Original Research Article

Analysis of Production of Phule Nachani Variety of Finger Millet in Kolhapur District

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A B S T R A C T

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Finger millet, Resource use efficiency, purposive sampling, Average productivity

The present study was intended to depict the picture of production of Phule Nachani variety of finger millet (Ragi) in Kolhapur district of Maharashtra during the period 2016-17.The sampling design adopted for the investigation was two stage purposive sampling and village as a secondary unit sampling. Necessary data were obtained from the sample respondents through personal interview method with the help of pre-tested questionnaire in order to ensure the accuracy of the data. Radhanagari and Panhala tahsils and their villages from each tahsil were selected purposively on the basis of highest area under Finger Millet. The findings of the investigation revealed that, resource use structure varied among the size groups of Finger Millet growers. The average per hectare total male labour use was 18.71-man days and female labour use was 17.72-man days, while the use of bullock labour was 7.35 pair days, Machine power was 8.52 hrs. Seed rate was 3.62 kg and N, P, K was 35.16 kg, 57.41 kg and 55.97 kg respectively. The average per hectare cost 'A', 'B' and 'C' were Rs. 16268.00, Rs. 37459.00 and Rs. 40161.00 respectively. The productivity was to the extent of 23.80 quintals. The per quintal cost of cultivation was Rs. 1687.00. The average per hectare net profit at Cost 'C' was Rs. 13020.00. The input-output ratio at Cost 'C' was 1.32 indicating Finger Millet cultivation as profitable enterprise. The average per hectare yield and gross returns were maximum on small and medium farms, respectively because the input used in the case of small and medium groups were used more efficiently than those were used in case of large groups farmers.

Introduction

Finger Millet (*Eleusine coracana* L.) is a major food crop of the semi-arid tropics of Asia and Africa. Finger Millet are a small grained cereal referred as ''Poor man's cereals''. These cereals are grown where other cereals failed to yield satisfactorily due to unfavorable agroclimatic condition. Millet

are known in India from Vedic times and have their own position at religions functions and consumed in fasting. As small millet is highly nutritious now called as nutria millet even superior to rice and wheat in certain constituents like Calcium (0.38%), Fiber (18%), Phenolic compounds (0.3-3%), and Sulpher containing amino acid. In view of this millet diet is advocated to children's

pregnant women's, patients recovered from prolonged illness and anemic patients. Small millet formed a group of six minor coarse cereals, namely Finger Millet (*Eleusine coracana* L.), Little millet (*Panicum sumatrense* R.), Kodo millet (*Paspalum scorbiculatum* L.), Foxtail millet (*Setaria italic* L.), Barnyard millet (*Echinochloa frumentacea* R.), and Proso millet (*panicum miliaceum* L.).

Objectives

This paper aims to evaluate economic analysis of production and efficiency of Phule Nachani variety of finger millet in Kolhapur district

To examine the resource use structure, costs and returns of Finger Millet.

Materials and Methods

Kolhapur district is the one of the leading districts growing Finger Millet in Maharashtra. Out of 12 tahsil in Kolhapur district, Radhanagari and Panhala tahsils were purposively selected on the basis area under Finger Millet crop.

Three village from each tahsil were selected from these tahsils were selected purposively on highest area under Finger millet crop. Fifteen Finger Millet growers from each village was randomly selected size of 90 growers.

To constitute a total sample the list of Finger Millet growers was prepared from each of selected villages, and grouped into three categories on the basis of their area under Finger Millet *viz,* small growers (0.01-0.20 ha), medium growers (0.21-0.40 ha) and large growers (0.41 ha and above). Thus, the total sample of 90 Finger millet growers was selected on the basis of area under Finger

Millet for the present study comprising 30 small growers, 30 medium growers and 30 large growers. The data were analysed in the tabular form with the help of averages and percentages to work out the differentials in resource productivity and resource use efficiency and cost and returns across the selected groups.

Estimation of cost of cultivation

For estimate costs and returns, the various components of costs were estimated by using standard cost concepts as under. For this purpose, simple tabular method was adopted.

Cost 'A'

Cost 'A' included following items.

Hired human labour

Owned and hired bullock labour

Seed

Manures

Fertilizers

plant protection charges

Machinery

Irrigation charges
Land revenue

Depreciation on farm implements

Repairs of farm implements

Cost 'B'

It included cost 'A' and rental value of owned land and interest on fixed capital.

