

International Journal of Agriculture Extension and Social Development

Volume 7; Issue 5; May 2024; Page No. 331-334

Received: 01-01-2024
Accepted: 05-02-2024

Indexed Journal
Peer Reviewed Journal

An economic analysis of onion production in Nalanda district of Bihar, India

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DOI: <https://doi.org/10.33545/26180723.2024.v7.i5e.626>

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Abstract

The aim of the current study was to determine the cost of cultivation, various expenses, and the benefit-cost ratio associated with production of onion across five farm size categories: marginal, small, semi-medium, medium, and large. The study was conducted in the Harnaut block of the Nalanda district of Bihar, which was specifically chosen due to its high yield and large number of onion farmers (ninety farmers were chosen from six villages within the block). The price of growing onions differed depending on the size group. Cost of cultivation was highest in large farm size farmers (Rupees 97210), while marginal-sized farmers incurred the lowest (Rs. 94550). For small, semi-medium, and medium-sized farmers, the expense was Rs. 96318, Rs. 95961.2 and 96156 per hectare respectively. Cost benefit ratio was highest in large size farms 1: 2.22 followed by semi-medium size farms 1: 2.20, medium size farms 1:2.19 and lowest in marginal and small farm size which was 1: 2.14 respectively. The total yield was highest in large size of farm groups which was 240 Qtl. per hectare and lowest in marginal size of farm groups which was 225 Qtl. per hectare.

Keywords: Cost of production, benefit-cost ratio, different costs, yield per quintal, net return

Introduction

One of the most significant vegetables farmed and consumed commercially is the onion (*Allium cepa* L.). Since at least 4000 BC, it has been grown and consumed practically everywhere in the world. It originated in the region that is now part of Afghanistan, Kazakhstan, Uzbekistan, Western Tianshan, North and West India, and Western Asia. It first spread to other regions of the world in the region surrounding the Mediterranean Sea. Dehydrated onions can be used as spices; they are available as flakes and powder. In addition, onions are a great source of phosphate, calcium, carbohydrates, proteins, and vitamins B and C. They are also used to manufacture oil and pectin. Numerous illnesses and ailments can be treated with onions. The most common ones are dropsy, heart disease liver, cirrhosis, diabetes, tuberculosis and heart attacks (Kumar *et al.*, 2016) [3]. India is largest producer of onion in the world. The total onion production in 2022-2023 was 26738 metric tonnes. (FAO stats 2024)

The onion production in Bihar was 1375000 tonnes in (2021-2022) (NBH).

Materials and Methods

In this study, the respondents, villages, blocks, and districts were chosen using a multistage sampling procedure. Using a random sampling technique, 90 onion producers from the six villages in the Harnaut block of the Nalanda district were chosen. The farmers were divided into five groups based on the size of their land holdings. First were marginal

producers, whose holding size was less than one hectare; second were small growers, whose holding size was between one and two hectares; and third were semi-medium growers, whose holding size was between two and four hectares. Large growers with land holding sizes greater than 10 hectares were in the fifth group, while medium growers with land holding sizes between 4 and 10 hectares were in the fourth. An organized and field-tested interview schedule was employed to gather information from onion growers about several facets of the production of onions. The socioeconomic characteristics of growers and the activities related to onion production were included in the survey data. The economic analysis employed benefit cost to calculate onion farmers' profitability. The entire cost of growing onions was computed, including the costs of preparing the land, running the farm, applying fertilizers and manures, weeding, irrigation, protecting the plants, and harvesting. Secondary data were gathered by looking through a variety of published and unpublished sources, including books, reports, and journals.

The sum of the total fixed and total variable costs is the overall cost of cultivation. The gross return is computed by multiplying the price that farmers get by the entire yield of crops per hectare. The entire cost of cultivation was deducted from the gross return to assess the net return received by onion growers. The benefit-cost ratio was computed by dividing the return on investment by the total cost to determine the return on each rupee. Gross return / total cultivation costs equal to the benefit-cost ratio.

Result and Discussion

Detail description of the cultivated land holdings in different sizes of farms.

The table 1 revealed that the number of onion growers in different farm size groups were marginal (31), small (19), semi-medium (16), medium (16) and large (8) respectively. Altogether 90 farmers were selected for study. Average size

of the cultivated holding per hectare for marginal size farms was 0.55 hectare followed by 1.25 hectare for small size farms, 3.15 hectare for semi-medium size farms, 6.75 ha for medium size farms group and for large size of farms groups was 10.30 which constituted on sample average of 4.4 ha respectively.

Table 1: Detail description of the cultivated land holdings in different sizes of farms

S. No.	Particulars	Size of Farms Group					Sample Average
		Marginal	Small	Semi-Medium	Medium	Large	
1	Size of Farms group (no.)	31	19	16	16	8	90
2	Average land holding(ha)	0.55	1.25	3.15	6.75	10.3	4.4

Distribution of respondents based on their age

The composition of respondents based on their age is indicated in table no. 2: 53 respondents belong to age

category of 36-60 years which was highest followed by age category 61 years and above (20 respondents) and age category 18-35 has less no. of respondents which was 17.

