



ESTIMATION OF BUSINESS POTENTIAL IN SORGHUM FODDER AND SEED PRODUCTION

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Abstract

Economics of scientific sorghum fodder and sorghum seed production was analysed from 2010-11 to 2012-13. The average per hectare total cost of cultivation incurred in scientifically grown sorghum fodder production was Rs 22738.20 and for sorghum seed production was Rs 30196.9. The average per hectare green fodder production was 523.89 quintals in sorghum fodder production while in sorghum seed production, the dry fodder yield was 72.07 quintals. In sorghum seed production, total quality seed received was 895.36 kg. The average per hectare total return and net return in sorghum fodder production was Rs 52388 and Rs 29650.68 respectively and in case of sorghum seed production Rs 60789.58 and Rs 29182.35 respectively. The benefit cost ratio in sorghum fodder production was 2.31 and in case of sorghum seed production was as 1.92. In sorghum fodder production, the cost of fodder production per quintal was found as Rs 43. It is the cost at which the farmers use the fodder for their livestock. While the cost of sorghum seed production per kg was found as Rs 11.81 when farmer able to utilize the byproducts and Rs. 35.99 when farmer is not utilizing the byproducts.

Key words : Comparative Economic analysis, sorghum fodder production, sorghum seed production, benefit-cost ratio.

Introduction

Cultivated fodder has an important role in meeting requirement of various nutrients & roughage to produce milk most economically. Feeds given to animals not only meet nutrient requirement but fills the rumen to satisfy the animal. Fodder crops provide all the critical elements like highly digestible protein, carbohydrates, fats and minerals. The livestock sector in India contributes in the range of 30 to 35 percent in total agricultural output.

The desired annual growth of agriculture sector can be accomplished only through enhancing overall productivity of the livestock sector. This requires a steady and adequate supply of quality fodder for supporting the livestock population.

One important fodder is from Sorghum. It is a warm-season annual fodder crop and grown widely by the farmers for fodder and grain production. The fodder is used for direct feeding and for silage making. The sorghum plant is a tall, erect annual grass, up to 5 m high. Sorghum

roots are adventitious and the root system can extend from the top 90 cm soil layer to twice that depth. It is a drought resistant annual crop and is cultivated mainly for fodder and grain (FAO, 2011). It is not suited to higher elevations (more than 1200 m). It can be grown on any soil except on very sandy soils. Forage sorghum can be grazed (young or as deferred fodder), cut fresh, made into hay or ensiled. If it is a single cut, it should be harvested at 60-65 days (50% flowering) after sowing and if it is a multicut, the first cut is 60 days after sowing and subsequently once in 40 days. Sorghum can be harvested after flowering stage for green fodder (Harada *et al.*, 2000). Compared with corn plants, it uses water more efficiently which is important in Bundelkhand like areas where irrigation is limited or there is a greater chance of drought. The feeding value of forage sorghum is influenced greatly by variety planted and stage of maturity at harvest. Sorghum can grow well in areas with less rain and produces the same amount of fodder as maize. This way the farmers can reduce the cost of replanting, land preparation, seeds and time (Lambert *et al.*, 1999).

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For fodder purpose, its seed gets huge demand in the market. The timely availability of seed to the farmers gets the full potential of its fodder. Thus, assurance of quality seed assures the high green fodder yield also. Thus, the study has been initiated to make a comparative economics of scientific sorghum fodder production, sorghum seed production and traditional sorghum fodder production for providing an opportunity to farmers/seed companies/dairy owners for taking the advantage of three different enterprises.

Materials and Methods

The data for sorghum fodder production are for year 2011-12 and 2012-13 from 10 farmers' fields in Datia, M.P. with the commercial variety MP Chari. The demonstrations were initiated under the supervision of IGFR, Jhansi. The fields were prepared first by harrowing/cultivator for good tilth and seed were sown manually/seed drill in line at 25 cm distance. The seed rate was 40 kg per hectare and 80 kg DAP was applied as basal dose and 80 kg Urea was applied (50% as basal and 50% as topdressed). Crop was rainfed and in demonstrations crop, on an average two cuttings were taken, while in traditional crop only one cutting was taken. First cutting for fodder was taken after 50-60 days of sowing and second after 30 days of first cutting. Rate of green fodder was estimated as Rs 100/quintal.

For sorghum seed crop (var. MP chari), the data were collected during *Kharif* 2011-12 and *Kharif* 2012-13 at IGFR, Jhansi from three different fields.

