

Cost of cultivation and returns on different cost concepts basis of onion in Rajasthan

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ABSTRACT

India is the second largest producer of vegetables in the world next only to China. The Onion is the major vegetable crop of Rajasthan. The present investigation was carried out to study the cost of cultivation and returns on different cost concepts basis of Onion. The study was conducted in Jodhpur and Nagaur which were selected on the basis of highest area and production of Onion. A sample of 50 Onion growing farmers from different land size categories was selected by probability proportion to number of farmers in each size group. Cost of cultivation of onion vegetables on the sample farms in Jodhpur and Nagaur district. Production is normally considered as the function of area and yield. The decision regarding the choice of crop enterprise to be taken on the farm and the allocation of area and resources under it depends to a great extent, on level of yield, price of output and the cost of inputs used in the production of that crop. The cost of cultivation and the returns to different factors of production help in decision making about the selection of crop and hence, these measures were worked out for onion. On an average, ₹ 77850 was spent on onion per hectare. Cost of cultivation of large farm category was highest, ₹ 91595, followed by medium farms (₹ 83689) and small farms (₹ 72258). Among the different components of cost of cultivation, human labour accounted for the largest portion (28.45 per cent) followed by seed (17.43 per cent). The other major components were rental value of land (12.85 per cent), irrigation charges (11.92 per cent), FYM (9.52 per cent), PP chemical (5.87 per cent), fertilizers (5.20 per cent) and machinery (3.22 per cent). The cultivation of onion requires more labour use for harvesting and cutting, application of irrigation and transplanting/sowing and as such the share of human labour accounted for the highest share of ₹ 22456 per hectare (28.85%). Large farmers spent ₹ 12835 on manures and fertilizers, which was higher than that of medium (₹ 12134) and small farmers category (₹ 10853).

Keywords: Cost of cultivation, onion, returns on different cost concepts basis, Rajasthan

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Consumer preferences have shifted away from cereals and moved towards high-value agricultural produce like vegetables. With increase in economic standards, urbanization, international market integration and trade liberalization, the demand for horticultural products is expected to increase even further. On the production side, if cereal pricing is left to market

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forces, land will be released from traditional cultivation to meet the growing demand for non-cereal crops such as fruits and vegetables in accordance with the diversification in consumption pattern (Mittal, 2006). Thus, in a holistic way, horticulture can be promoted as a means of agro-diversification for the second green revolution, providing the much needed impetus to the growth of agricultural sector, through increase in trade, income and employment. Presently, Indian agriculture is diversifying into the production of high value commodities, also providing an increasing role to small holding farmers. Indian rural economy had been facing the challenge of inability to manage the problems involved with transition of agriculture from a supply-driven value chain to a demand-led market-oriented supply chain (Viswanadham, 2006).

India is the world's second largest producer of vegetables next only to China. Important vegetable crops grown in the country are tomato, onion, brinjal, cabbage, cauliflower, okra and Onions. In Rajasthan, area under vegetables crop in 2010-11 was 140.3 thousand ha and production was 885 thousand MT with productivity of 6.3 MT/ha (Anonymous, 2010-11). In India onion is grown in 1064 thousand ha with production of 15118 thousand tonnes. Onion is grown in 49 thousand ha area with production of 494.2 thousand MT in Rajasthan (Anonymous, 2010-11).

Bala *et al.* (2011) studied the costs and returns structure for the production of major off-season vegetables in Kullu and revealed that per hectare cost A₁ was highest for tomato, followed by cabbage, cauliflower and lowest for peas, among the selected vegetables. However, per quintal cost of cultivation has been found to be highest for peas, followed by cauliflower, tomato and cabbage. Costs on plant protection measures have been the major constituents of cost A₁ in all the crops, followed by expenditure on seed and fertilizers. Vegetables being the labour-intensive crops, have incurred significantly high costs on human labour, ₹ 13200, ₹ 15600/ha. Gross returns as well as net returns per hectare have been observed to be highest for tomato, followed by cauliflower, cabbage and peas. The present study was undertaken to study cost of cultivation and returns on different cost concepts basis of Onion.