Cost 'C'

It included cost 'B' and value of family human labour. Thus cost 'C' means the total cost of cultivation.

Farm business income = Gross Returns - cost A

Family labour income = Gross Returns - cost B

Net income = Gross Returns - cost C

Functional analysis

A Cobb-Douglas type of production function was attempted, for estimating the resource use efficiency of Finger Millet.

$$Y = aX_1^{b1} \ X_2^{b2} \ X_3^{b3}X_4^{b4}X_5^{b5}X_6^{b6}X_7^{b7}X_8^{b8} \dots X_n^{bn}e^u$$

Where,

Y = Output of Finger Millet (qtl)

X_1 = Human labour (Man days)

X_2 = Bullock labour (Pair days)

X_3 = Machine power (Hrs.)

X_4 = Manure (tonne)

X_5 = Nitrogen (kg)

X_6 = Phosphorous (kg)

X_7 = Potash (kg)

X_8 = Seed (kg`)

b_i^S = Elasticity of production of respective factors

e^u = Error term

Study area

Kolhapur district is located between 15 43' and 17 17' North latitude and 73 40' and 74 42' East longitude of southern Maharashtra. The region receives average rainfall 1900 mm. The total numbers of villages are 1196 and towns are 18. The district is consisting of 12 revenue tehsils' namely Shahuwadi, Panahala, Hatkangale, Shirol, Karveer, Gaganbavada, Radhanagri, Kagal, and Bhudhargad.

Results and Discussion

per hectare cost of cultivation

The cost of cultivation of Finger Millet includes cost 'A', cost 'B' and cost 'C'. The cost of production is mainly influenced by relationship between output and input.

The per hectare cost of cultivation of Finger Millet worked out by using standard cost concepts normally used in farm management studies. The information on item wise cost of cultivation for Finger Millet growers is presented in Table 1. It is seen from the table that, cost-C was the highest as Rs.39306 on large farm followed by Rs.38954 on medium farm and Rs.38748 on small farm. At overall level, cost-C was found to be Rs.40161.

Among the different items of costs, interest on fixed capital was the highest (29.70 per cent). The other important items of cost were rental value of land (23.38 per cent) followed by machine power (9.85 per cent),bullock labour(9.60 per cent), manure (5.54 per cent),family male labour (4.99 per cent), hired male labour (3.36 per cent),potash (2.85 per cent),hired female labour(2.76 per cent),interest on working capital(1.88 per cent),phosphorous (1.49 per cent),family female (1.23 per cent), seeds (0.98 per cent), depreciation on farm implements (0.94 per cent) and nitrogen (0.74 per cent).

Table.1 Item wise per hectare cost of cultivation of Finger millet

(Value in Rs.)

