DOI: 10.15740/HAS/AU/12.3/465-467
Agriculture Update
Volume 12 | Issue 3 | August, 2017 | 465-467
Visit us : www.researchjournal.co.in
e ISSN-0976-6847

RESEARCH ARTICLE :

Resource productivity and resource use efficiency in coconut production

RACHANA ASHOK KOLAMBKAR

ARTICLE CHRONICLE :
Received : *28.05.2017;*
Revised : *06.07.2017;*
Accepted : *18.07.2017*

SUMMARY : Investigation was carried out during the year 2013-14. In all 48 cashewnut growers were randomly selected from sixteen villages of two tehsils in South-Goa district of Goa State. Cross sectional data were collected from coconut growers with the help of pretested schedule by personal interview method. Data were related to coconut output and inputs like machine labour, manure, fertilizers, irrigation and family human labour as resources. Cobb-Douglas production function was fitted to the data. The result revealed that, regression co-efficient of area under coconut was 0.383 followed by that of irrigation (0.044). In next order, regression co-efficient of manure was 0.048. Regression co-efficient of hired human labour, nitrogen and family human labour were positive but non-significant. Marginal product of area under coconut was 91.77 quintals followed by that of machine labour (1.418 q), manure (0.178 q) and irrigation (0.003) and so on. MVP to price ratio with respect to machine labour was 2.65 followed by area under coconut was 2.24, nitrogen (1.85), irrigation (1.42) and manure (1.24). Hence, preference might be given to increase machine labour on priority basis in coconut cultivation. Optimum resource use of area under cotton was 0.85hectares and that of irrigation was 2121.16 m^3.

How to cite this article : Kolambkar, Rachana Ashok (2017). Resource productivity and resource use efficiency in coconut production. *Agric. Update,* **12**(3): 465-467; **DOI : 10.15740/HAS/AU/12.3/465-467.**

KEY WORDS :
Coconut, Geometric mean, Resource productivity, Marginal productivity, Optimum resources

Author for correspondence :
RACHANA ASHOK KOLAMBKAR
Department of Agricultural Economics, College of Agriculture (MPKV), NESARI (M.S.) INDIA
Email:kolambkar.rachana14@gmail.com

BACKGROUND AND OBJECTIVES

Coconut (*Cocos nucifera* L.) is one of the most important plantation crop in Goa State. In Goa state, coconut is cultivated in 25750 hectare with a production of 128.13 million nuts. Its productivity is 4976 nuts/ha. The reasons for low productivity are existence of senile seedling plantations and low input usage. In coconut production process, some of the resources either are underutilized or overutilized. There is need to know optimum resource use for maximum profit in coconut production. Keeping in view the above aspects, the present study has been undertaken.

RESOURCES AND METHODS

Sampling design :

Multistage sampling design was adopted for selection of district, tehsils, villages and orchard farms. In the first stage, the South-Goa district was purposively selected because of mostly existence of orchard farmings. In the second stage, Sanguem and Quepem tehsils were selected on the basis of higher area under orchard farms. In the third stage, eight villages were selected from the each of tehsils on the basis of higher area under orchard farms. From Sanguem tehsil villageswere selected namely Bhati, Cotarli, Kale, Netravali, Rivona, Uguem, Vadem and Xeldemwhile from Quepem tehsil villages were selected namely Avadem, Balli, Barlem, Dhadem, Malkarne, Mirabag, Pirla and Quitol. In the fourth stage, from each village, the separate list of orchard farmers along with their holding sizes were obtained. From each of the lists, three orchard farmers were randomly selected from each of the villages. In this way, from sixteen villages, 48 farmers were selected for the present study.

Analytical techniques :

Cobb-Douglas production function :

Cobb- Douglas production function was fitted to the data to estimate resource use efficiency with respect to each of the explanatory variables. The fitted equation for a number of independent variables was as follows.

$$Y = aX_1^{b1} \times X_2^{b2} \times X_3^{b3} \text{———} X_n^{bn}.e^u$$

In this functional form 'Y' is dependent variable, 'Xi' are independent resource variables, 'a' is the constant representing intercept of the production function and 'bi' are the regression co-efficients of the respective resource variables. The regression co-efficients obtained from this function directly represent the elasticities of production, which remain constant throughout the relevant ranges of inputs. The sum of co-efficients that is 'bi' indicates the nature of returns to scale. This function can easily be transformed into a linear form by logarithmic transformation. After logarithmic transformation, this function expressed as,

$$\text{Log } Y = \log a + b_1 \log X_1 + b_2 \log X_2 + \ldots\ldots b_n \log X_n + u \log e$$

For fitting the production function, eight input variables were considered as important factors by considering the problem of multicollinearity in estimating production function. Multicoliniarity refers to situation where because of storing interrelationship among the independent variables, it becomes difficult to their separate effects on the dependent variables. Some of the independent variables are not important just because the standard errors are high. It might be due to the presence of multicoliniarity. The consequences of multicoliniarity are (a) the sampling variances of the estimate co-efficients increases as the degree of collinearity increases between the explanatory variables (b) estimated co-efficients may become very sensitive to small changes in data that is addition or deletion of a few observations produce a drastic changes in some of the estimates of the co-efficients. The equation fitted was of the following form.

$$\hat{Y} = aX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}X_5^{b5}X_6^{b6}X_7^{b7}X_8^{b8}$$

where,

$\hat{Y}$ = Estimated yield of the crop in quintals per farm, a = Intercept of production function, bi = Partial regression co-efficients of the respective resource variable (i = 1, 2, 3… .8), X_1 = Area of the crop (hectare /farm), X_2 = Hired human labour (manday/farm), X_3 = Machine labour (hour /farm), X_4 = Manure (quintal / farm), X_5 = Nitrogen (kg /farm), X_6 = Plant protection(L /farm), X_7= Irrigation (cubic meter/farm) and X_8= Family labour (manday /farm).

