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Estimation of costs and returns per hectare of banana cultivation in Vaishali district of Bihar

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Abstract
The study was designed with the main objective of estimating the costs involved in banana cultivation and returns from banana production. Primary data were collected from 100 banana growers, located in five randomly selected villages of purposively selected Bidupur block and Hazipur block of Vaishali district. The respondents were grouped into four size categories *Viz*. marginal, small, medium and large farmers based on their size of holding. The secondary data were collected from various published and unpublished sources. It was observed that total cost of cultivation for marginal, small, medium and large banana grower was RS.129244, Rs. 126103, Rs. 135937 and Rs. 142114 respectively. On an average 55.00 of banana was produced on one hectare of land. The same time no. of banana was 4518. Gross income from per hectare of banana cultivation was estimated at 423694 Rs./ha and net return was 290544 Rs. per hectare. Cost of production of banana fruits was calculated at Rs. 221.0/ qtl. Cost of production of sucker was estimated at Rs.2.60 per suckers. Cost benefit ratio on an average was found out to be 1:3.17.

Keywords: Cost of cultivation, cost of production, variable cost, marginal farmer

Introduction
Banana (*Musa species*) the "queen of tropical fruit" is considered to be one of the oldest fruits known to mankind. It has enjoyed universal popularity in this country from times immemorial. The antiquity of banana can be traced to the mythological time. There are frequent references to bananas in the Ramayana and Mahabharata. It has been the food of sages and hence the name *Musa sapientum.* India is believed to be one of the centers of origin of banana. It is said to have been taken by Arabs from the West Coast of India to Palestine and Egypt. Indian traders took it to Africa from where it spread to the West. Banana is grown within thirty degrees latitude on either side of the equator. It is cultivated in India over an area of about 3.2 million hectares and accounts for 23 per cent of the area under fruits.

Methodology
Selection of the study area
In order to study" Production and Marketing of Banana "the present study was undertaken in Vaishali district of Bihar. The district was purposively selected because this district had abundant banana production. This district is well known for growing quality banana. Also, this is one of the leading banana producing districts of Bihar.
There are altogether sixteen blocks in vaishali district. A list of banana producing blocks along with quantity of banana produced in respective blocks was prepared and arranged in ascending order. Out of the of 16 blocks, Hajipur and three villages from Bidupur blocks were selected randomly. From each selected blocks, a list of banana producing villages was prepared and after arranging them in ascending order, two village namely, Ismailpur and salimabad from Hajipur and Mohanpur, Dharmpur and salimpur from Bidupur were selected randomly there by making a total of five sample village. Again, a list of banana growers of every selected village was prepared and from each village 20 banana growers were selected randomly. Thus, total 100 banana growers were selected for detail investigation.

Method of Inquiry
At first general information about the village was obtained from the District Statistical Office, vaishali. The information comprised land utilization, crop rotation demographic features, marketing facilities etcetera. The survey method was followed for detailed inquiry of the individual Banana growers

Tools and techniques adopted

Cost of Banana production

The unit cost of Banana Production was worked out as follows:

CBP = T.F.C + T. V. C. / Q.B.P.

Where. CBP is the cost of Banana production (Rs/ton).

TFC is the total fixed cost which includes:

a) Depreciation of machine.
b) Land revenue & Taxes.
c) Rental value of own land.
d) Interest on the value of fixed cost.

TFC is the total fixed cost which included interest on the value of fixed capital.

TVC is the total variable cost which includes:

a) Cost of Machine labour charge
b) Cost of Bullock labour charge
c) Cost of Human labour charge (Hired + owned)
d) Cost of Suckers
e) Cost of Manure
f) Cost of Fertilizers
g) Cost of Plant protection
h) Cost of Irrigation

QBP is the quantity (ton / annum) of Banana production.

