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Resource productivity and resource use efficiency in pearl millet production

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ABSTRACT

Pearl millet (*Pennisetum typhoids*) popularly known as *bajra*. India is the largest producer of pearl millet crop. The study was conducted to know the resource productivity, resource use efficiency and optimum resource use in pearl millet production. Cobb-Douglas production function was fitted to the data. The results revealed that the regression coefficients of bullock labour (0.181), area (0.330) and family human labour (0.112) were positive and significant. It revealed that these resources when increased by one per cent each, that led to increase the production of pearl millet grain by 0.181, 0.330 and 0.112 per cent, respectively. Use of bullock labour was optimum as 8.99 pair days followed by area (0.58 ha) and family human labour (10.42 man days). The sum of the production elasticities (Σbi) was 0.80 which indicated decreasing return to scale.

Key words : Pearl millet, Resource productivity, Regression coefficient, Use, Marginal product.

Pearl millet (*Pennisetum typhoids*) belongs to the family Graminaceae. The origin has been traced to the tropical Africa. Pearl millet is the sixth most important cereal crop after wheat, rice, maize, barley and sorghum in the world as one of the millet crop. It was introduced in India from Africa. India is the largest producer of pearl millet crop. In the country major pearl millet growing states are Rajastan, Maharashtra, Gujarat and Andhra Pradesh. Maharashtra State is the third largest and second in respect of area under pearl millet. In these state ofo Maharashtra Nasik, Beed, Satara, Sangli, Solapur, Dhule and Jalgaon are the important bajra growing districts. Millet is nutritionally superior to rice and comparable in many respects with wheat. Pearl millet is rich source of iron. The increased demand may lead increase in prices of pearl millet and the farmers may be benefited. The need was felt to answer certain queries such as resources and their optimal use. Keeping in view these aspects, the study has been undertaken.

METHODOLOGY

Multistage sampling design was adopted for selection of the district, Tehsil, villages and farmers. At the first stage, Beed district was purposively selected for present study because of higher area under pearl millet. At the second stage, Georai tehsil was purposively selected from Beed district because of higher area under pearl millet. At the third stage, eight villages from Georai Tehsil were selected randomly having pearl millet crop. At the fourth stage, the list of pearl millet growers was obtained from all the 8 villages. From each village, twelve farmers were randomly selected. In this way, ninety six pearl millet growers were selected for present study. Cross sectional data were collected from the sample farmers by personal interview method with the help of pretested schedule. Data were related to inputs with their prices and the produce with monetary returns for the year 2008-09. Resources namely, area of pearl millet, hired human labour, family human labour, bullock labour, machine labour, seed, nitrogen, phosphorus, potassium and manures on farm were taken in the study.

Cobb-Douglas production function was found to be the best fit to the data to estimate the resource productivity and resource use efficiency and optimum resource use with respect to each of the explanatory variables. The fitted equation was as follows:

$$Y = aX_1^{bi}.X_2^{b2}.X_3^{b3}.X_4^{b4}.X_5^{b5}.X_6^{b6}.X_7^{b7}.X_8^{b8}.e^u$$

where, Y= Production of pearl millet in quintals per farm, a = Intercept of production function, bi = Partial regression coefficients of the respective resource, X_1 = Area of the crop in hectares per farm, X_2 = Hired human labour in man day per farm, X_3 = Bullock labour in pair day per farm, X_4 = Machine labour in hours per farm, X_5 = Nitrogen in kg per farm, X_6 = Phosphorus in kg per farm, X_7 = Potash in kg per farm, X_8 = Manure in quintals

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per farm and X_9 = Family human labour in man day per farm and e is error term. The function was transformed into log linear form as follows:

$$\text{Log } Y = \log_a + b_1 \log x_1 + b_2 \log x_2 + \ldots\ldots b_n \log x_n + a \log_e$$

Concepts were explained as Cobb-Douglas production function allows either constant, increasing or decreasing marginal productivity. The MP equation is MP=bY/X where b is regression coefficient of particular independent variable. X=geometric mean of particular independent variable. Y=Geometric mean of dependent variable. The MVP of various input worked out by the formula:

$$MVP = b.Y.Py / X$$

FINDINGS AND DISCUSSION

The findings obtained from the present study are presented below:

Elasticity of production:

Partial regression coefficients with respect to various explanatory variables were calculated and are presented in Table 1. It was observed that the partial regression coefficient of bullock labour was 0.181 which was positive and highly significant at 1 per cent level. It inferred that if 1 per cent increase is in use of bullock labour over the geometric mean, it would lead to increase bajra production by 0.181 per cent. Regression coefficient with respect to area was 0.330 which was positive and significant at 5 per cent level. It inferred that if 1 per cent increase is in use of area over its geometric mean, it would lead to increase bajra production by 0.330 per cent. Then, regression coefficient with respect to family human labour was 0.112 which was also positive and significant. If 1 per cent increase in family human labour, it would lead to increase the bajra production by 0.112 per cent. The partial regression coefficient with respect to potash was -0.025 which was negatively significant. Partial regression coefficients with respect to hired human labour, machine labour and manure were positive but non-significant. On the contrary, regression coefficient with respect to nitrogen, phosphorus were negative and non-significant. Coefficient of multiple determination (R^2) was 0.902 which indicated 90.20 per cent variation in bajra production that was explained due to variation in all independent variable. The 'F'-value of $R^2$was highly significant (87.79). It was clear that each explanatory variables on its own was not very important but together they explained significantly part of variation in bajra production. The sum of partial regression coefficients