The fields were prepared by harrow and cultivators. The seed rate was 18 kg per hectare and crop was sown by seed drill and 100 kg DAP was applied as basal dose and 100 kg Urea was applied in two times (50% as basal and 50% as top dressed). As crop was sown in Rainy season, so irrigation was not required. No fodder cuttings were taken. The variable cost and fixed cost were calculated for different machines used and multiplied with hours for which they used to find the expenditures incurred on them. The prevalent labour rate was taken as per manday for 8 hours was Rs 150 in 2011-12 and 2012-13. The total variable cost is calculated by adding three percent interest to total working capital. The addition of all the fixed cost, overhead cost and rental value of land gives the total fixed cost. The rental value of land was considered as the prevailing in the locality that is Rs 5000/ha for one crop (Kumar *et al.*, 2013). Management and risk was considered as ten percent of total variable and fixed cost. The cost of cultivation data were calculated for every stage of crop growth. The rate of dry fodder received from harvesting was calculated at Rs 300 per quintal. The rate for pure seed was considered as Rs 35

per kilogram in 2011-12 and Rs 50 per kg in 2012-13.

To study the comparative impact of scientific sorghum fodder production and traditional sorghum fodder production, 5 farmers' fields were selected that are growing the sorghum fodder crop in traditional ways in 2011-12 and 2012-13. The impact analysis was also made.

Results and Discussion

Operation wise cost of cultivation

Operation wise cost of production is calculated over individual farms then the data are converted into per hectare basis and presented in table 1. In case of Scientific fodder production, it was found that highest cost was incurred in fodder cutting (Harvesting) as Rs 6777.20 (29.81% of total cost) and followed by manures and fertilizers as Rs 4719.98 (20.76 % of total cost). The variable cost was Rs 15354.24 per hectare (67.53% of total cost) and the fixed cost was 23.38% of total cost. The total cost of Sorghum fodder production was found as Rs 22738.20 per hectare.

While in case of Sorghum seed production, the harvesting and pooling has incurred the highest expenditure that was Rs 5500 (19.27% of total cost) followed by manures and fertilisers (17.93% of total cost). Two rougings are performed and the average cost incurred on that is Rs 2293.1. The harvesting was done manually by sickle. The total variable cost is found as Rs 21082.7. The rental value is taken as Rs 5000 per hectare as this is found prevalent in the locality. The total fixed cost is found as Rs 5175.5 per hectare. The share of variable cost and fixed cost in total cost is 73.86 percent and 18.13 percent respectively. The average total cost is found as Rs 30196.9 per hectare (table 1).

The input/itemwise numbers and cost distribution is analyzed and presented in table 3. The total labour mandays used in sorghum fodder production was 32.75 per hectare while in sorghum seed production, the total labour mandays used was 87.69. The higher mandays were involved in sorghum seed production was due to numbers of operations that involved human labour as weeding, rouging and harvesting. The percentage expenditure made on labour was also found highest in both fodder production and seed production which was 24.41 and 46.08 percent, respectively. This also confirms the findings of Langyintuo *et al.* (2003) that labour often accounts as highest cost in the total cost of production. In fodder production, the crop was rainfed and no irrigation was required (table 2).

Per hectare economics of sorghum seed processing is shown in table 3. The net graded seed was found as 895.36 kg and some other by products were also received.

Table 1 : Operation wise cost expenses (Rs/hectare) in sorghum fodder and seed production.

Operations	Scientific fodder crop production (average)	Percent	Scientific fodder seed production (Average)	Percent
Field preparation	1374.72	6.05	1076.5	3.77
Sowing	2035.13	8.95	1052.3	3.69
Manures and fertilisers	4719.98	20.76	5118.9	17.93
Irrigation	-	—	0.0	0.00
Weeding	-	—	4500.0	15.77
Rouging	-	—	2293.1	8.03
Fodder cutting	6777.20	29.81	—	
Harvesting and pooling			5500.0	19.27
Threshing	-	—	927.8	3.25
Total working capital	14907.03	65.56	20468.6	71.71
Total variable cost	15354.24	67.53	21082.7	73.86
Rental value of land	5000	21.99	5000.0	17.52
Total fixed cost	5316.85	23.38	5175.5	18.13
Total variable cost + Total fixed cost	20671.095	90.90	26258.2	91.99
Management & Risk	2067.11	9.09	3938.7	13.80
Total Cost	22738.20	100.00	30196.9	105.79

Table 2 : Item wise cost distribution in Sorghum fodder and seed production (per hectare).

Particulars	Sorghum fodder production	Percent	Sorghum seed production	Percent
Draft power				
Draft power, hours	2.40		8.98	
Draft power cost, Rs	995.36	4.99	1933.07	6.77
Labour power				
Total mandays, Numbers	32.75	—	87.69	
Total Labour cost, Rs	4867.62	24.41	13153.23	46.08
Seed cost, Rs	2250	11.28	773.43	2.71
Manures and Fertilizers, Rs	4290.91	21.52	4608.91	16.15
Irrigation	-	0.00		
Tubewell hours, Numbers	-	0.00	0.00	
Tubewell cost, Rs	-	0.00	0	
Plant protection chemicals, Rs	-	0.00	0	
Total Working capital, Rs	12403.9	62.21	20468.63	71.71
Interest on WC, Rs	372.11	1.87	614.06	
Total variable cost, Rs	12776.02	64.07	21082.69	73.86
Fixed and other overhead cost, Rs	350.77	1.76	175.50	
Rental value of land, Rs	5000	25.08	5000.00	17.52
Total fixed cost, Rs	5350.77	26.84	5175.50	18.13
TVC+TFC, Rs	18126.8	90.91	26258.19	91.99
Management & risk, Rs	1812.68	9.09	3938.73	
Total Cost, Rs	19939.48	100.00	30196.92	105.79

The dry fodder was 7207.06 kg (table 3).