Results And Discussion

Cost of cultivation of banana

Cost of cultivation is the cost incurred in setting up of an orchard. This cost once incurred remains valid for entire period of the orchard. The economic life of a banana orchard is generally four years. The cost of marginal, small, medium, and large banana farmers has been shown in Table 1.

It may be observed from the table that average cost incurred in cost of cultivation banana orchard was Rs 81941 Rs. /ha and for different categories of farmers i.e. marginal, small, medium, and large it was computed to be Rs 80461, Rs 76300, and Rs. 84867 and Rs. 86136 per hectare, respectively.

Table 1: Cost of Cultivation of Banana on different size of farms

Sl. No.	Categories	Marginal farms	Small farms	Medium farms	Large farms	Overall farms
A.	Variable Cost	80461 (62.26)	76300 (60.51)	84136 (61.89)	86867 (61.13)	81941 (62.32)
1 Land Preparation and Pit Digging						
i	Machine Labour	7749 (5.60)	8980 (7.12)	9155 (6.73)	9680 (6.82)	8891 (6.65)
ii.	Bullock Labour	1695 (1.32)	---	-----	----	1695 (1.24)
iii.	Human Labour	8590 (6.64)	8450 (6.70)	8164 (6.00)	7856 (5.53)	8265 (6.20)
2.	Cost of Suckers	19441 (15.04)	17656 (14.00)	20537 (15.11)	21366 (15.03)	19750 (14.80)
3.Manures and Fertilizer Cost						
i.	Manures	11467 (8.87)	8989 (7.13)	12195 (8.97)	9685 (6.81)	10584 (7.94)
ii.	Fertilizers	9543 (7.38)	10546 (8.36)	12030 (8.85)	13010 (9.15)	11282 (8.46)
4.	Plant Protection Cost	5985 (4.63)	6205 (4.92)	6165 (4.53)	6365 (4.48)	6180 (4.63)
5.	Irrigation Cost	9687 (7.49)	9496 (7.53)	9298 (6.84)	12099 (8.51)	10145 (7.60)
6.	Interest on Working Capital	6304 (4.88)	5978 (4.74)	6592 (4.85)	6806 (4.79)	6420 (4.80)
B	Fixed Cost	48783 (37.74)	49803 (39.49)	51801 (38.11)	55247 (38.87)	51409 (37.68)
1	Depreciation on equipments and machineries	1239 (0.96)	1857 (1.47)	1685 (1.24)	2172 (1.53)	1738 (1.30)
2	Land Revenue & Taxes	188 (0.14)	192 (0.15)	171 (0.12)	186 (0.03)	184 (0.14)
3	Rental value of owned land	34652 (26.81)	34821 (27.61)	36326 (26.72)	38252 (26.92)	36013 (26.14)
4	Fencing of Orchard	7869 (7.63)	7997 (6.43)	8485 (6.24)	9162 (6.45)	8378 (6.28)
5	Interest on Fixed Capital	4835 (3.37)	4936 (3.91)	5134 (3.78)	5475 (3.85)	5095 (3.82)
C	Total Cost (A+B)	129244 (100.00)	126103 (100.00)	135937 (100.00)	142114 (100.00)	133350 (100.00)

Source: Primary Data (Year 2017-18), Figures in parenthesis indicate percentage to total