METHODOLOGY

A sample of 50 Onion growing farmers from different land size categories was selected by probability proportion to number of farmers in each size group. For the selection of farmers, a complete list of all the vegetable growers of selected villages was prepared and arranged in ascending order on the basis of area under selected crop. The farmers were categorized as small, medium and large by cumulative total method on the basis of area under vegetable crop. A sample of 25 farmers from each selected village was selected by probability proportion to number of farmers in each size group holding.

ANALYTICAL TOOLS

Cost of cultivation

The cost of cultivation of vegetables crops was worked out by using various cost concepts defined below:

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. Depreciation
7. Irrigation charges
8. Land revenue
9. Interest on working capital
10. Miscellaneous expenses

Cost A₂ : Cost A₁ + rent paid for leased-in land

Cost B₁ : Cost A₁ + interest on fixed capital (excluding land)

Cost B₂ : Cost B₁ + rental value of owned land + rent for leased-in land

Cost C₁ : Cost B₁ + imputed value of family labour

Cost C₂ : Cost B₂ + imputed value of family labour

Cost C₃ : Cost C₂ + 10 per cent of cost C₂ as management cost.

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

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

Income measures : Following income measures were calculated –

Gross income: It is the total value of main product.

$$GI = (Q_m \times P_m)$$

Where,

GI = Gross income

Q_m = Quantity of main product

P_m = Price of main product

(ii) Returns over variable cost (RVC):

$$RVC = \text{Gross income} - \text{Cost } A_1$$

(iii) Farm business income (FBI):

$$FBI = \text{Gross income} - \text{Cost } A_2$$

(iv) Family labour income (FLI) or returns to family labour:

$$FLI = \text{Gross income} - \text{Cost } B_2$$

(v) Net income (NI):

$$NI = \text{Gross income} - \text{Cost } C_2$$

(vi) Returns to management

$$RM = \text{Gross income} - \text{Cost } C_3$$

Returns per rupee (RPR)

$$RPR = \frac{\text{Gross income/ha}}{\text{Cost } C_2/\text{ha}}$$

Various constraints faced by farmers in production of selected vegetable crop were also studied.

RESULTS AND DISCUSSION

Cost structure

Table 1 shows breakup of the cost incurred by different size groups in various operations of onion cultivation. On an average, ₹ 77850 was spent on onion per hectare. Cost of cultivation of large farm category was highest, ₹ 91595, followed by medium farms (₹ 83689) and small farms (₹ 72258). Among the different components of cost of cultivation, human labour accounted for the largest portion (28.45 per cent) followed by seed (17.43 per cent). The other major components were rental value of land (12.85 per cent), irrigation charges (11.92 per cent), FYM (9.52 per cent), PP chemical (5.87 per cent), fertilizers (5.20 per cent) and machinery (3.22 per cent). The cultivation of onion requires more labour use for harvesting and cutting, application of irrigation and transplanting/sowing and as such the share of human labour accounted for the highest share of ₹ 22456 per hectare (28.85%). Large farmers spent ₹ 12835 on manures and fertilizers, which was higher than that of medium (₹ 12134) and small farmers category (₹10853).

Table 1: Item-wise break up of cost of cultivation/ha in onion crop

S. No.	Item	Size groups						Weighted average	
		Small		Medium		Large		Value (₹)	%
		Value (₹)	%	Value (₹)	%	Value (₹)	%		
1.	Human labour								
	Family	20556	28.45	6624	7.92	2820	3.08	14324	18.40
	Hired	0	0.00	17784	21.25	24414	26.65	8132	10.45
2.	Seed	12454	17.24	14846	17.74	15925	17.39	13567	17.43
3.	FYM	7020	9.72	7862	9.39	8271	9.03	7415	9.52
3.	Fertilizers	3833	5.30	4272	5.10	4564	4.98	4047	5.20
4.	Machinery	2375	3.29	2625	3.14	2875	3.14	2505	3.22
5.	PP chemical	4245	5.87	4770	5.70	5820	6.35	4571	5.87