Sr. No.	Particulars	Size groups											
		Small			Medium			Large			Overall		
1.	Hired human labour	Qty	Value	Per cent	Qty	Value	Per cent	Qty	Value	Per cent	Qty	Value	Per cent
	a. Male	9.80	1470	3.80	8.90	1338	3.43	7.29	1458	3.70	8.93	1352	3.36
	b. Female	16.83	1683	4.35	9.25	925	2.37	8.10	810.5	2.06	11.12	1112	2.76
2.	Bullock labour (pairdays)	6.00	3045	7.85	6.5	2925	7.50	4.57	3208	8.16	7.35	3878	9.60
3.	Machine power (Hrs.)	7.09	3340	8.62	10.00	4550	11.68	8.48	3978	10.12	8.52	3956	9.85
4.	Seed (kgs)	3.12	312.33	0.80	3.75	375.54	0.96	4.00	500.70	1.27	3.62	395.10	0.98
5.	Manures (Tonnes.)	7.18	3232	8.34	5.35	2411	6.18	3.65	1036	2.63	3.59	2226	5.54
6.	Fertilizer (kgs.)												
	N	27.50	233.75	0.60	33.00	280.50	0.71	45.00	382.50	0.97	35.16	298.86	0.74
	P	46.60	489.30	1.26	56.65	594.82	1.52	70.00	735	1.87	57.41	602.88	1.49
	K	46.40	951.20	2.45	55.50	1137.7	2.91	72.03	1476.6	3.75	55.97	1147.3	2.85
7.	Irrigation charges (Rs.)	0		0	0		0	0		0	0		0
8.	Plant protection charges (Rs.)	0		0	0		0	0		0	0		0
9.	Incidental charges (Rs.)		126.36	0.32		129.2	0.33		133.30	0.33		129.6	0.32
10.	Repair (Rs.)		98.36	0.25		69.23	0.20		50.30	0.18		72.63	0.17
	Working capital (Rs.)		**14981**	**38.64**		**14435**	**37.79**		**13768**	**35.00**		**15171**	**37.70**
11.	Int. on working capital		961.81	2.48		820.60	2.10		533	1.35		711.40	1.88
12.	Depre. on farm implement		223.60	0.57		436	1.12		293.80	0.74		317.30	0.94
13.	Land revenue and taxes		70.50	0.18		60.00	0.15		75.00	0.19		68.50	0.18
14.	**Cost 'A'**		**16236**	**41.87**		**15751**	**41.16**		**14669**	**37.28**		**16268**	**40.70**
15.	Rental value of land		11465	29.50		8678	22.20		7889	20.17		9344	23.38
16.	Int. on fixed capital		8099	20.90		12473	32.00		14970	38.06		11847	29.70
17.	**Cost 'B'**		**35800**	**92.20**		**36902**	**95.30**		**37528**	**95.51**		**37459**	**93.78**
18.	Family labour												
	a. Male	10.66	2132	5.60	7.00	1401	3.40	6.70	1005	2.52	9.78	1956.5	4.99
	b. Female	8.16	816.50	2.20	6.50	650.45	1.30	5.15	773	1.97	6.60	746.3	1.23
19.	**Cost 'C'**		**38748**	**100.00**		**38954**	**100.00**		**39306**	**100.00**		**40161**	**100.00**
II	Output (Qtls.)												
	Main produce	24.00	55125		24.25	52585		23.17	51834		23.80	53181	
III	Cost 'C' net of bye produce		37665			38204			38604			39250	
IV.	**Per quintal cost**		1614			1606			1696			1687	

Table.2 per hectare costs, returns, gross income

(Value in Rupees)

Sr. No.	Particulars	Size groups			
		Small	Medium	Large	Overall
1.	Production (qtls)	24.00	24.25	23.17	23.80
2.	Gross income	55125.00	52585.00	51834.00	53181.00
3.	Total cost				
	i)Cost 'A'	16236.00	15751.00	14669.20	16268.00
	ii)Cost 'B'	35800.00	36902.00	37528.00	37459.00
	iii)Cost 'C'	38748.00	38954.00	39306.00	40161.00
4.	Profit at				
	i)Cost 'A'	38889.00	36834.00	37165.00	36913.00
	ii)Cost 'B'	19325.00	15683.00	14306.00	15722.00
	iii)Cost 'C'	16377.00	13631.00	12528.00	13020.00
5.	Cost of production	1614	1606	1696	1687
6.	B:C Ratio				
	i)Cost 'A'	3.39	3.34	3.53	3.26
	ii)Cost 'B'	1.53	1.42	1.37	1.41
	iii)Cost 'c'	1.42	1.35	1.31	1.32

Table.3 Results of estimated Cobb-Douglas production Function for Finger Millet

Sr. No.	Particulars	Regression of coefficient of variable
1	Constant (a)	1.529 (0.171)
2	Human labour (X_1)	-0.8686*** (0.172)
3	Bullock labour (X_2)	0.4372*** (0.1094)
4	Machine power (X_3)	0.3618*** (0.0979)
5	Manure (X_4)	0.0729 (0.044)
6	Nitrogen (X_5)	0.0332 (0.075)
7	Phosphorous(X_6)	-0.2456 (0.191)
8	Potash (X_7)	0.0788 (0.219)
9	Seed (X_8)	0.4450*** (0.1120)
10	R^2	0.71
11	F value	5.12

(Figures in parenthesis are the standard error of respective regression co-efficient and ***, **, * significant at 1, 5 and 10 per cent level of significance)

The share of cost incurred in respect of Incidental charges, repairs and land revenue and taxes were negligible in the cost of cultivation.

In the total cost of cultivation, the Cost 'A' was Rs.16268 (40.70 per cent) and Cost 'B' was Rs. 37459(93.78 per cent) at overall level.

