

## Economic Performance of Improved Variety (G-9) of Banana in Konkan Region (M.S.)

Hande P. C.<sup>1</sup>, Naik V. G.<sup>2</sup>, Talathi J. M.<sup>3</sup> and Kshirsagar P. J.<sup>4</sup>

**ABSTRACT:** The present study on "Economics performance of improved variety (G-9) of Banana in Konkan region (M.S.)" was undertaken considering the importance of the crop in non traditional area of Konkan region. A cross sectional sample of 60 banana growers was drawn from Sawantwadi and Dodamarg tahsils of Sindhudurg district. The data related to the agricultural year 2010-2011 and analyzed with suitable statistical tools and Cobb- Douglas production function to study resources use efficiency.

The per hectare cost of cultivation of improved variety of banana was Rs. 186030. The per hectare yield of improved variety of banana obtained was 57000 kg. The gross returns realized were Rs. 501990. The benefit cost ration was worked out to 2.70. The variation in yield explained by the various explanatory variables in banana cultivation was to the extent of 81 per cent ( $R^2$  0.8170) in improved variety. Among the variables identified planting material, female labour, N,P,K and plant protection were statistically significant. The ratio of MVP to factor cost for the male labour, N, P2O5, in improved variety were less than one indicating excess utilization of the resources.

From the total production of banana (1011400 kg,) 98.40 per cent was sold in the market. The banana growers followed two channels in selling of banana fruit in the study area viz. Channel – I Producer to contractor i.e. direct sale on own farm and Channel – II Producer to Commission Agents i.e. sale at distant market place. The proportion of banana growers and quantity sold was 30 per cent and 25.82 in Channel –I and 70 per cent and 74.18 per cent in Channel – II. The price realized by banana growers for sale on own farm to contractor and producer to commission agent was Rs. 7.46/kg. and Rs. 9.51/kg. respectively for improved variety.

The major constraints opined by banana growers were inadequate and timely supply of labour, non availability of credit in time and irregular supply of electricity and load shedding.

**Key words:** Cost, returns, profitability, resource use efficiency and constraints

### INTRODUCTION

Banana is an important tropical and sub-tropical crop in Konkan region. Sindhudurg district is well known for growing banana and extensive area being available for increasing cultivation of banana. The Government of Maharashtra is encouraging the cultivators to undertake plantation of rain fed horticultural crop like banana and mango cashew nut in the Konkan region plants having been used and cultivated. Banana is second important fruit next to mango in India. India rank first with 28.34 per cent of world's banana production. Banana is the cheapest, plentiful and nourishing of all fruits including minerals and vitamins and has several medicinal properties. Apart from fresh consumption, the different parts of banana

are used for various purposes. The famous varieties grown in India are Poovan, Champa, Lalvelchi, Karpurachakrakeli, Palayan and Kadali. In Maharashtra state rank third in area and first in production of banana with 85 thousand hectare area and production of about 5200 thousand metric tones, with average productivity 61.1 metric tones in the year 2010-11.

In Maharashtra state, Jalgaon is the largest banana growing district accounting for 70 per cent of the area in Maharashtra state. The area under banana in Konkan region is about 900 hectares. Sindhudurg district occupied near about 100 hectares of area under banana producing 5700 metric tons of fruits. The area under banana cultivation in Sindhudurg district is

\* Department of Agril. Economics, Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri (M.S.) Pin - 415 712.

<sup>1</sup> Ex. Post Graduate Student, <sup>2</sup> Associate Professor, <sup>3</sup> Head and <sup>4</sup> Assistant Professor

increasing since last decade. Goa is the nearest market to Sindhudurg. Considering the importance of this crop in the economy of the region in near future, it is need of time to conduct systematic research in respect of production and other related aspects of this highly remunerative crop.

In view of the above mentioned aspects the present study was undertaken to know Economics performance of improved variety (G-9) of Banana in Konkan region (M.S.) in non traditional area.

