P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating: 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 7; SP-Issue 6; June 2024; Page No. 160-162

Received: 05-03-2024
Accepted: 12-04-2024

Indexed Journal
Peer Reviewed Journal

Resource use efficiency and economics of okra cultivation in South Gujarat

[1]SR Padavi and [2]Narendra Singh

[1]Department of Agricultural Economics, Navsari Agricultural University, Navsari, Gujarat, India

[2]Professor and Head, Department of Agricultural Economics, Navsari Agricultural University, Navsari, Gujarat, India

DOI: https://doi.org/10.33545/26180723.2024.v7.i6Sc.726

Corresponding Author: SR Padavi

Abstract

The okra is the major vegetable crop in South Gujarat. The present study was carried out to study the cost and returns and resource use efficiency. The study was conducted in Surat, Navsari and Tapi districts selected on the basis of area under okra. A sample of 120 okra growers was selected with randomly. The selection of 2 talukas within each district was done randomly for the study. The selection of 2 villages within each taluka was done randomly for the study. The result revealed that the total cost of cultivation (cost C_3) per ha of okra amounted to ₹ 108262, ₹ 125533 and ₹ 139242 on small, medium and large farm, respectively. Overall Cost C_3, which includes managerial cost, was worked out to be ₹ 114786 per ha. An increasing trend was observed in different cost concepts with increase in size of farm. The results indicated that the coefficient of multiple determination (R^2) is 84.80 per cent. It implies that 84.80 per cent of the total variation in the output of okra was explained by the explanatory variables included in the model.

Keywords: structure, resource use efficiency, MPP and MVP

Introduction

Vegetables hold a crucial position in both the local and national agricultural economies. Despite being the second-largest producer of vegetables globally, India has witnessed remarkable growth in the horticulture sector, largely attributed to investments made through initiatives like the National Horticulture Mission (NHM) and various other programs. These efforts have catalyzed what is often referred to as the "Golden Revolution," significantly boosting vegetable production. Okra, known for its versatile applications, serves as a valuable food, non-food, and medicinal resource. Its dry seeds boast high oil content (18-20 %) and protein levels (20-23 %). Widely cultivated and consumed across India, okra stands out for its nutritional richness, offering an abundance of nutrients including protein, minerals, and notably high levels of Vitamins A, B, C, and K. Rise in the area under okra was observed in South Gujarat during the period 2022-23. The increase in area, production and productivity under okra crops were recorded 37.56 thousand ha, 500.38 thousand tonnes and 13.32 tonnes per ha, respectively.

Methodology

Cost of cultivation:

The various cost concepts are determined by agricultural economists who were used while analyzing the data as:

Cost A1: It includes

1. Value of hired human labour.
2. Value of hired and owned bullock labour.
3. Value of hired and owned machine labour.
4. Value of seed (both farm seed and purchased).
5. Value of manures (owned and purchased) and fertilizers.
6. Value of plant protection (insecticides/pesticides).
7. Irrigation charges.
8. Land revenue.
9. Interest on working capital.
10. Miscellaneous expenses.
11. Depreciation.

Cost A_2: Cost A_1 + rent paid for leased in land.
Cost B_1: Cost A_2 + interest on fixed capital (excluding land)
Cost B_2: Cost B_1 + rental value of owned land + rent for leased in land.
Cost C_1: Cost B_1 + imputed value of family labour.
Cost C_2: Cost B_2 + imputed value of family labour.
Cost C_3: Cost C_2 + 10 per cent of cost C_2 as management cost.

Cost of production: The cost of production was worked out by using following formula:

$$\text{Cost of production/qtl} = \frac{\text{Cost of cultivation/ha}}{\text{Quantity of main product/ha}}$$

Resource use efficiency

The use of different inputs in production of selected vegetables crops on sample farms was studied. To analyze the resource use efficiency in vegetables, Cobb–Dougles (1928) production function was fitted to estimate the elasticity of production, marginal physical product and marginal value productivity. The model was as follows:

$\mathbf{Y} = a. X_1^{b1}. X_2^{b2}. X_3^{b3}. X_4^{b4}. X_5^{b5}. X_6^{b6}. X_7^{b7}. X_8^{b8}. U_i$

Different variables used in the production function were as under:
Y = Total returns/ output (₹/ha)
X_1 = Area (ha)
X_2 = Value of seed (₹/ha)
X_3 = Tractor charges (days/ha)
X_4 = Cost on human labour (days/ ha)
X_5 = Cost on chemical fertilizers (₹/ha)
X_6 = Cost on FYM (₹/ha)
X_7 = Cost on plant protection chemical (₹/ha)
X_8 = Number of irrigations per hectare
a = Constant
$b_1, b_2, \ldots b_8$ = Regression coefficients of respective variable
U_i= Error term

The regression coefficients, their significance, standard error and co-efficient of multiple determination (R^2) were worked-out. Marginal physical product and marginal value productivity were worked out for each significant input.

