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Original Research Article

Economics of Foxtail and Little Millets Production in Ballari and Koppal Districts of Karnataka, India

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A B S T R A C T

Foxtail and littlemillets hold great potential in contributing substantially to food and nutritional security of the country and thus they are not only a powerhouse of nutrients, but also are climate resilient crops and possess unique nutritional characteristics. Karnataka is one of the major producers of foxtail. Based on highest area under production of foxtail millet, two districts, Ballari and Koppal, were selected for the study. Forty sample farmers cultivating foxtail millet from each district were interviewed. Since the area under little millet cultivation is limited, snowball sampling technique was employed to collect data from 40 little millet growing farmers in Ballari and Koppal districts. The net returns work out to be `12,116 and `11,506 with a return per rupee of investment of 1.60 and 1.52 for foxtail and little millet farmers. Human labour cost, bullock labour cost, machine labour cost and seed cost in foxtail millet and human labour cost and machine labour cost in little millet were significant and positive thus foxtail and little millet production was highly influenced by these factors respectively. Marketable surplus of foxtail and little millet was found to be around 88 per cent.

Keywords

Foxtail and Little Millets, Net returns Marketable surplus

Introduction

Millets are a group of highly variable small seeded grasses, widely grown around the world as cereal crops or grains for fodder and human food. Generally, these are rainfed crops grown in areas with low rainfall and thus resume greater importance for sustained agriculture and food security. The crops are favoured due to their productivity and short growing season under dry, high-temperature conditions. Millets hold great potential in contributing substantially to food and nutritional security of the country and thus they are not only a powerhouse of nutrients, but also are climate resilient crops and possess unique nutritional characteristics. The unique nutritional properties of millets, with high fibre, quality protein and minerals composition being called as "nutri-cereals". Millets are used for food, feed, forage and industrial or other products in tropical or temperate regions. Individual millet species or varieties frequently possess some unusual characters for adaptation or use, like tolerance or resistance to drought, high temperatures, low soil fertility and diseases or pests; or for making special foods or beverages. They are resource efficient crops grown with limited water and usually without application of any fertilizers or other inputs by a multitude of small-holder farmers in many countries. Karnataka is one of the major producers of millets such as ragi,

jowar, bajra, foxtail with an area of 20,038 ha, production of 10,906 tonnes and a productivity of 573 kg/ha and little millet with an area of 14425 ha, production of 14,132 tonnes and at a productivity of 1031 kg/ha(Anon, 2018a).Farmers in Karnataka have doubled acreage to around 40,000 hectares under minor millets majorly for foxtail because of promotions in relation to foxtail nutritional value and its comparatively higher yield than other millets (Anon, 2018b).Millets are now emerging need for alternating meal, fill the gap in the absence of essential nutrients. Since NEK is leading producer of foxtail millet (*Navane*) and now area under little millet (*saame*) is also increasing in the study area.

Materials and Methods

The primary data were collected from millet producing farmers regarding production cost, which includes labour cost and material costs. The relevant information on other aspects like fixed assets, land use, cropping pattern, yields and returns, quantity sold, price realized and the constraints faced by respondents in production and marketing were also collected from respondents. Based on highest area under production of foxtail millet, two districts, Ballari and Koppal, were selected. Basedon area under cultivation Hagaribommanahalli and Siruguppa taluk were selected from Ballari district and Yelburga and Koppal taluk from Koppal district. Foxtail millet farmers were interviewed using pre tasted questionnaires. Forty sample farmers cultivating foxtail millet from each district were interviewed. Since the area under little millet cultivation is limited, snowball sampling technique was employed to collect data from little millet growing farmers in Ballari and Koppal districts. A total of 40 little millet cultivating farmers were interviewed. Production function analysis is used in the present study to analyse the resource productivity and resource use efficiency. Tabular method was employed to compile the cost and returns of foxtail millet and little millet cultivation and marketed surplus.