## METHODOLOGY

Sawantwadi and Dodamargtahsils were randomly selected for present study as the area under banana was maximum in these tahsils of Sindhudurg district. Three stage random sampling technique was followed in the selection of banana growers with tahsil as a primary unit, village as a secondary unit and banana grower as an ultimate unit. Six villages from each tahsil having maximum area under banana cultivation and five improved ten banana growers were selected randomly from each village. Thus the final sample consisted of 12 villages and 60 banana growers.

The data related to the agricultural year 2010-2011 were collected by personal interviews with the banana growers and analyzed with suitable statistical tools. The cost of cultivation was worked out by using different cost concepts. Cobb-Douglas production function was found "best Fit" to the present data to estimate resource use efficiency.

The following form of Cobb- Douglas production function was used.

$$Y = aX_1^{b_1} X_2^{b_2} X_3^{b_3} X_4^{b_4} X_5^{b_5} X_6^{b_6} X_7^{b_7} X_8^{b_8} X_9^{b_9}$$

The estimated log linear form of above production function was used for analysis of data.

$$\log Y = a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + b_6 \log X_6 + b_7 \log X_7 + b_8 \log X_8 + b_9 \log X_9$$

Where,

Y	=	Yield of banana (kg)
X <sub>1</sub>	=	Planting material (no.)
X <sub>2</sub>	=	Male labour (days)
X <sub>3</sub>	=	Female labour (days)
X <sub>4</sub>	=	N (Rs.)
X <sub>5</sub>	=	P <sub>2</sub> O <sub>5</sub> (Rs.)
X <sub>6</sub>	=	K <sub>2</sub> O (Rs.)
X <sub>7</sub>	=	Plant protection (kg.)
X <sub>8</sub>	=	Irrigation charges (Rs.)
X <sub>9</sub>	=	Manures (tones.)

b<sup>1</sup> to b<sup>9</sup> are the production elasticities of respective resources.

In this functional form 'Y' is the dependent variables and X<sub>1</sub>X<sub>2</sub>X<sub>3</sub> - X<sub>9</sub> are the independent variables were considered on per farm basis. The regression coefficients obtained from this function are also called as elasticities of production. The sum of coefficients of regression i.e. b<sup>1</sup> b<sup>2</sup> b<sup>3</sup> - b<sup>9</sup> indicate return to scale in banana product.

## Estimation of MPP and MVP

The following formulae were used for calculation of marginal physical product and marginal value product.

1. Marginal physical product (MPP) :

$$MPP_{xi} = b_i \frac{\bar{Y}}{\bar{X}_i}$$

Where,

b<sub>i</sub> = Production elasticities of i<sup>th</sup> input

$\bar{Y}$  = Geometric mean of output

$\bar{X}_i$  = Geometric mean of i<sup>th</sup> input

2. Marginal value product (MVP) :

$$MVP_{xi} = MPP_{xi} \times \text{Price per unit of output}$$

3. Marginal cost (MC) :

$$MC = \text{Price per unit of the input.}$$

## Allocative Resource use Efficiency

After estimating the MVP, the resource use efficiency of different resources were judged with the help of MVP to factor cost ratio under,

- (i) MVP/FC = 1 Optimum use of resource,
- (ii) MVP/FC < 1 Excess utilization of resource,
- (iii) MVP/FC > 1 Under utilization of resource.

## RESULTS AND DISCUSSION

### Input use for Improved Variety of Banana

The per hectare input use for improved variety of banana is given in Table 1.

It is seen from the Table 1 that, the per hectare labour used 146.93 days. Of which 46.02 per cent were hired labours and 53.97 per cent were family labours. Further, it was also observed that of the total labour used, 82.78 per cent were the male labours. The number of suckers used by the improved variety banana growers were 3085, manures were 3.12 t., and chemical fertilizer used were 270 kg N, 105 kg P and 164 kg K.

Cost of cultivation of improved variety of banana

Item wise per hectare cost of cultivation of improved variety of banana is presented in Table 2.

