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RESEARCH PAPER

Resource productivity and resource use efficiency in marigold production

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ABSTRACT

The flowers symbolize the most sensitive, delicate and loving feeling eloquently what our words fail to express. In India marigold is an important and popular flower. It is an ornamental herb grown for its highly decorative and long lasting flowers. India is a country having abundant sunshine, plenty of land, availability of cheap and skilled manpower which are our strength for cultivation of variety of flowers in different regions of the country. Therefore, an attempt was made to study the resource use efficiency and constraints faced by the cultivators in marigold production of western Maharashtra. In marigold the elasticity co-efficient for manures (X_2), fertilizers (X_3) and working capital (X_6) was positive and significant at 1.00 per cent level of probability. High cost of seedlings was the major problem in marigold production (97.00%) followed by high cost of fertilizers, irregularity in electric supplies, lack of technical knowledge for pesticide application and high cost of pesticides faced by 95.00 per cent, 90.00 per cent, 80.00 per cent and 73.00 per cent, respectively by the marigold growers.

KEY WORDS : Marigold, Resource use efficiency, Marginal productivity

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India is a country having abundant sunshine, plenty of land, availability of cheap and skilled manpower which are our strength for cultivation of variety of flowers in different regions of the country (Patil *et al.*, 2010). Marigold is a very important flowering plant useful for garlands, garden disc play, loose flowers and perfume industries. It is also used in extraction of natural dies from African marigold flower (*Tagates erecta*) for textile colouration (Jothi, 2008). The commercial cultivation of seedling plot of marigold is a source of income and employment to marginal farmers and large farmers. It is also used as the trap crop in the borders to attract insects attacking the main crop. In the country, total area under floriculture is estimated at 60487.6 hectares in 2011. Among the states Karnataka has the highest area under flower cultivation 20780 hectares, followed by Tamil Nadu 16745 hectares, Maharashtra 15000 hectares, West Bengal 13720 hectares and Andhra Pradesh 8420 hectares (Anonymous, 2011). These states together accounted for 98.64 per cent of the total area in the country. The flowers are grown mainly for traditional and industrial purposes. However, in the recent years, commercial floriculture products are being taken up by private companies to produce cut flower for export purposes (Bagchi, 2011). In Maharashtra marigold contributes 29.00 per cent share with an area of 4350 hectares.While the production of floriculture is 64440 million tones out of which marigold contributes 33488 million tones which accounts for about 52 per cent. Therefore, an attempt was made to study

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the resource use efficiency and constraints faced by the cultivators in flower production of western Maharashtra.

METHODOLOGY

The Kolhapur and Sangli districts of Western Maharashtra were selected purposively for the present study on marigold. Both the districts have medium to light type of soil with limited irrigation facilities. The area under marigold in Kolhapur and Sangli districts was 1025 and 1138 hectares, respectively, with an area of 135.23 and 154.00 hectares in Hatkanangale and Miraj tahsils of respective districts. Keeping in view the highest acreage under marigold,

$$Y = a.X_1^{b1}.X_2^{b2}.X_3^{b3}\ldots\ldots\ldots\ldots\ldots\ldots X_n^{bn}.e^u$$

where,

Y = Dependent variable (Output)

X_is = Independent variable (Input)

b_i's= Regression co-efficients also production elasticity's of the corresponding inputs

a = Constant

e^u = Error term.

The variables included in the production function are as given below:

Y = Output in quintal

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X_2 = Manure in Rs.

X_3 = Fertilizers in Rs.

X_4 = Crop protection in Rs.

X_5 = Number of irrigation

X_6 = Working capital in Rs.

The marginal value of product of resource indicates the addition of gross value of farm production for a unit increase in the 'i' th resource with all resources fixed at their geometric mean levels. The MVP of various inputs worked out by the following formula:

$$MVP = \frac{b\bar{Y}}{\bar{X}}Py$$

where,

b = Regression co-efficient of particular independent variable,

$\bar{X}$ = Geometric mean of particular independent variable,

$\bar{Y}$ = Geometric mean of dependent variable,

Py = Price of dependent variable.

ANALYSIS AND DISCUSSION

The findings of the present study as well as relevant discussion have been summarized under the following heads:

Resource use efficiency:

Cobb-Douglas production function was fitted to perform input-output data to find out resource use efficiency. The results estimated by the Cobb-Douglas function are given in Table 1. The value of co-efficient of multiple determination (0.84) indicated that six resources together explained 84 per cent of variation in the output of the marigold production. The elasticity co-efficient for manure (X_2), fertilizers (X_3) and working capital (X_6) were 0.3185, 0.8286 and 0.2834 this indicated that one per cent increase in expenditure in manure (X_2), fertilizers (X_3) and working capital (X_6) would result in increasing the gross income by 0.3185, 0.8286 and 0.2834 per cent, respectively. It was observed that regression co-efficient of manure, fertilizers and working capital were positive and highly significant at 1 per cent level of probability. The elasticity co-efficient of human labour was 0.0835 and pesticides (X_4) was 0.2799 which were positive but non-