Results and Discussion

Cost and returns of foxtail millet cultivation

The costs incurred in the cultivation of foxtail millet and returns obtained are presented in Table 1. The findings of the study clearly showed that the per hectare variable cost of foxtail millet was ₹13,281/ha. The major variable cost constituted bullock labour (12.69%) followed by chemical fertilizers (10.51%), FYM (9.86%), men labour (9.74%), machine labour (7.38%), women labour (6.11%), interest on working capital (4.91%), seed cost (2.60%) and PPC (2.43%) and the variable cost in foxtail millet cultivation was 66.23 per cent of total cost.

The fixed cost for foxtail millet was `6,774/- which constituted 33.78 per cent of total cost of cultivation in foxtail millet.

The per hectare average yield obtained by farmers was 12.05 quintals in case of foxtail millet and the farmers had realized an average price of `2,619 per quintal. The per hectare with a total gross returns obtained by foxtail millet growers was `32,658. The net returns work out to be `12,116. The cost of production per quintal was `1,664. Thus the return per rupee of investment was worked out to be 1.60.

The cost of cultivation of foxtail millet was worked out and major share was of variable cost which included labour cost and material input cost. In material input cost, FYM and fertilizer had a major share and the expenditure on plant protection chemicals was very less since foxtail millet is a hardy crop. Fixed cost incurred was one third of

total cost in which land rent had a major share, since foxtail millet is dry land crop and doesn't require much of investment.

It could be observed that the cost of cultivation was less because this is cultivated in dry land and requires minimum inputs like fertilizer and FYM. Accordingly the cost of cultivation is worked out and foxtail millet is profitable in the study area with returns per rupee of investment ratio of 1.60 these results are in confirming with the results of Kusuma (2011) and Alagodi (2013).

Cost and returns of little millet cultivation

The costs incurred in the cultivation of little millet and returns obtained are presented in Table 2. The findings of the study clearly showed that the per hectare variable cost of little millet was `15,031/ha. The major variable cost constituted bullock labour (15.38%) followed by chemical fertilizers (10.50%), FYM (9.70%), men labour (8.71%), machine labour (7.14%), women labour (5.19%), interest on working capital (5.00%), seed cost (3.16%) and PPC (2.69%) and the variable cost in little millet cultivation was 67.47 per cent of total cost. The fixed cost for little millet was `7,247/- which constituted 32.53 per cent of total cost of cultivation in little millet.

The per hectare average yield obtained by farmers was 10.65 quintals in case of littlemillet and the farmers had realized an average price of `3,107 per quintal. The per hectare with a total gross returns obtained by little millet growers was `33,784. The net returns work out to be `11,506. The cost of production per quintal was `2,092. Thus the return per rupee of investment was worked out to be 1.52.

The cost of cultivation of little millet worked out and major share was of variable cost which included labour cost and material input cost. In material input cost on FYM and fertilizer had a major share and the expenditure on plant protection chemicals had was very less since little millet is a hardy crop. Fixed cost incurred one third of total cost in which land rent had a major share, since little millet is dry land crop and doesn't require much of investment. Similar types of findings were observed by Naik *et al*., (2013) and Alagodi (2013). Results of Kumar *et al.*, (2013) in cost of cultivation as well as in returns per investment in little millet was very less when compared to study results but returns per of rupee investment was found to be similar and profitable.

Resource use efficiency of foxtail millet and little millet

The main aim of any production unit is the better co-ordination and utilization of various resources to realize the greater return. An attempt was made to analyse the productivity of various resources in production of millets. The analysis was done separately for the cultivation of foxtail millet and little millet.

The cobb-douglas type of production function was fitted to the farmers data by taking gross returns as dependent variable and various production input expenses like human labour cost(X^1), Bullock labour cost(X^2), Machine labour cost(X^3), seed cost(X^4) and fertilizers cost (X^5) as independent variables.

Production function estimates in foxtail and little millet cultivation

The details of production function estimates in foxtail and little millet cultivation are presented in Table 3 As indicated in the table, the coefficient of determination (R^2) was 0.97 and 0.95 which indicated that the variables in the function had explained 97 and 95 per cent of variation in output of both foxtail and little millet, respectively.