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**Table 1**  
**Per Hectare Input use for Improved Variety of Banana**

Sr. No.	Particulars	Male	Female	Quantity/Total
1.	Human Labour (days)			
	Hired	56.35	11.28	67.63 (46.70)
	Family	67.12	12.18	79.03 (46.70)
	Total	123.47(82.78)	23.46(17.22)	146.93(100.00)
2.	Planting material: suckers (No.)			3085
3.	Manures (tones)			3.12
4.	Fertilizer (kg.) N P K			270105164
5.	Pesticides (kg.)			2.68

(Figures in parentheses are percentages to total)

**Table 2**  
**Per Hectare Cost of Cultivation of Improved Variety of Banana**

Sr. No	Particulars	Amount (Rs.)	Percentage
1.	Hired labour		
	Male	14087	7.57
	Female	1692	0.91
	Total	15779	8.48
2.	Planting material (suckers)	37020	19.90
3.	Manuers	6024	3.24
4.	Fertilizers		
	N	3240	1.74
	P	1470	0.79
	K	1804	0.97
	Total	6514	3.50
5.	Pesticides	1608	0.86
6.	Irrigation charges	850	0.46
7.	Land revenue and other cesses	50	0.03
8.	Depreciation on machinery and implements	2771	1.49
9.	Interest on working capital	4067	2.19
	Cost A	74,684	40.14
10.	Rental value of land	83,665	44.98
11.	Interest on fixed capital	1606	0.86
	Cost B	1,59,955	85.98
12.	Family labour		
	Male	16780	9.02
	Female	1827	0.98
	Total	18607	10.00
13.	Supervision charges	7468	4.02
	Cost C	186030	100.00

From the Table 2 it is seen that, the total cost of cultivation

(cost 'C') of improved variety banana was Rs.1,86,030 of which share of cost 'A' was 40.14 per cent and cost 'B' was 85.98 per cent. Among the items of cost planting material was Rs.37020 followed by human labour Rs.34386 and fertilizers Rs.6514. These observations are similar to findings of Senthilnathan and Srinivasan (1994).

The interest on working capital was worked out to Rs.4067, respectively. Interest on fixed capital came to Rs.1606. While, the rental value of land came to Rs.83,665. The supervision charges were Rs.7468 respectively.

**Per hectare cost, returns and profitability of improved variety**

The per hectare yield received, gross returns, cost incurred and profitability of improved variety of banana is worked out and presented Table 3.

It is seen from Table 3 that, the per hectare yield realized from improved variety of banana was 57000 kg and its rate Rs. 8.55/kg. Hence, returns received from banana were Rs. 487350. The additional returns from sale of the banana suckers were of Rs. 14640. The profitability was Rs. 427305 at cost 'A', 342034 at cost 'B' and Rs. 315959 at cost 'C'. The benefit cost ratio 2.70 this showed that improved variety banana cultivation is a profitable venture like the other fruits

**Table 3**  
**Per hectare Cost, Returns and Profitability of Improved Variety**

Sr. No.	Particulars	Amount (Rs.)
1.	Yield (kg)	57000
2.	Rate (Rs./kg)	9.51
	Returns	487350
	Sale of sucker	14640
3.	Gross return (Rs.)	501990
4.	Cost of Cultivation	
	a. Cost A (Rs.)	74684
	b. Cost B (Rs.)	159955
	c. Cost C (Rs.)	186030
5.	Returns at	
	a. Cost A (Rs.)	427305
	b. Cost B (Rs.)	342034
	c. Cost C (Rs.)	315959
6.	<b>Benefit cost ratio</b>	<b>2.70</b>

crop in the Konkan region. Mali *et al.* (2003) observed similar results.

**Resource Productivities of Inputs in Banana Production**

The result of functional analysis of improved variety of banana is given in the Table 4.