The return received from processed seed and other by products from field and processing unit in case of seed production are presented in table 3. The total cost involved in seed production was Rs 31607.24 per hectare and total return from various items as graded seed, waste seed and straw from processing and green fodder from harvesting green crop was Rs 60789.58 per hectare (table 3).

The comparative cost and return analysis for sorghum fodder and seed production are shown in table 3. It is found that total cost incurred in fodder production was Rs 22738.20 and sorghum seed production was Rs 31607.24 per hectare. Per hectare green fodder production was 523.89 quintals in sorghum fodder production. The value of green fodder is estimated at Rs 100 per quintals (the rate at which fodder is sold in limited

Table 3 : Cost and return analysis for Sorghum (MP chari) fodder and seed production (per hectare).

Parameters	Average for green fodder production	Average for graded seed production
Total cost (Rs)	22738.20	31607.24
Green fodder (qtl.)	523.89	—
Rate (Rs/qtl.)	100.00	—
Dry fodder (qtl.)	—	7207.06
Rate (Rs/qtl.)	—	300
TFL seed (kg)	—	895.36
Rate for TFL seed (Rs/kg)	—	42.50
Gross return (Rs)	52388.89	60789.58
Net return (Rs)	29650.68	29182.35
Benefit : Cost ratio	2.31	1.92
Cost of green fodder/pure seed (Rs/quintal)	43	—
Cost of graded seed when only main product is considered (Rs/kilogram)	—	35.99
Cost of pure seed, when both main and byproducts are considered (Rs/kilogram)	—	11.81

urban fodder markets). Most of the fodder is produced by the farmers for their livestock consumption only. The gross return was Rs 52388.89 per hectare in sorghum fodder production, while it is Rs 60789.58 in case of sorghum seed production. The net return per hectare was found as Rs 29650.68 in sorghum fodder production and Rs 29182.35 in sorghum seed production.

The benefit cost ration in case of sorghum fodder production was 2.31 and in case of sorghum seed production was 1.92. The cost of one quintal fodder production was found as Rs 43. This is the cost at which the farmer uses the green fodder for its livestock. If there is market for green fodder, the farmer is able to sell green fodder up to Rs 100 per quintal and receives the significant margin over the cost. In case of seed production, the cost per kg of graded seed production was Rs 11.81 when by product were also utilized and Rs 35.99 per kg only pure seed was used and no by products (table 3).

Thus, it is clear from the study that if there is market for the sale of green fodder, the sorghum seed production is highly profitable. The price of sorghum seed varies in the market from Rs 40 per kilogram to Rs 55 per kilogram, the farmers can take the advantage of high price during the sowing season, so they are advised to sell the seed during the sowing season.

Conclusion

From the finding, it is concluded that cost of sorghum fodder production is about half the cost of sorghum seed production. However, the sorghum seed production leads to more employment of resources and bringing the quality seed for next season and reduces the farmers'

dependability on uncertain market. The area under sorghum fodder and demand for quality sorghum seed are complementary in nature. As if there is more area under sorghum fodder, the health of livestock will be good and also the production from them will be higher. This will increase the demand for quality sorghum seed. The farmers can also leave a small area for sorghum seed production to reduce the uncertainty of seed availability in next season and also receive the seed at half of the cost of seed in market.

References

- FAO (2011). *Grassland Index*. A searchable catalogue of grass and forage legumes. FAO.
- Harada, H. Y. Yoshimura, Y. Sunaga and T. Hatanaka (2000). Variations in nitrogen uptake and nitrate-nitrogen concentration among sorghum groups. *Soil Sci. Plant Nutr.*, **46** (1) : 97-104.
- Lambert, G.A., T. B. Hilder, H. G. Bishop and R. M. Dodt (1999). Regeneration of drought-affected Queensland bluegrass pastures. In: *People and rangelands: building the future*. Proceedings of the VI International Rangeland Congress, Townsville, Queensland, Australia, 19-23 July, 1999, **1 and 2** : 277-278.
- Kumar, V. (2009). Assessment Of Marketing Charges And Price-Spread Under Different Channels In Marketing of Wheat. *Plant Archives*, **9** (1) : 171-172.
- Kumar, V., Khem Chand and Harish C. Pandey (2014). Impact of improved technology of oat fodder production on farmers income. *An Int. J. of Agro Economist*, **1**(1) : 25-28.
- Thomas, C. George (2008). Fodder sorghum. Forage crop production in the tropics. Book from Kalyani Publications 2008. 2nd edition. 2008 : 113-116.