Table 1: Elasticity co-efficient of cobb-douglas production function

Sr. No.	Particulars	Regression co-efficients	't' Value
1.	Human labour (X_1) in days	0.0835(0.0620)	1.3475
2.	Manure (X_2) in Rs.	0.3185***(0.0688)	4.1928
3.	Fertilizer (X_3) in Rs.	0.8286***(0.0733)	4.4808
4.	Pesticides (X_4) in Rs.	0.2799(0.0271)	1.0313
5.	Irrigations (X_5) in turns	-0.1361(0.1300)	-1.0469
6.	Working capital (X_6) in Rs.	0.2834***(0.0841)	3.3688
7.	Constant	0.6610(0.2339)	2.8249
8.	R^2	0.84	--

Figures in the parentheses are the standard error to respective regression co-fficient, *** indicate significance of value at P=0.1

significant. The elasticity co-efficients of number of irrigation (X_5) was -0.1361 suggesting that one per cent increase in expenditure of irrigation would result in decrease of gross income by 0.1361 per cent. The findings are in conformity to those obtained by Khade (2004).

Table 2 indicates, marginal product, marginal value product, marginal cost and ratio between marginal value product and ratio between marginal value product and cost for each resource used in the marigold production. In regard to resource use efficiency, it was revealed that use of manure in marigold production indicated the highest MVP to price ratio of working capital (4.37) followed by fertilizers (2.29), pesticides (1.07) and manure (1.01) which were greater than unity. This implied that further increase in use of resources would bring higher returns. The scope for enhancing profit by increased use of resource was evident from the analysis. On the contrary, MVP to price ratio with respect to human labour was less than unity and that of number of irrigation was negative implying that farmers could maximize their profit by using lesser quantities of human labour and number of irrigations. Therefore, their use was uneconomical in the study area.

Constraints faced by the marigold cultivators:

The information regarding the problems experienced by the marigold cultivators is presented in Table 3.

It is observed from Table 3 that the high cost of seedlings, high cost of fertilizers, irregularity in electric supply, lack of technical knowledge for pesticide application, high charges of pesticides, difficulties related to tillage operations and not getting reasonable price were the major problems faced in production of marigold as reported by 97.00, 95.00, 90.00, 80.00, 73.00, 67.00 and 58.00 per cent of sample farmers, respectively. The findings are in conformity to those obtained by Gajanan and Subramanyam (1999).

Conclusions and policy implications :

Out of six variables tested, factors which contributed significantly to marigold output among the farmers were, manure, fertilizers and working capital. The result revealed that the co-efficients of the multiple determination R^2 was 0.84 which means that the explanatory variables included in the model explained 84 per cent variation in marigold production and F-value of the equation was significant at 1 per cent level of confidence implying that the variation in marigold production mainly depend upon the explanatory variables included in the model. In regard to resource use efficiency, it was revealed that use of manure in marigold production indicated the highest MVP to price ratio was of working capital followed by fertilizers, pesticides and manure which were greater than unity. This implied that further increase use of resources would bring higher returns. The scope for enhancing profit by increased use of resource was evident from the analysis. On the contrary, MVP to price ratio with respect to human labour was less than unity and that of number of irrigation was negative implying that farmers could maximize their profit by using lesser quantities of human labour and number of irrigations. Based on the above findings, the following recommendations are made:

The cultivators should form co-operative marketing societies and sell their flowers through these societies. The

Table 2: Marginal value productivity of resources in marigold

Sr. No	Independent variable	G.M. of inputs	M.P. (q)	MVP (Rs.)	M.C.in (Rs.)	Ratio MVP/MC	Level of resource use
1.	Human labour (X_1) in days	245.76	0.042	1.46	83.48	0.02	Excess utilization
2.	Manure (X_4) in Rs.	1350.30	0.029	1.01	1.00	1.01	Under utilization
3.	Fertilizer (X_5) in Rs.	1551.62	0.067	2.29	1.00	2.29	Under utilization
4.	Pesticides(X_6) in Rs.	1127.10	0.031	1.07	1.00	1.07	Under utilization
5.	No. of irrigations (X_7)	18.76	-0.904	-31.16	314.49	-0.10	Excess utilization
6.	Working capital (X_8) in Rs.	278.54	0.127	4.37	1.00	4.37	Under utilization

Table 3: Constraints faced by the marigold cultivators

Sr. No.	Particulars	No.	Percentage
1.	High cost of seedling	58	97
2.	High cost of fertilizers	57	95
3.	Irregularity in electric supplies	54	90
4.	Lack of technical knowledge for pesticide application	48	80
5.	High cost of pesticides	44	73
6.	Difficulties related to tillage operations	40	67
7.	Not getting reasonable price	35	58

society also see the possibilities of storing the flowers at market place and also see the possibility to sell their produce direct to the consumers by establishing their firms where direct consumers are available.

The transport cost forms a major part of the marketing cost to the producer as well as the intermediaries. Steps may be taken at the government level to regularize the transport charges. For this purpose, the monopoly of the transport agencies will have to be broken and controlled charges be informed.

Market information with respect to the price in consuming markets should be made available to the farmers. Availability of information on prices will enable the farmers to adjust the harvesting of crop.

The cultivation of marigold in Kolhapur and Sangli district is a highly profitable proposition. This crop should, therefore, be cultivated on large area.

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