**Table 4**  
**Regression Coefficients of Independent Variables in Estimated Cobb-Douglas type of Production Function**

Sr. No.	Variables	Estimated regression coefficient	Standard error
1.	Planting material(no.) (X <sub>1</sub> )	0.813342*	0.2567659
2.	Male labour (days) (X <sub>2</sub> )	-0.460256	0.261232
3.	Female labour (days) (X <sub>3</sub> )	0.331323*	0.116315
4.	N (Kg) (X <sub>4</sub> )	0.906149*	0.316481
5.	P <sub>2</sub> O <sub>5</sub> (Kg) (X <sub>5</sub> )	-0.652423*	0.137963
6.	K <sub>2</sub> O (kg.) (X <sub>6</sub> )	-0.706243*	0.254703
7.	Irrigation charges (Rs.) (X <sub>7</sub> )	0.242972	0.140145
8.	Plant protection (Rs.) (X <sub>8</sub> )	0.422665*	0.059485
9.	Manures (X <sub>9</sub> )	0.138191	0.076250
9.	Intercept (a)	4.9702631	11454.27
10	R <sup>2</sup>	0.81	
11	Sum of elasticities (Sbi)	1.03	

\*\* 1% level of significance

\* 5% level of significance

It is observed from the Table 4 that, the regression coefficient of all the variables used were positive expect for P<sub>2</sub>O<sub>5</sub> (-0.62), male labour (-0.46) and K<sub>2</sub>O (-0.70). The resources (variable) planting material (0.81), N (0.90), female labour (0.33) and plant protection (0.42) were found to be positive and statistically significant at 5 per cent level. This indicated that 1 per cent increase in their respect resources would level to increase the producing improved variety of banana by 0.81%, 0.90%, 0.33% and 0.42% respectively. The regression coefficient of resources P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O were found to be statistically significant but negative indicating that increasing 1 per cent availability of resources to decrease in production by 0.65% and 0.70%, respectively.

It is observed that the coefficient of determination (R<sup>2</sup>) of improved variety and local variety of banana was 0.81. This indicated 81 per cent variation in gross returns was explained by the variables included in the production function. The sum of elasticity of coefficient was observed to the tune of 1.03 for improved variety of banana which showed constant returns to scale.

**Allocative Efficiency**

Considering the production elasticities of various inputs from the fitted equation, geometric means of independent and dependent variables, prices of independent and dependent variables, the allocative resource use efficiencies in production of banana of improved variety were calculated and results are presented in Table 5.

It is seen from the table that, in production of banana in case of improved variety MVP to FC ratio more than unity was for plant protection (Rs. 82491.68) followed by manures (Rs. 28543.00), female labour (Rs. 5429.25), P<sub>2</sub>O<sub>5</sub> (Rs. -2920.59) and K<sub>2</sub>O (Rs. -2014.55). Whereas MVP to FC ratio revealed that over utilization of the resources like male labour (X<sub>2</sub>), P<sub>2</sub>O<sub>5</sub> (X<sub>5</sub>) and K<sub>2</sub>O (X<sub>6</sub>).

**Table 5**  
**Marginal Value Product and Resource use Efficiency in Banana Production**

Sr. No.	Variables	Marginal product (MP)	Marginal Value Product (MVP)	Price/unit of Xi (Rs.)	RatioMVP/Priceof X <sub>i</sub>	Remarks
1	Planting material (No.) (X <sub>1</sub> )	16.56	141.58	12	11.79	Under utilization
2	Male labour (days) (X <sub>2</sub> )	-187.56	-1603.63	250	-6.41	Excess use
3	Female labour (days) (X <sub>3</sub> )	635	5429.25	150	36.19	Under utilization
4	N. (kg.) (X <sub>4</sub> )	183.35	1567.64	5.20	301.46	Under utilization use
5	P <sub>2</sub> O <sub>5</sub> (kg) (X <sub>5</sub> )	-340.59	-2920.59	10	-292	Excess use
6	K <sub>2</sub> O (kg) (X <sub>6</sub> )	-233.64	-2014.55	7.4	-272.23	Under utilization
7	Irrigation charges (Rs.) (X <sub>7</sub> )	16.25	140.64	1	140.64	Under utilization
8	Plant protection (Rs) (X <sub>8</sub> )	9648.15	82491.68	220	374.9	Under utilization
9	Manures (tones) (X <sub>9</sub> )	3338.41	28543.00	240	118	

This analysis revealed that the banana growers have to reallocate and judiciously use input resources to maximize production at lower cost. These observations are in conformity to Patil *et al.* (1987) and Patil (1972).