It was observed that suckers, fertilizer application and Manure application were the three important items. Cost of suckers (Rs. 19750) accounted for 14.80 per cent of total cost for overall category and it accounted for 15.04 per cent, 14.00 per cent, 15.11 per cent and 15.03 per cent in case of marginal, small, medium and large farmers, respectively. Fertilizer application cost was accounted for 8.46 per cent of total cost for overall category and, it accounted for 7.38 per cent 8.36 per cent 8.85 per cent, and 9.15 per cent for marginal, small, medium and large categories respectively. Manure application cost was constituted 7.94 per cent of total cost for overall group and it was 8.87 per cent, 7.13 per cent, 8.85 per cent and 9.15 per cent of total cost in case of marginal, small, medium and large farmers, respectively. The fourth important cost involved in cost of cultivation of banana orchard was cost of Irrigation which constituted 7.60 per cent of total cost in overall category and it was constituted 7.49 per cent, 7.53 per cent 6.84 per cent and 8.51 per cent of total cost in case of marginal, small, medium and large. Machin labour cost which constituted 6.65 per cent in overall category and it was estimated 5.60 per cent for marginal, 7.12 per cent for small 6.73 per cent for medium and 6.82 per cent for large farm size groups. Other costs involved in of banana orchard were human labour (6.20 per cent), interest on working capital (4.80 per cent), plant protection (4.63 per cent) and bullock labour (1.24 per cent.)

Fixed costs of banana production

In banana cultivation there are two types of costs fixed cost and variable cost. The variable cost varies with the level of production and the fixed cost remains the same irrespective of the level of production. The various items of fixed cost have been shown in Table 2.

The fixed cost per hectare was estimated to be Rs. 51409 for overall category size and it was estimated at Rs.48783, Rs 4936, Rs.51801, Rs. 55247 in case of marginal, small, medium and large farmers respectively. It was observed that fixed cost was higher for larger farms in comparison with that of smaller farms. Out of the various items of fixed cost emerged as the most important one with a share of 26.14 per cent in the total fixed cost. The rental value of owned land increased with increasing farm size in terms of quantum. Next item of fixed cost was fencing cost which accounted 6.28 per cent of total fixed cost. Other items of fixed cost were

depreciation on equipment machineries (1.30 per cent), land revenue & taxes (0.14 per cent), interest on fixed capital (3.82 per cent).

Inter farm size wise comparison of cost of various items of variable cost exhibited almost similar trend. However, it was noticed that expenses on family labour decreased as size of farm increased. In contrast, it was observed that charges for hired human labour and expenses on other material inputs such as fertilizer, irrigation and plant protection measures showed an increasing trend with increasing in farm size Relative resource fullness of larger farms may be the main reason for this phenomenon.

Table 2: Share of variable cost and fixed cost in total cost. (Rs/ha)

SI. No.	Particulars	Marginal	Small	Medium	Large	Over all
1	Total fixed cost (Rs/ha)	48783 (37.74)	49803 (39.49)	51801 (38.11)	55247 (38.87)	51409 (37.68)
2	Total variable cost (Rs/ha)	80461 (62.26)	76300 (60.51)	84136 (61.89)	86867 (61.13)	81941 (62.32)
3	Total cost of cultivation (Rs/ha)	129244 (100.00)	126103 (100.00)	135937 (100.00)	142114 (100.00)	133350 (100.00)

Figures in the parentheses indicate percentage to total cost.

The share of fixed cost and variable cost in total cost was analyzed and the findings have been presented in Table 2. The overall total cost was calculated to be Rs.133350/ha. The total costs of marginal, small, medium and large farm sizes were Rs 129244, Rs 126103, and Rs 135937 and Rs.142114/ ha, respectively. The total cost of the four categories of farm size indicated that the total cost varied directly with the size of farm. As the farm size increased the total cost also increased. It may be mainly due to increases in variable cost with increases in size of farm. However, the quantum of fixed cost also increased with increasing size of farm. The result pointed out that share of variable cost was higher than that of fixed cost. The variable cost was found comparatively high in case of large farms size (Rs.86867/ha.) as against Rs.80461/ha. in case of marginal farms.