Thus, from the foregoing discussion, it was noticed that the cost of cultivation varied among the size group of Finger Millet growers. The average per hectare productivity of Finger Millet was 23.80 quintals at the overall level. It was highest in medium group (24.25 qtls) followed by small (24.00 qtls) and large group (23.17 qtls). The cost required for the production of one quintal of Finger millet was lowest in medium size group (Rs.1606.00) followed by small (Rs.1614.00) and large group (Rs.1696.00) respectively. This is because of appropriate production management practices adopted by medium size group of Finger Millet growers.

Costs, Returns and profitability

An attempt has been made here to compare the per hectare output, cost of production, returns and profitability in Finger Millet, the details in this respect are given in Table 2

The per hectare gross income received from 55125.00 was Rs.52585.00, and Rs.51834.00 in small, medium and large size groups, respectively while, it was worked out to Rs.53181.00 at overall level. It is observed that, small size group has obtained more gross income followed by medium and large size groups respectively. Thus, it was noted that, as size group increases the per ha. cost decrease. In case of per ha. returns, specific trend was observed across the different size groups. Per hectare cost 'A' was Rs.16236.00, Rs. 15751.00 and Rs. 14669.00 in small, medium and large size groups, respectively. Per hectare profit at cost 'A' was Rs.38889.00, Rs.36834.00 and Rs. 37165.00 in small, medium and large size

groups respectively. Whereas, the profit at Cost B was Rs. 19325.00, Rs. 15683.00 and Rs. 14306.00 in small, medium and large size groups respectively. Per hectare total cost, i. e. Cost 'C' was Rs.38748.00, Rs. 38954.00 and Rs.39306.00 in small, medium and large size groups respectively. The profit at cost 'C' was Rs. 16377.00, Rs. 13631.00 and Rs.12528.00 in small, medium and large size groups, respectively. On the whole, it is clear that the cultivation of Finger Millet is profitable at every stage of production. The B: C ratio was highest in small (1.42) followed by medium (1.35) and large (1.32) size groups. It is seen that small size group of Finger millet growers received more profit followed by medium and large size groups.

Production function analysis for estimation of Finger Millet growers

The resource use productivity and resource use efficiency for Finger Millet production was analyzed using Cobb-Douglas type of production function. Cobb-Douglas type of production was fitted to the sample data for Finger Millet cultivation and results are presented in table 3.From the Table 3, it was revealed that, the significant 'F' ratio obtained in respect of production function of Finger Millet cultivation was significant; it indicates the overall significance of the estimated production function. The coefficient of multiple determinations (R^2) indicates the proportion of total variation in the dependent variable (i.e. crop output) explained by the independent variables jointly. The eight-resource variable included in the production. The production function analysis has explained variation in output i.e. 0.71 which suggests that the eight variables included in the production function analysis have jointly explained as high as 71 per cent of the total variation in the production of Finger Millet. The regression coefficient of the resource variable viz. Human labour (X_1),

Bullock labour (X_2), Machine power (X_3), Seed(X_8) were positive and significant at 1 per cent level of significance respectively indicating that Bullock labour, Machine labour, Seed found influencing input with magnitude of 0.4372, 0.3618 and 0.4450 respectively. In case Human labour (X_1) the value coefficient of variation is (-0.8686) negative but it shows significant effect on yield. However, negative and non-significant regression coefficient (-0.2456) of the resource variable namely, Phosphorus (X_6) was shown by which adversely affects the yield of Finger Millet. In Cobb Douglas production function frame work the regression coefficients indicate the production elasticities of the respective resource variables.

The regression coefficient in Cobb-Douglas production function framework is the elasticites of the respective resource variables and sum indicates the type of return to scale. The returns to scale are increasing, constant and decreasing according to the sum of regression coefficient is greater, equal or less than unity. The sums of elasticities were found greater than one indicates that increasing return to scale and further scope for increasing the production of Finger Millet by increasing productivity.

Area under Finger Millet in small, medium and large group was 0.19, 0.38 and 0.64 hectares respectively showing major share in Cropping pattern (18.43 per cent) in *kharif* season. The Cost of cultivation increased as the area under Finger millet increased. The output Input ratio was more in small farm (1.42) as compared to medium (1.35) and large (1.31) groups.

In Finger millet production, regression coefficient with respect to bullock labour, machine power and seed ware positive and significant. There was scope to increase these variables in finger millet production.

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