Table.1 Cost and returns structure of foxtail millet cultivation

(₹/ha)

Sl. No.	Particulars	Value (₹)	Per cent
I	**Variable cost**		
1	**Material input cost**		
A	Seed	522	**2.60**
B	FYM	1977	**9.86**
C	Chemical fertilizer	2107	**10.51**
D	Plant protection chemicals	487	**2.43**
2	**Labour cost**		
E	Men labour	1953	**9.74**
F	Women labour	1226	**6.11**
G	Bullock labour	2545	**12.69**
H	Machine labour	1480	**7.38**
3	**Interest on working capital @8%**	984	**4.91**
	Total variable cost	**13281**	**66.23**
II	**Fixed cost**		**0.00**
A	Land revenue	21	**0.10**
B	Depreciation	1568	**7.82**
C	Rental value of land	4569	**22.79**
D	Interest on fixed capital @10%	616	**3.07**
	Total fixed cost	**6774**	**33.78**
III	**Total cost of cultivation (I+II)**	**20055**	**100.00**
IV	**Returns**		
A	Main product (q)	12.05	
B	By product (tonne)	4.22	
C	Price of main product (₹/q)	2619	
D	Price of by product (₹/tonne)	145	
G	**Gross returns**	**32171**	
H	**Net returns**	**12116**	
I	**Cost of production per quintal**	**1664**	
J	**Returns per rupee of investment**	**1.60**	

Table.2 Cost and returns structure of little millet cultivation

(₹/ha)

Sl. No.	Particulars	Value (₹)	Per cent
I	**Variable cost**		
1	**Material input cost**		
A	Seed	**703**	**3.16**
B	FYM	**2162**	**9.70**
C	Chemical fertilizer	**2340**	**10.50**
D	Plant protection chemicals	**600**	**2.69**
2	**Labour cost**		**0.00**
e	Men labour	**1940**	**8.71**
f	Women labour	**1156**	**5.19**
g	Bullock labour	**3427**	**15.38**
h	Machine labour	**1590**	**7.14**
3	Interest on working capital @ 8%	**1113**	**5.00**
	Total variable cost	**15031**	**67.47**
II	**Fixed cost**		**0.00**
a	Land revenue	**26**	**0.12**
b	Depreciation	**1662**	**7.46**
c	Rental value of land	**4900**	**21.99**
d	Interest on fixed capital @10%	**659**	**2.96**
	Total fixed cost	**7247**	**32.53**
III	**Total cost of cultivation (I+II)**	**22278**	**100.00**
IV	**Returns**		
a	Main product (q)	10.65	
b	By product (tonne)	2.4	
c	Price of main product (₹/q)	3107	
d	Price of by product (₹/tonne)	289	
g	**Gross returns**	**33784**	
h	**Net returns**	**11506**	
i	**Cost of production per quintal**	**2092**	
j	**Returns per rupee of investment**	**1.52**	

Table.3 Resource use efficiency of foxtail and little millets

(Per hectare)

Sl. No.	Variables	Parameters	Foxtail millet (n=80)		Little millet (n=40)	
			Coefficients	t Stat	Coefficients	t Stat
1	Intercept	a	7.0874** (0.1998)	37.47	8.3030** (0.5607)	14.80
2	Human labour cost	X_1	0.2122** (0.0220)	9.62	0.3378** (0.0115)	29.25
3	Bullock labour cost	X_2	0.1450** (0.0178)	8.4	0.0012 (0.0083)	0.15
4	Machine labour cost	X_3	0.0829** (0.0290)	2.85	0.0279** (0.0121)	2.30
5	Seed cost	X_4	0.1592** (0.0442)	3.59	0.0740 (0.0793)	-0.93
6	Fertilizer cost	X_5	0.0114 (0.0188)	0.60	0.0389 (0.0270)	-1.44
	Coefficient of multiple determination	**R^2**	**0.97**		**0.95**	
	F value	**-**	**700.55**		**185.57**	

