmers complained about the supply of poor quality and un-recommended varieties of seeds for sorghum fodder crop. Most of the fodder growers reported about shortage of labour especially during harvesting, which is highly labour-intensive. The multi cut varieties of fodder require human labour frequently and for prolonged duration during the harvesting season. The problem was more severe for semi-medium, medium and large farmers as they were more dependent on the hired labour for carrying out various agricultural operations. Being less important crops, the extension camps for these crops are seldom organised and the farmers lack technical knowledge about efficient cultivation of fodder crops. Being, the subsistence crop, the access to credit for these less commercialized crops was poor and was discouraged by the financing agencies.

Low price in the market was the major marketing problem confronted by sorghum fodder growers. Lack of market information was reported as another bottleneck faced in the marketing of fodder as there were no regulated markets for disposal of fodder in the state. The sharp fluctuations in prices in wake of even small changes in production/supply were also impacting the cultivation of these crop choices as prices are dependent on the demand for fodder by dairy owners. About 33 per cent of the farmers reported about delayed payment for their produce by the commission agents in the market.

Conclusions and Policy Implications

The area under fodder crops in Punjab has been diminishing continuously for the past two decades which might be attributed to the lessening of livestock

population and growing productivity of fodders during this period. Besides, the fodder crops are grown by the farmers to meet requirements of their own livestock herd and not for commercial purpose. Non-availability of regulated markets for fodders in the state and lower profitability of these crops have also attributed to the decline in their area.

The study has revealed that only two marketing agencies operate in the study area. Fodder is sold to the forwarding/commission agent and dairy owner (ultimate buyer) by the growers. More than 60 per cent volume of the total produce is directly sold to the forwarding/commission agent by more than 23 per cent of the sorghum growers. In Channel-I (Producer-Forwarding agent/Commission agent- Dairy owner (ultimate buyer), the producer's share in consumer's rupee has been found to be 74 per cent, while in Channel-II (Producer-Forwarding agent/Commission agent-Chaff cutter- Dairy owner (ultimate buyer), it is about 70 per cent.

Fodder processing is not commonly practised in the state and less than 5 per cent of the fodder growers undertake such preparations. Silage or ensilage method of fodder processing is more popular than hay making in Punjab. It is practised during the *kharif* season when sorghum and bajra are mixed, chaffed and put in a underground pit. The cost involved in silage making has been found to be about ₹ 11/q which comprises chaffing (74%), transportation (18%) and pit making (6%). Supply of poor quality and un-recommended varieties of seed, shortage of labour especially during harvesting period, lack of technical knowledge, poor access to credit, low price in the market, lack of market information and delayed payment have been identified as the major constraints confronted by the fodder growers in the state. Since fodder availability in the state is 10-12 kg/animal/day against the requirements of 40-50 kg/ animal/ day, the production of fodder needs to be augmented manifold. As one of the viable means of diversification, cultivation of fodder should be promoted to strengthen the milk/livestock base in the state.

Fodders which have been accorded low priority so far, deserve special attention/effort of the researchers in terms of evolving high-yielding varieties. The availability of quality sorghum seed in adequate

quantity is a major constraint confronted by the growers. The central government subsidy being provided for purchasing of quality berseem seed to cattle farmers needs to be enhanced liberally and extended to other fodder crops including sorghum. The primary agricultural credit cooperative societies and other funding agencies should extend short-term credit facilities to fodder crops also. There is a need to make more efforts through extension services to update farmers about the latest know-how regarding these crops. On the marketing front, there is a need of regulated markets with better market infrastructure in the state. To popularise fodder processing in the state, there is need to generate awareness amongst the fodder growers regarding the subsidy of 80 per cent being provided by the central government for making silo pits with automatic loader.

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