Table 3: Output and Return in the Cultivation of Banana Crop

Particulars	Marginal	Small	Medium	Large	Overall
Output					
Main Product (Fruits) (Qlt/ha.)	56.4	53.2	49.8	57.2	55.00
By Product (No. of suckers/ ha.)	4372	4252	4667	4781	4518
Returns (Rs./ha.)					
(Main Product)	378286	383430	368457	415203	386342
(By Product)	36470	32852	39648	40436	37352
Gross Return (Rs./ha.)	414756	416282	408105	455639	423694
Net return (Rs./ha.)	285512	290179	272168	313525	290544
Cost of production (Rs/Qtl)					
Main Product (Fruits)	208.1	218.1	245.1	226.3	221.0
By Product (Rs/suckers)	2.60	2.34	2.83	2.63	2.60
Cost – Benefit Ratio	1:3.20	1:3.35	1:3.11	1:3.38	1:3.17

Source: primary data (2017-18)

Output and returns from banana cultivation and cost of production of banana, were calculated and have been presented in table 3. On an average 55.00 of banana was produced on one hectare of land. The same time no. of banana was 4518. Gross income from per hectare of banana cultivation was estimated at 42369 Rs./ha. and net return was 290544 Rs. per hectare. cost of production of banana fruits was calculated at Rs. 221.0/ qtl. Cost of production of sucker was estimated at Rs.2.60 per suckers. Cost benefit ratio on an average was found out to be 1:3.17.

Summary And Conclusion

An attempt to work out the per hectare total cost for banana production revealed that for marginal, small, medium and large farmers it was to the per hectare Rs.129144, Rs.126103, Rs.135937 and Rs.142114. respectively. Cost of cultivation Items like machine labour, bullock labour, human labour, suckers, manure, fertilizer, plant protection, irrigation and fencing of total establishment cost. Out of the various cost items the cost of sucker (Rs.19750.00 per hectare) occupied first rank which constituted for 14.80 per cent of the total establishment cost. Next in importance Fertilizer application cost (Rs. 11280.00 per hectare) which amounted for 8.46 per cent of total establishment cost. Cost of Manure application (Rs. 10584.00 per hectare) was computed 7.94 per cent of total cost. The fourth important cost involved in cost of cultivation of banana orchard was cost of irrigation (Rs.10145.00 per hectare) which constituted 7.60 per cent of the total cost. machine labour cost (Rs.8891 per hectare) which constituted 6.65 per cent of total cost. Other cost involved in banana orchard were human labour (6.20 per cent), plant protection (4.63 per cent) and bullock labour cost 1.24 per cent.

The fixed cost involved in running a banana cultivation amounted to estimated Rs. 51409 per hectare. It was observed that fixed cost was higher for larger farms in comparison with that of smaller farms. Out of various items of fixed cost emerged as rental value of own land Rs. 36013 per hectare most important one with a share of 26.14 per cent in the total fixed cost. The rental value of owned land also increased with increasing farm size in terms of quantum. Next important item of fixed cost was fencing cost Rs. 8378.00 per hectare, which accounted 6.28 per cent of total fixed cost. Other items of fixed cost were depreciation own machine (1.30 per cent), land revenue & Taxes (0.14 per cent) and Interest on fixed capital (3.82 per cent).

The share of fixed cost and variable cost in total cost. The overall total cost was calculated to be Rs. 133350 Rs. per hectare. The total cost of the four categories of farm size indicated that the total cost varied directly with the size of farm. As the farm size increased the total cost also increased. It may be mainly due to increases in variable cost with

increases in size of farm. However, the quantum of fixed cost also increased with increasing size of farm. The results pointed out that share of variable cost were higher than that of fixed cost. The fixed cost was found comparatively high in case of large farm size (37.68 per cent).

Out put and returns from banana cultivation and cost of production of banana, were calculated and have been presented in table 5.14. on an average 55.00 of banana was produced on one hectare of land. The same time no. of banana was 4518. Gross income from per hectare of banana cultivation was estimated at 42369 Rs./ha. and net return was 290544 Rs. per hectare. Coat of production of banana fruits was calculated at Rs. 221.0/ qtl. Cost of production of sucker was estimated at Rs.2.60 per suckers. Cost benefit ratio on an average was found out to be 1:3.17.

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