### Variety wise Per Farm Production and Disposal of Banana

The production and disposal of banana is presented in Table 6.

Production disposal of banana included total quantity sold, quantity used for home consumption, quantity given as kind wages and quantity given to relatives etc. From the total production quantity sold was 98.40 per cent, followed by home consumption

0.54 per cent, given to relatives 0.36 per cent and kind wages 0.25 per cent.

It is observed from the table that they followed to channels in selling of banana fruit in the study area.

Channel – I Producer to contractor i.e. direct sale on own farm

Channel – II Producer to Commission Agents i.e. sale at distant market place.

The proportion of banana growers and quantity sold was 30 per cent and 25.82 in Channel –I and 70 per cent and 74.18 per cent in Channel – II. The price realized by banana growers for sale on own farm to contractor and producer to commission agent was Rs. 7.46 and Rs. 9.51 respectively for improved variety.

**Table 6**  
**Production and Disposal of Banana**

Sr. No.	Particulars	No. of Farmers	Quantity (Kg.)	Price (Rs. per Kg.)	Value (Rs.)
A)	Production of Banana				
a.	Production	60	1011400 (100.00)		
b.	Retention on farm	60			
	Home consumption		12651 (1.25)		
	Kind wages		2530 (0.25)		
	Given to relatives		1030 (0.10)		
c.	Marketed surplus	60	995189 (98.40)		
B)	Disposal of Banana				
a.	At farm gate to contractors	18 (30.00)	257030 (25.82)	7.46	1917448 (21.45)
b.	At distant place to commissioner agent	42 (70.00)	738159 (74.18)	9.51	7019893 (78.55)
c.	Total	60 (100.00)	995189 (100.00)		8937341 (100.00)

### Constraints Faced by Banana Growers

The information regarding the constraint faced by the banana growers in cultivation of banana is presented in Table 7.

**Table 7**  
**Constraints Faced by Banana Growers**  
(Frequency distribution)

Sr. No.	Types of problem	Number (N=60)	Percentage
1.	Inadequate and timely supply of labour	42	70.00
2.	Irregular supply of critical input	19	31.66
3.	Supply of credit in time	37	61.66
4.	Shortage of Irrigation	18	30.00
5.	Irregular supply of electricity and load shedding	21	35.00
6.	Fluctuation in price	12	20.00
7.	Arbitrary reduction in price of produce	15	25.00

It is revealed from the Table 7 that, the important constraint faced by banana growers in improved variety banana growers were inadequate and timely supply of labour (70.00%), followed by supply of credit in time (61.66%), irregular supply of electricity and load shedding (35.00%), shortage of Irrigation water in summer month (30.00%), Irregular supply of critical inputs (31.00%), fluctuation in price (25.00%), Arbitrary reduction in price produce (20.00%). These results are in conformity with Shivnathan and Jahanmohan (1999).

### CONCLUSIONS

For cultivation of banana, sample growers had rationally used inputs viz. suckers, manures, and pesticides. Banana cultivation was profitable with

benefit cost ratio in improved variety at 2.70. There is scope to reduce expenditure on banana cultivation by planning judicious use of resources. Banana was found to be labour intensive crop providing proportionately higher employment opportunities to family members. The Cobb-Douglas production function analysis for improved variety of banana indicated that number of planting material (Suckers) and fertilizers were the major influential variables in banana cultivation. Marginal value productivity analysis in banana cultivation indicated to have appropriate reallocation of resources for enhancement of profitability in banana cultivation through mainly irrigation scheduling.

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