6.	Weedicides	660	0.91	780	0.93	900	0.98	722	0.93
7.	Irrigation charges	8834	12.23	9720	11.61	10485	11.45	9283	11.92
8.	Land revenue	14	0.02	14	0.02	14	0.02	14	0.02
9.	Depreciation	725	1.00	1870	2.23	2160	2.36	1235	1.59
	Total variable cost	40160	55.58	64543	77.12	75428	82.35	51489	66.14
10.	Interest on working capital	803	1.11	1291	1.54	1509	1.65	1030	1.32
11.	Interest on fixed capital	739	1.02	1231	1.47	1838	2.01	1006	1.29
12.	Rental value of land	10000	13.84	10000	11.95	10000	10.92	10000	12.85
	Total cost	72258	100.0	83689	100.0	91595	100.0	77850	100.00

Cost of cultivation and different cost concept basis

The comparative estimates of different costs incurred in

onion cultivation for different size groups are given in Table 2.

Table 2: Cost of cultivation of onion on different cost concepts basis on different size holdings (₹/hectare)

Cost	Small	Medium	Large	Weighted Average
Cost A ₁	40963	65834	76937	52519
Cost A ₂	40963	65834	76937	52519
Cost B ₁	41702	67065	78775	53525
Cost B ₂	51702	77065	88775	63525
Cost C ₁	62258	73689	81595	67850
Cost C ₂	72258	83689	91595	77850
Cost C ₃	79484	92058	100755	85635

The table shows that total cost of cultivation (Cost C₂) per hectare of onion amounted to ₹ 72258, ₹ 83689 and ₹ 91595 on small, medium and large farm, respectively with an average of ₹ 77850. On an average, Cost A₁ was ₹ 52519, which was highest on large farms (₹ 76937) and low on small farms (₹ 40963). The average Cost B₁ and Cost B₂ were ₹ 53525 and ₹ 63525 respectively. Among different land size categories, Cost C₁ was highest (₹ 81595) on large farms and lowest (₹ 62258) on small farms with an average of ₹ 67850. Cost C₃, which includes managerial cost, was worked out to be ₹ 85635 per hectare on an overall basis. An increasing trend was observed in different costs with increase in the farm size.

Income measures

A comparison of various income measures from onion cultivation in Rajasthan are given in Table 3.

Table 3: Returns from cultivation of onion crop on sample farms per hectare (₹)

Particulars	Size holding			Weighted average
	Small	Medium	Large	
Returns over variable cost	76217	77386	82243	77194
Farm business income	76217	77386	82243	77194

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Family labour income	65478	66155	70405	66187
Net income	44922	59531	67585	51863
Returns to Mgt.	37696	51162	58426	44078
Returns per rupee	1.62	1.71	1.74	1.66

The table reveals that returns over variable cost varied between ₹ 76217 to ₹ 82243. The returns over variable cost increased with increase in the size of land holding. Farm business income which represents returns over cost A₂ were same as returns over variable cost as there was no difference between cost A₁ and A₂ because the leasing in land for vegetable production was not in practice in the study area. The family labour income per hectare of onion cultivation varied from ₹ 65478 in small farms to ₹ 70405 on medium farms. On an overall basis, family labour income was worked out to be ₹ 66187 per hectare. Net income implies profit per hectare after deducting cost C₂ from gross income. The overall net income from onion cultivation was ₹ 51863 per hectare. Among different size groups, it varied between ₹ 44922 per hectare to ₹ 67585 per hectare on different land size holdings. The overall returns to management (cost C₃ basis) from onion cultivation were ₹ 44078 per hectare. It varied between ₹ 37696 to ₹ 58426 on different land size holdings.

Net returns on different cost concepts basis

Table 4: Net returns per hectare from onion cultivation on different cost concepts (₹)

Particulars	Size holding			Weighted average
	Small	Medium	Large	
Cost A ₁	76217	77386	82243	77194
Cost A ₂	76217	77386	82243	77194
Cost B ₁	75478	76155	80405	76187
Cost B ₂	65478	66155	70405	66187
Cost C ₁	54922	69531	77585	61863
Cost C ₂	44922	59531	67585	51863
Cost C ₃	37696	51162	58426	44078

It is evident from Table 4.10 and Figure 4.7 that on an overall basis, returns from the cost A₁, A₂, B₁, B₂, C₁, C₂ and C₃ were ₹ 77194, ₹ 77194, ₹ 76187, ₹ 66187, ₹ 61863, ₹ 51863 and ₹ 44078 per hectare of onion cultivation, respectively.