Marginal physical product and marginal value productivity

The marginal physical product of the input, used in each vegetable crops were worked out with the help of following equation:

$$\mathbf{MPPXi = bi \frac{\bar{Y}}{\bar{Xi}}}$$

Where,
bi = Elasticity of production of i^{th} input
Y = Geometric mean of output per hectare
X_i = Geometric mean of i^{th} input per hectare

MVP was worked out as follows:

$$\mathbf{MVP_{xi} = MPP_{xi} \times P_y}$$

Where,
MVP_{xi}= Marginal value of product
P_y= Price of output

Result and Discussion

Cost and returns of okra

Different components of cost incurred to raise okra crop were presented in Table 1. In small farms, the highest expenses were incurred on seed acquisition, comprising 27.60 per cent of the total expenditure, followed by family labor (17.82%), rental value of land (13.49%), and Plant Protection Chemical (11.65%). Hired labour and FYM accounted for 9.08 per cent and 6.09 per cent of the expenditure, respectively. Meanwhile, medium-sized farms allocated the largest portion of their budget to seed procurement (25.54%), followed by expenditures on hired labour (23.23%), rental value of land (13.85%), and Plant Protection Chemical (11.51%). FYM constituted 6.12 per cent of the total expenses for this category.

Large farms also prioritized seed acquisition, accounting for 24.30 per cent of their expenditure, which is following by hired labour (24.06%), Plant Protection Chemical (12.92%), and rental value of land (12.65%). FYM accounted for 6.42 per cent of their total expenses. Across all farm size groups, the highest expenditure was consistently on seed procurement (26.75%), followed by hired labour (13.93%), rental value of land (13.46%), and family labour (13.21%). Plant Protection Chemical and FYM also represent 11.78 per cent and 6.14 per cent of the total expenditure, respectively.

Table 1: Item-wise break up of cost of cultivation of okra (₹/ha)

Sr. No.	Item	Size groups			
		Small	Medium	Large	Overall
1	Human labour				
	(a) family	17536.54 (17.82)	5221.98 (4.58)	4096.39 (3.24)	13787.18 (13.21)
	(b) hired	8939.39 (9.08)	26505.49 (23.23)	30457.83 (24.06)	14532.47 (13.93)
2	Seed	27165.78 (27.60)	29142.86 (25.54)	30756.63 (24.30)	27917.22 (26.75)
3	FYM	5989.30 (6.09)	6989.01 (6.12)	8132.53 (6.42)	6403.44 (6.14)
4	Fertilizers	3039.72 (3.09)	3623.66 (3.18)	4690.96 (3.71)	3323.28 (3.18)
5	Machinery	2032.44 (2.07)	2394.74 (2.10)	2502.41 (1.98)	2150.53 (2.06)
6	PP chemical	11468.18 (11.65)	13138.02 (11.51)	16351.81 (12.92)	12295.92 (11.78)
7	Irrigation charges	3423.13 (3.48)	3901.65 (3.42)	4644.46 (3.67)	3641.74 (3.49)
8	Miscellaneous	1572.10 (1.60)	1784.18 (1.56)	2251.20 (1.78)	1683.37 (1.61)
9	Depreciation	1351.94 (1.37)	1954.42 (1.71)	2413.04 (1.91)	1577.47 (1.51)
10	Total variable cost	64981.99 (66.03)	89434.03 (78.37)	102200.87 (80.74)	73525.42 (70.46)
11	Interest on working capital	1949.46 (1.98)	2683.02 (2.35)	3066.03 (2.42)	2205.76 (2.11)
12	Interest on fixed capital	675.97 (0.69)	977.21 (0.86)	1206.52 (0.95)	788.73 (0.76)
13	Rental value of land	13276.21 (13.49)	15804.39 (13.85)	16013.84 (12.65)	14043.70 (13.46)
14	Total Cost C_2	98420.17 (100.00)	114120.62 (100.00)	126583.65 (100.00)	104350.80 (100.00)

Note: Figure in parenthesis indicate the percentages to total Cost C_2

The table 2 showed that total cost of cultivation (cost C_3) per ha of okra amounted to ₹ 108262, ₹ 125533 and ₹ 139242 on small, medium and large farm, respectively with an average of ₹ 114786. On an average, cost A_1 and A_2 was ₹ 75731. The highest cost A_1 and A_2 were observed on large farms (₹ 105267) and the lowest on small farms (₹ 66931). The average of cost B_1 and cost B_2 were ₹ 76520 and ₹ 90564, respectively. Among different farm size groups, cost C_1 was highest (₹ 110570) on large farms and the lowest (₹ 85144) on small farms with an average of ₹ 90307. Cost C_3, which includes managerial cost, was worked out to be ₹ 114786 per ha. An increasing trend was observed in

different cost concepts with increase in size of farm.

Table 2: Cost of cultivation of okra according to different size holdings (₹/ha)

Cost	Small	Medium	Large	Overall
Cost A_1	66931	92117	105267	75731
Cost A_2	66931	92117	105267	75731
Cost B_1	67607	93094	106473	76520
Cost B_2	80884	108899	122847	90564
Cost C_1	85144	98316	110570	90307
Cost C_2	98420	114121	126584	104351
Cost C_3	108262	125533	139242	114786

The Table 3 reveals that on the overall basis, yield of okra was 136.14 qtl. per ha. The highest yield was observed (155.32 qtl.) on large farms, followed by medium farms (142.85 qtl.) and small farms (131.48 qtl.) which indicated that as the size of holding increased, the yield of okra also increased. The gross income, cost of cultivation, net income and per quintal cost of production were increased with increase in the size of holding.