Table 1 : Estimation of Cobb-Douglas production function as partial regression coefficients in order to know resource productivity, resource use efficiency and optimum resource use in bajra production

Independent variables	Partial Regression coefficient (bi)	Standard error (SE) of (bi)	't' value of (bi)	Geometric mean of input ($\bar{x}$ i)	Marginal product (q)	Marginal value product (Rs.)	Price of input (Rs.)	MVP to price ratio	Optimum resource use ($\bar{x}$ i)
1. Area (ha/farm)	0.330	0.104	2.462*	0.539	7.586	4559.01	4232.15	1.07	0.58
2. Hired human labour (man day / farm)	0.125	0.083	1.506	25.258	0.061	36.851	80.00	0.46	11.63
3. Bullock labour (pair day/farm)	0.181	0.071	2.549**	6.793	3.330	198.410	150.00	1.32	8.99
4.Machine labour (hour/farm)	0.087	0.081	1.074	3.806	0.283	170.214	300.00	0.56	1.41
5. Nitrogen (kg/farm)	-0.005	0.003	0.167	23.689	-0.002	-1.571	10.91	-0.14	-
6. Phosphorus (kg/farm)	-0.009	0.005	1.800	9.697	-0.011	-6.911	24.85	-2.28	-
7. Potash (kg/farm)	-0.025	0.010	2.500*	8.677	-0.035	-21.454	7.60	-2.82	-
8. Manure (q/farm)	0.007	0.005	1.400	1.617	0.053	32.235	35.00	0.92	1.49
9. Family human labour (man day/farm	0.112	0.048	2.330*	8.608	0.161	96.886	80.00	1.07	10.42

Intercept (log $_a$)	2.426
R^2	0.902
F-value	87.790**
Return to scale	0.803
n	96

Note : Geometric mean ($\bar{Y}$) of bajra production was 12.39 quintals per farm and its price (Py) was Rs.601 per quintal.

* and ** indicate significance of values at P=0.05 and 0.01, respectively

was 0.803 which indicated decreasing return to scale. Kanhore (2008) reported decreasing return to scale in perarlmillet production.

Marginal production:

Resource productivities with respect to various explanatory variables were estimated and are also presented in Table 1. The marginal productivity with respect to area was 7.586 quintals followed by that of machine labour (0.283 q), family human labour (0.161 q), manure (0.053 q), hired human labour (0.060 q) and bullock labour (3.330 q). It inferred that, if 1 hectare area increased in bajra production at its geometric mean level, it would lead to increase the production of bajra with 7.586 quintals. Similarly, per unit of machine labour, family human labour, manure, hired human labour and bullock labour, it would cause to increase the production of bajra by 0.285, 0.161, 0.061, 0.053 and 0.330 q, respectively. The results are conformity with the results obtained by Patil (2003) in bajara production.

Resource use efficiency:

In regard to resource use efficiency, it was also evident from Table 1 that, use of bullock labour indicated the highest MVP to price ratio as 1.32 followed by family human labour (1.07) and area (1.07) which were greater than unity. It inferred that there was scope to increase use of the above variables by giving the priority to higher MVP to price ratio in bajra production. Similar, results were found by Bhagwat (2008).

Optimum resource use:

In regard to optimum resource use, it was clear that use of bullock labour was optimum as 8.99 pair days followed by area (0.58 ha) and family human labour (10.42 man days). The results were conformity to the results were obtained by Pawar and Pawar (2006).

REFERENCES

Bhagwat, M.Z. (2008). Economic analysis of small farm in Marathwada region of Maharashtra. M.Sc. (Ag.) Thesis, Marathwada Agricultural University, Parbhani, 108pp.

Kanhore, S.H. (2008). Economics analysis of large farm in Marathwada egion of Maharashtra. M.Sc. (Ag.) Thesis, Marathwada Agricultural University, Parbhani, 114pp.

Patil, P.R. (2003). Economics of production and marketing of bajra in Sangli district of Maharashtra State. M.Sc. (Ag.) Thesis, Marathwada Agricultural University, Parbhani, 84pp.

Pawar, B.R. and Pawar, D.B. (2006). Resource productivity, resource use efficiency and optimum resource use in rainfed pearl millet production. *Internat. J. Agric. Sci.*, **2** (1) : 112-114.

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