Cost of production per quintal

The cost of production of onion across different land size categories is given in Table 5. It reveals that on an average, ₹ 252.92 was spent on producing a quintal of onion on Cost C₂ basis. The cost of production on Cost C₃ basis was ₹ 278.21, while on Cost A₁, Cost A₂, Cost B₁, Cost B₂ basis, it was ₹ 167.24, ₹ 167.24, ₹ 170.41 and ₹ 203.22, respectively. The cost of production on Cost C₂ basis was found to be highest on small farms (₹ 258.99) followed by medium farms (₹ 245.42) and large farms (₹ 241.68) per quintal. The cost of production on Cost C₃ basis was higher on small farms than that of other two categories. This indicates that large farms are more efficient and have economies of scale on their farms as compared to small and medium farms.

Table 5: Cost of production of onion on different size holdings (₹/Qtl.)

Cost	Small	Medium	Large	Weighted Average
Cost A ₁	146.82	193.06	203.00	167.24
Cost A ₂	146.82	193.06	203.00	167.24
Cost B ₁	149.47	196.67	207.85	170.41
Cost B ₂	185.31	226.00	234.23	203.22
Cost C ₁	223.15	216.10	215.29	220.11
Cost C ₂	258.99	245.42	241.68	252.92
Cost C ₃	284.89	269.96	265.84	278.21

Returns per rupee of investment

Return per rupee investment is one of the effective methods to measure the economic feasibility of any crop. This is presented for onion cultivation in Table 6.

Table 6: Returns per rupee of investment in onion cultivation

Particulars	Size holding			Weighted average
	Small	Medium	Large	
Cost A ₁	2.86	2.18	2.07	2.56
Cost A ₂	2.86	2.18	2.07	2.56
Cost B ₁	2.81	2.14	2.02	2.52
Cost B ₂	2.27	1.86	1.79	2.09
Cost C ₁	1.88	1.94	1.95	1.91
Cost C ₂	1.62	1.71	1.74	1.66
Cost C ₃	1.47	1.56	1.58	1.51

It is evident from the table that on an average, the returns per rupee of investment on cost A₁, A₂, B₁, B₂, C₁, C₂ and C₃ were ₹ 2.56, ₹ 2.56, ₹ 2.52, ₹ 2.09, ₹ 1.91, ₹ 1.66 and ₹ 1.51, respectively. The returns per rupee of investment on large farms on cost C₂ basis were highest (₹ 1.74) followed by medium farms (₹ 1.71) and small farm (₹ 1.62). This showed that large farms were more efficient than medium and small farms mainly because of lower cost per unit of output.

Policy Implications

The cultivators of onion had lack of scientific knowledge about cultivation practices and efficient use of productive resources. Therefore, it is important to impart technological knowhow at doorstep through extension workers and Agricultural Research stations organizing field days on farmer's fields. The production and productivity levels have to be improved in the study area to increase the availability as well as to reduce per unit cost of production. This can be achieved by rational allocation of scarce farm resources by the vegetable growers.

CONCLUSION

Cost of cultivation of onion showed tendency to increase with increase in the size of holding. However, per

hectare yield was higher on large farms as compared to medium and small farms. Therefore, gross returns per hectare of onion cultivation were higher on large farms. The analysis of cost of cultivation shows that on an average, the total cost (Cost C₂) per hectare of onion cultivation was ₹ 77850 for the sample farms of the study area. The cost C₂ was highest on large farms followed by medium and small farms. The overall gross income from per hectare of onion cultivation was ₹ 129713. This was higher on large farms as compared to the medium and small farms. On an overall basis, the farm business income was ₹ 77194 per hectare. It was higher on large farms, followed by medium and small farms. The family labour income also followed the same pattern. On an overall basis, the family labour income was ₹ 66187 per hectare. The net income per hectare of onion cultivation was ₹ 51863, It showed that large farms earned more profits per hectare followed by medium and small farms. On an overall basis, the cost of production was ₹ 252.92 on sample farms. It was highest on small farms, followed by medium and large farms. The returns per rupee of investment were ₹ 1.66. It was highest on large farms (₹ 1.74), followed by medium (₹ 1.71) and small (₹ 1.62) farms.

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