The result of the production function for okra was presented in Table 4. The results indicated that the coefficient of multiple determination (R^2) is 84.80 per cent. It implies that 84.80 per cent of the total variation in the output of okra was explained by the explanatory variables included in the model. However, seed, tractor charge, FYM, irrigation, human labour found at 5 per cent level of significant.

Table 3: Per hectare output, cost of production, gross income and net income of okra

Particulars	Size holding			Overall
	Small	Medium	Large	
Yield (qtl./ha)	131.48	142.85	155.32	136.14
Cost of cultivation (₹/ha)	98420	114121	126584	104351
Gross income (₹/ha)	168551	172953	192614	171901
Net income (₹/ha)	70131	58833	66031	67550
Per quintal cost of production (₹/qtl.)	661.87	714.02	750.87	682.52

Resource use efficiency

Table 4: Regression coefficients of different production variables in cultivation of okra

Input variables	Coefficient	Standard error
Seed (kg/ha)	0.548*	0.055
Tractor charge (₹/ha)	0.398*	0.042
Chemical fertilizer (₹/ha)	0.464	0.045
Plant Protection Chemical (₹/ha)	0.545	0.047
FYM (₹/ha)	0.416*	0.052
Irrigation (₹/ha)	0.485*	0.052
Human labour (₹/ha)	0.235*	0.015
R^2	0.848	

* Significant at 5% level of significance

It could be seen from the Table 5 that the MVPs of seeds, tractor charge, chemical fertilizer, PPC, FYM, irrigation and human labour were lower than their corresponding unit price the ratio of MVP to factor price. It was less than unity which calls for its underutilization.

Table 5: MPP and MVP of different inputs for okra

	MVP	MFC	MVP/MFC
Seed (kg/ha)	0.013	1.000	0.013
Tractor charge (₹/ha)	0.025	1.000	0.025
Chemical fertilizer (₹/ha)	0.019	1.000	0.019
Plant Protection Chemical (₹/ha)	0.012	1.000	0.012
FYM (₹/ha)	0.009	1.000	0.009
Irrigation (₹/ha)	0.018	1.000	0.018
Human labour (₹/ha)	0.027	1.000	0.027

Conclusion

The cost analysis of okra cultivation indicates that, on overall, the total cost per hectare (cost C3) was ₹114,786 across all farms in the study area. Costs were highest on large farms, followed by medium, small, and marginal farms. The cost of production averaged ₹ 682.52 on sample farms, highest for marginal farms and lowest for large farms. Cost C3 returns per rupee of investment were 1.50. The coefficient of multiple determination (R^2) was 84.80 per cent, indicating that 84.80 per cent of the total variation in okra output was explained by the included explanatory variables. However, seed, tractor charge, FYM, irrigation, and human labor were significant at the 5 per cent level. The Marginal Value Products (MVPs) of seeds, tractor charge, chemical fertilizer, PPC, FYM, irrigation, and human labor were all found to be lower than their corresponding unit prices. This ratio of MVP to factor price was less than unity, indicating underutilization of these factors.

References

1. Godambe RB, Torane SR, Kshirsagar PJ, Talathi JM. Resource use efficiencies of okra in Thane district of Maharashtra. The Asian Journal of Horticulture. 2015;10(1):153-157.
2. Godambe RB, Torane SR, Talathi JM, Kshirsagar PJ. Cost return and profitability of okra in Thane district of Maharashtra. The Asian Journal of Horticulture. 2016;11(1):14-18.
3. Kushwaha RR, Kumar P, Supriya Singh VK, Singh A. Resource use efficiency on potato farms in Kannauj district of Uttar Pradesh. Journal of Pharmacognosy and Phytochemistry. 2019;8(3):4620-4623.
4. Kushwaha S, Singh KK, Kushwaha RR. Okra: a study on cost and profitability analysis in Deoria district of Uttar Pradesh. Journal of Pharmacognosy and Phytochemistry. 2018;7(5):153-156.
5. Kushwaha S, Singh KK, Mauriya SK, Kushwaha S. Resource use efficiencies of okra in Deoria district of U.P. International Journal of Current Microbiology and Applied Sciences. 2018;7:2806-2811.
6. Lokapur S, Kulkarni GN, Gamanagatti PB, Gurikar R. Resource use efficiency of major vegetables in Belgaum district in Karnataka. International Research Journal of Agricultural Economics and Statistics. 2014;5(1):108-110.
7. Vidhya S, Kuthe S, Patel KS. Economics of okra production in South Gujarat. Int. J Agricult. Stat. Sci. 2015;11(1):149-154.
8. Vidhya S, Sharma S, Patel KS, Singh IP. Economics of brinjal production in South Gujarat. Economic Affairs. 2014;59(2):231-241.