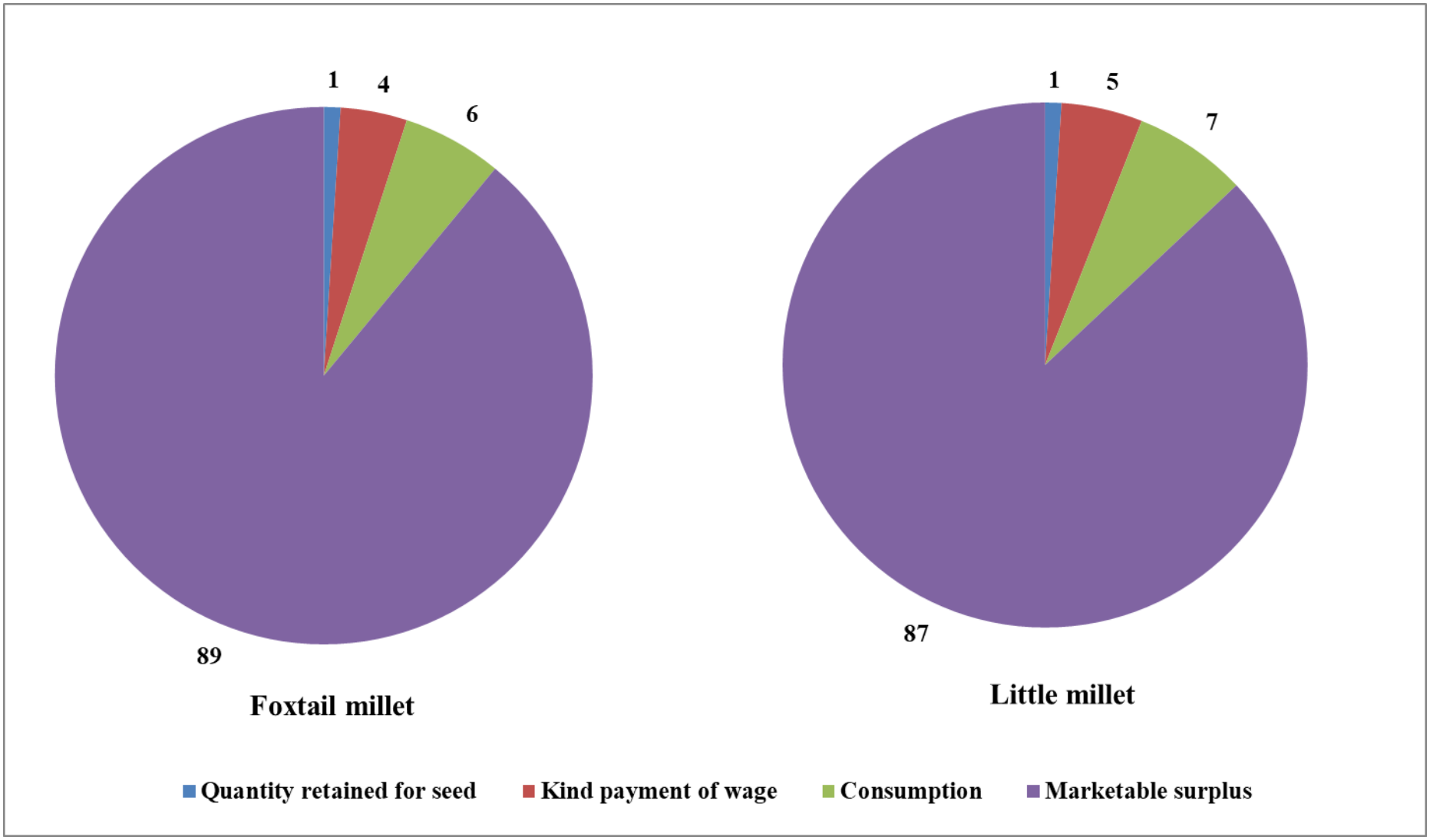
Note: Figures in parentheses indicates standard errors
** Significant at 5% level

Table.4 Annual marketable surplus of millet among sample farmers

(n=120)