Table 2: Distribution of respondents based on their age

S. No.	Age Categories	Marginal	small	Semi-Medium	Medium	Large	Total
1	18-35	8	3	2	3	1	17
2	36-60 years	20	10	9	9	5	53
3	61 years and above	3	6	5	4	2	20
Total		31	19	16	16	8	90

Economics of onion cultivation (Rs/ha.)

The table 3 reveals that among different size of farms, total cost incurred by the large farms were high (Rs. 97210/ha) as compared to Semi- medium, medium, small and marginal size farms (Rs. 96156/ha, Rs. 95961.2, Rs. 96318 and Rs. 94550/ha). Sample average for total cost was Rs. 96039/ha in different size of farms group.

The cost of human labour, fertilizers, seeds were the items for the cost with major share in the variable costs, because most of the operations like harvesting and weeding were human labour-intensive operations and the other operations like land preparation and inter culture were bullock labour cost of human labour intensive. The distribution of pattern of operational cost under various inputs revealed that cost of hired human labour was highest in large size farms (Rs. 20750 /ha), as compared to medium size farms (Rs. 19250/ha), Semi- medium (18000/ha), Small (18000/ha) and lowest Marginal size farms (Rs. 15750/ha).

Machinery cost was Rs. 7750/ha in marginal size farms and for small size farms was Rs 7050/ha for Semi-medium size farms Rs 7050/ha, medium size farm Rs. 7000/ha and large size farms Rs 6800/ha. The cost of seeds was highest in Marginal size farms (Rs. 5300/ha), as compared to semi-medium size farms (Rs. 5110/ha) and lowest in large size farms (Rs. 4950/ha). As onion would respond well with chemical fertilizer so the cost of farm yard manure used was ranged from Rs. 5200/ha in large size farms, Rs. 5500/ha in medium size farms, Rs. 5500/ha in Semi- medium size farms, Rs. 5600 in small size farms and Rs. 5600 in marginal size farms. Whereas, the expenditure on fertilizers was highest in Marginal size farms (Rs. 8200/ha), as

compared to Semi- medium size farm (Rs. 7750/ha) and small size farms (Rs. 7700/ha), Large size farms (Rs. 7650/ha) and lowest in medium size farms (7600/ha) respectively. Sample average for depreciation on fixed resources Was Rs. 1924. Interest on working capital Rs. 4250, interest on fixed capital was Rs. 2522, average family labour charges for different size of farms group is Rs. 14150. The cost of rental value of own land was 20000 per season for all farm size groups.

Different Cost concept in onion crop per hectare in different size of farm groups

Table 4 reveals that cost concepts on different size of farms group per hectare. Cost A1, was highest in large size farms (Rs. 61560/ha) followed by medium size farms (Rs. 60356/ha), semi-medium size farms (Rs. 58971.2/ha), small size farm (Rs. 58868/ha and marginal size farms (Rs. 57080/ha) respectively. Cost A2 in marginal, small, semi-medium, medium and large size of farms group was Rs. 77080/ha, Rs. 78868/ha Rs. 78971.2/ha, Rs. 80356/ha and Rs. 81560/ha respectively. Cost B was highest in large size farms (Rs. 84210/ha) and lowest in marginal size farms (Rs. 79550/ha) as compared to semi-medium and medium size farms (Rs. 81461.2/ha) and (82906/ha) respectively. Cost C was highest in large size farms (Rs. 97210/ha) and lowest in marginal size farms (Rs. 94550/ha) as compared to semi-medium size farms (Rs. 95961/ha) respectively. Sample average for Cost A1, A2, Cost B and Cost C was Rs. 59367/ha, Rs. 79367/ha, Rs. 81889/ha and Rs. 96039/ha in different size of farms group.

Table 3: Resource use and cost of cultivation of onion crop per hectare in different sizes of farms group.

Number of respondents = 90 (Value in rupees)