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

$$MVP \; Z \; \frac{b\overline{Y}}{\overline{X}} \times Py$$

where,

bi = Partial regression co-efficient of particular independent variables, Y = Geometric mean of dependent variable, X = Geometric mean of particular independent variable, and Py = Price of dependent variable.

OBSERVATIONS AND ANALYSIS

The findings with respect to elasticity of production, marginal productivity, resource use efficiency and optimum resource use were obtained and are presented as follows.

Elasticity of production :

Results showed that partial regression co-efficient with respect to variables under Cobb-Douglas production function could be expressed in terms of elasticity of production. Partial regression co-efficient of area under coconut was 0.383 which was positive and highly significant. Similarly, partial regression co-efficient of irrigation was 0.044 which was highly significant. In next order, partial regression co-efficient of manure was 0.048 which was significant at 5 per cent level. Co-efficient of multiple determinations was 0.836 which indicated 83.60 per cent variation in coconut production due to all

Table 1 : Estimates of Cobb-Douglas production function in coconut production on orchard farm

Independent variable	Partial regression co-efficient (bi)	Standard error (SE)	't' value	Geometric mean (Xi)	Marginal product (q)	Marginal value produce (Rs.)	Price of input (Rs.)	MVP to price ratio	Optimum resource use (Xi)
Area under coconut (ha/farm)	0.383	0.073	5.239**	0.38	91.77	79686.64	35615.62	2.24	0.85
Hired human labour(manday/farm)	0.065	1.422	0.046	27.18	0.218	189.07	180.00	1.05	28.55
Machine labour (hour/farm)	0.045	0.041	1.097	2.89	1.418	1231.06	465.00	2.65	7.65
Manure (q/farm)	0.048	0.021	2.286*	24.50	0.178	154.90	125.00	1.24	30.36
Nitrogen (kg/farm)	0.008	1.988	0.004	25.34	0.029	24.96	13.47	1.85	46.96
Plant protection (L/farm)	-0.003	0.016	-0.187	0.05	-5.463	-4743.69	294.88	-16.08	-
Irrigation (m^3/farm)	0.044	0.015	2.931**	1491.69	0.003	2.33	1.64	1.42	2121.16
Family human labour (manday/farm)	-0.074	0.464	-0.159	9.66	-0.697	-605.65	180.00	-3.36	-
Intercept (log a) ---------------------	3.469								
F value -------------------------------	2.884**								
R^2 ------------------------------------	0.836								
Return to scale (Σbi) -------------	0.516								

Note:- Geometric mean of ($\overline{Y}$) coconut production was 91.05 q/ farm and price was Rs. 868.33 /q

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

independent variables together. F value was 2.884 which was significant at 1 per cent level. Return to scale was found to be 0.516 which indicated decreasing return to scale (Table 1).

Marginal productivity :

Results revealed that marginal productivity of area under coconut was 91.77 quintals on orchard farm. It means that when addition of one hectare area to its geometric mean of 0.38 hectare on orchard farm, then the added one hectare area could cause to give additional production of 91.77 quintals of coconut when other things remaining same in coconut production . Marginal produce with respect to irrigation was 0.003 quintal while that was 0.178 quintal with respect to manure.

Resource use efficiency :

Results revealed that the relationship between marginal value produce and price of input can be in the form MVP price ratio. It was clear that marginal value produce to price ratio for area under coconut was 2.24. Marginal value produce to price ratio for manure was 1.24. While for irrigation, it was 1.42. Other than significant variables, MVP to price ratio with respect to machine labour was also considerable as 2.65. Similarly marginal value produce to price ratio of nitrogen was 1.85.

Optimum resource use :

Optimum resource use of area under coconut was found to be 0.85 hectare. Use of manure can be increased upto 30.36 quintals. Similarly, use of irrigation can be extended upto 2121.16 cubic meters. Further there was also scope to increase the use of nitrogen, hired human labour and machine labour in coconut production on orchard farm. Similar work related to the present investigation was also concluded by More (1999); Naik *et al.* (1991); Saini (1969); Veerkar (2004); Wagale *et al.* (2007) and Wongana (2012).

REFERENCES

More, S.S. (1999). Economics of production and marketing of banana in Maharashtra state. M.Sc. (Ag.) Thesis, University of Agricultural Science, Dharwad, KARNATAKA (INDIA).

Naik, V.G., Borude, S.G. and Wadkar, S.S. (1991). Economics of farming systems in Sindhudurg district. *J. Mahrashtra Agric. Univ.*,**10** (3) : 407-409.

Saini, G.R. (1969). Resource use efficiency in Indian agriculture. *Indian J. Agric. Econ*, **24** (2) : 1-18.

Veerkar, P.D. (2004). Economic analysis of coconut-based cropping systems in Konkan Region (M.S.). *Agric. Econ. Res. Rev.*,**18** (2) : 333-334.

Wagale, S.A., Talathi, J.M., Naik, V.G. and Malave, D.B. (2007). Resource use efficiency in Alphanso mango production in Sindhudurg district. *Internat. J. Agric. Sci.*,**3** (1):32-38.

Wongana, C.A. (2012). Resource use efficiency in cashew production in Wenchi municipality, Ghana. *Agric. On-line Papers Economics & Informatics*, **6** (4): 73-80.