Sl. No.	Particulars	Foxtail millet(n=80)			Little millet (n=40)		
		Quantity (q)	Value (₹)	Per cent	Quantity (q	Value (₹)	Per cent
A	Total quantity produced	21.69	56806.11	100.00	15.40	47847.80	100.00
B	Total quantity utilized	2.34	6128.46	11.00	1.93	5996.51	13.00
1	Quantity retained for seed	0.14	366.66	1.00	0.12	372.84	1.00
2	Kind payment of wage	0.90	2357.10	4.00	0.70	2171.84	5.00
3	Consumption	1.30	3404.70	6.00	1.12	3479.84	7.00
C	**Marketablesurplus(A-B)**	**19.35**	**50677.65**	**89.00**	**13.47**	**41851.29**	**87.00**

Fig.1 Household utilization of foxtail millet and little millet (% / year)



It was worth noting that human labour cost, bullock labour cost, Machine labour cost and seed cost, had significantly influenced the output of foxtail millet cultivation. Whereas, machine labour cost and human labour cost have significantly influenced the output of little millet cultivation at 5 per cent level of significance.

The output elasticity of human labour (0.2122), bullock labour (0.1450), machine labour (0.0829) and seed (0.1592) was positively significant in foxtail millet, thus indicated that were underutilized and can increase returns per increment in application of above mentioned resources. Fertilizer cost was non-significant for foxtail millet returns. Similarly, in little millet cultivation, the output elasticity of human labour (0.3378) and machine labour (0.0279) were positively significant in little millet thus indicated underutilization of resources and returns can be increased per increment in application of above mentioned resources. And bullock labour, seed and fertilizers were non-significant.

Human labour cost, bullock labour cost, machine labour cost and seed cost in foxtail millet and human labour cost and machine labour cost in little millet were significant and positive thus foxtail and little millet production was highly influenced by these factors respectively. Fertilizer cost is non-significant in both the millets and failed to exert any significant influence on millet production.While the results of Naik *et al.*, (2013) showed that land, bullock labour, farmyard manure and seeds were underutilized. On the other hand, labour and fertilizers were over used on little millet farms. Unlike in the case of little millet crop FYM, fertilizers, were underutilized. Bullock labour, seeds were over utilized and human labour failed to exert any significant influence on foxtail millet returns.

Marketable surplus among sample millet farmers

The marketable surplus was estimated and presented in Table 4. The average production of foxtail millet per farm was 21.69 quintals and the total quantity utilized by farmers was 2.34 quintals. Among total quantity retained 14 kg were for seed purpose, 90 kg was utilized for kind payment of wages and about 1.30 quintals was retained for consumption. Thus the total marketable surplus in foxtail millet was 19.35 quintals amounting to`50677.65 constituting 89.00 per cent of total production. While in case of little millet average production per household was 15.40 quintals and total quantity utilized by farmers was 1.93 quintals.12 kg of little millet retained for seed purpose, 70 kg was utilized for kind payment and about 1.12quintals was retained for consumption. Thus the total marketable surplus in little millet was 13.47 quintals amounting `41851.29 constituting 87.00 per cent of total production.

Marketable surplus of foxtail and little millet was found to be around 88 per cent. This was due to lower quantity retained for seed, own consumption and payment of wages in kind for the labourers (Fig. 1). Because these millets cannot be consumed as it is and required processing, and these millets were not the main staple food of the study area and it was consumed along with other cereals like rice and sorghum. These results were contrary with Chakhiyar (2007) where major proportion was utilized by farmer (68.16%) out of total production.

In conclusion, cost of cultivation was less because millets were cultivated in dry land and required minimum inputs like fertilizer and FYM. Accordingly the cost of cultivation was worked out and foxtail and

little millet were profitable in the study area with returns per rupee investment ratio of 1.60 and 1.52, respectively. Costs on human labour, seed, machine labour and bullock labour in foxtail millet and seed and machine labour in little millet were significant and positive thus foxtail and little millet production was highly influenced by these factors in resource use efficiency of foxtail and little millet respectively. Marketable surplus of foxtail and little millet was found to be around 88 per cent. This was due to lower quantity retained for seed, own consumption and payment of wages in kind for the labourers. Millets cannot be consumed directly as it requires processing, and these millets were not the main staple food of the study area and it was consumed along with other cereals like rice and sorghum.

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