S. No.	Particulars of farm operation	Size of farms groups					Sample average
		Marginal	Small	Semi-Medium	Medium	Large	
1	Hired Human Labour	15750 (16.65)	18000 (18.68)	18000 (18.75)	19250 (20.08)	20750 (21.56)	18350 (19.10)
2	Machinery charge	7050 (7.45)	7050 (7.31)	7050 (7.34)	7000 (7.27)	6800 (7.06)	6990 (7.27)
3	Cost of seed	5300 (5.60)	5100 (5.29)	5120 (5.33)	5050 (5.25)	4950 (5.14)	5104 (5.31)
4	Cost of farm yard manure	5600 (5.92)	5600 (5.81)	5500 (5.73)	5500 (5.71)	5200 (5.40)	5480 (7.70)
5	Cost of Fertilizers	8200 (8.66)	7700 (7.99)	7750 (8.07)	7600 (7.90)	7650 (7.95)	7780 (8.10)
6	Cost of Irrigation	5050 (5.34)	5150 (5.34)	5200 (5.41)	5200 (5.40)	5250 (5.46)	5170 (5.32)
7	Cost of Plant Protection Charge	4300 (4.54)	4250 (4.41)	4270 (4.44)	4350 (4.53)	4400 (5.57)	4314 (4.49)
8	Interest on working Capital @8%	4100 (4.33)	4228 (4.38)	4231.2 (4.40)	4316 (4.48)	4400 (5.57)	4250 (4.42)
9	Depreciation on fixed capital	1730 (1.82)	1790 (1.85)	1850 (1.92)	2090 (2.17)	2160 (2.24)	1924 (1.99)
10	Land Revenue paid to gov.	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
11	Rental Value of owned land	20000 (21.15)	20000 (20.76)	20000 (20.84)	20000 (20.80)	20000 (20.78)	20000 (20.82)
12	Interest on Fixed capital@11%	2470 (2.61)	2450 (2.54)	2490 (2.59)	2550 (25.50)	2650 (.75)	2522 (2.62)
13	Family Labour Charges	15000 (15.86)	15000 (15.57)	14500 (15.11)	13250 (13.77)	13000 (13.51)	14150 (14.73)
14	Total Cost of Cultivation	94550 (100)	96318 (100)	95961.2 (100)	96156 (100)	97210 (100)	96039 (100)

Table 4: Cost concept in onion crop per hectare in different size of farm groups

Number of Respondents = 90

S. No.	Cost Concepts	Size of Farm groups					Sample Average
		Marginal	Small	Semi-Medium	Medium	Large	
1	Cost A1	57080	58868	58971.2	60356	61560	59367
2	Cost A2	77080	78868	78971.2	80356	81560	79367
3	Cost B	79550	81318	81461.2	82906	84210	81889
4	Cost C	94550	96318	95961.2	96156	97210	96039

Measures of farm profitability in onion crop per hectare in different size of farms groups

Table 5 Reveals that cost and returns in onion cultivation in different size of farms group. Among different size of farms groups, the total cost of cultivation incurred by the large farms were high (Rs. 97210/ha) as compared to small (Rs. 96318/ha), medium (Rs. 96156/ha), semi-medium (Rs. 95961.2/ha) and marginal farms (Rs. 94550/ha). Sample average for total cost of cultivation was Rs. 96039/ha in different size of farms group. Yield is less in marginal size farms is 225 Qtl/ha, as compared to small 230 Qtl/ha, semi-medium 235 Qtl/ha, medium 235 Qtl/ha and large size farms group is 240 Qtl/ha. Sample average for Yield is 233

Qtl/ha. The gross returns obtained per hectare by large size farms were high (Rs. 216000/ha) as compared to medium size farms (Rs. 211500/ha), semi-medium size farms (Rs. 211500/ha) small size farms (Rs. 207000/ha) and marginal size farms (Rs. 202500/ha) respectively. The net returns per hectare obtained by large size farms were (Rs. 118790/ha) as compared to medium size farms (Rs. 115344/ha), semi-medium size farms (Rs. 115538.8/ha) small size farms (Rs. 110682/ha) and marginal size farms (Rs. 107950/ha) respectively. benefit cost ratio was highest in large size farms (1:2.22) followed by semi- medium size farms (1:2.20), medium size farms (1:2.19) and lowest in marginal and small size farms group (1:2.14), (1:2.14)

Table 5: Measures of farm profitability in onion crop per hectare in different size of farms groups

Sl. No.	Particulars	Size of farm groups					Sample Average
		Marginal	Small	Semi-Medium	Medium	Large	
1	Total Cost of Cultivation (Rs. /ha)	94550	96318	95961.2	96156	97210	96039
2	Yield (Qtl. /ha)	225	230	235	235	240	233
3	Price (Rs. /Qtl)	900	900	900	900	900	900
4	Cost of Production (Rs. /Qtl.)	420.22	418.771	408.34	409.17	405.04	412.31
5	Gross Return per hectare	202500	207000	211500	211500	216000	209700
6	Net return per hectare	107950	110682	115538.8	115344	118790	113661
7	Family labour income	15000	15000	14500	13250	13000	14150
8	Family business income	125420	128132	132528.8	131144	134440	130333
9	Family investment income	130420	133132	138028.8	137894	141440	136183
10	Benefit Cost ratio	1:2.14	1:2.14	1:2.20	1:2.19	1:2.22	1:2.18

Conclusion

The study conducted in the Nalanda district of Bihar provides valuable insights into the economic aspects of onion production. The increase in onion production is primarily due to higher productivity and a larger area dedicated to the crop. However, the acreage of onions is more influenced by factors such as rainfall and market prices than by productivity improvements. The cropping pattern is dominated by onions, followed by groundnut, sugarcane, and paddy. Resource usage in onion cultivation varies across different farm sizes. The cost of onion production also differs according to the size of the farm, with the highest per hectare cultivation costs on small farms and the lowest on large farms. Major cost components include land rental, hired labour, fertilizers, manures, and seeds, with overall cultivation costs varying among different groups of onion growers.

Acknowledgement

I extend my heartfelt thanks to my advisor Dr. Mukesh Maurya for his continuous support and expert guidance throughout the research process.

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