The Pharma Innovation Journal 2022; SP-11(3): 244-249

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(3): 244-249

www.thepharmajournal.com
Received: 19-01-2022
Accepted: 21-02-2022

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A study on costs and returns of paddy, chilli and cotton growing small and marginal farmers of Khammam district

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Abstract
Agriculture provides livelihood to more than half of the Telangana state's workforce, is crucial for restoring rural economy. Paddy, chilli and cotton are the three important growing crops in Telangana State of Khammam district as it occupies major area. Paddy is one of the most important staple food crop of India for more than 2/3rd of its population. Chilli is an important vegetable cum spice crop grown in almost all parts of tropical and subtropical regions of the world. India has emerged as the second largest producer of cotton in the world and occupies the first position in terms of total area under crop production. The present study was undertaken in Khammam district in order to find out the costs and returns from each crop from small and marginal farmers. Further the results it revealed that the total cost of paddy worked out to be Rs.89404.03 ha for marginal farmers and Rs.82655.14 for small farmers respectively. In case of chilli, marginal farmers obtained Rs.163609.8ha and small farmers obtained Rs. 210611.In case of cotton the total cost was found to be Rs.74201.23 for marginal farmers and Rs. 99523.53 for small farmers respectively.

Keywords: Paddy, chilli, cotton, small and marginal farmers

Introduction
Agriculture is the main occupation in India. Mostlytwo-third of population is dependent on agriculture directly or indirectly. It is the main source of food, fodder and fuel. It is the basic foundation of economic development and provides highest contribution to national income. Agriculture provides livelihood to more than half of the Telangana state's workforce, is crucial for restoring rural economy. Paddy, chilli and cotton are the three major growing crops in Khammam district of Telangana state. Paddy is one of the most important staple food crop of India for more than 2/3rd of its population. It is the primary source of food for more than three billion people Rice is consumed after cooking with water. Other edible products include rice flakes, puffed rice, rice wafers and canned rice. It is also used in starch and brewing industries. It is mainly produced in the regions, such as West Bengal, Uttar Pradesh, Andhra Pradesh, and Punjab. Chilli (*Capsicum annuum* L.) is an important vegetable cum spice crop grown in almost all parts of tropical and subtropical regions of the world. It belongs to the family Solanaceae and originated from South and Central America where it was domesticated around 7000 BC. Many chilli constituents are important for nutritional value, flavor, aroma, texture and colour. Chillies are low in sodium and cholesterol free, rich in vitamin A, vitamin C, vitamin E, a good source of potassium and folic acid. In India chilli occupies an area of 7.50 lakh hectares with an annual production of 11.67 lakh tones (2009). Andhra Pradesh, Maharashtra, Karnataka and Tamil Nadu are major chilli growing states in India which together contributes about 75 per cent of the total cultivated area. Cotton is one of the most important fiber's and cash crops of India and plays a dominant role in the industrial and agricultural economy of the country. India has emerged as the second largest producer of cotton in the world and occupies the first position in terms of total area under crop production at over 9.44 million hectares. In India, the major cotton cultivating states are Gujarat, Maharashtra, Andhra Pradesh, Telangana, Haryana, Karnataka, etc. Bt (Bacillus thuringiensis) cotton was introduced to India in 2002 and commercialized all over the country within two to three years. (Geetha and Mahesh 2019). It is the most precious gift of nature to the mankind to cloth the people all over the world. Cotton accounts more than 70% of the raw fiber used by the world textile industry and handlooms hence it is also called "King of fibers" (James 2006).

Cotton contributes not only fiber to the textile industry but also edible oil which plays an important role in meeting the ever-increasing demand of edible oil in the country. Edible oil extracted from the cotton seed is estimated to the 5 lakh tonnes along with 30 lakh tonnes cake. In India, all the four cultivated cotton species *viz*., *Gossypium arboreum*, *G. herbaceum*, *G. hirsutum* and *G. barbadense* are grown on commercial scale (Singh and Kairon, 2008). Being a cash crop, cotton is known for its intensive cultivation.

Materials and Methods

The primary data required for costs and returns of major crops (paddy, cotton and chilli) adopted by small and marginal farmers will be obtained from the selected sample farmers by interview method through a pre-tested questionnaire. Cluster sampling technique is adopted for identification of three clusters which are mutually homogeneous but internally heterogeneous. Three clusters included three mandals of Khammam district i.e., Mudigonda, Kusumanchi, Nelakondapalli are selected for the study. In each cluster 15 small and 15 marginal farmers were randomly selected for the study who happened to grow different crops. Thus, making a sample of 90 farmers under 45 marginal and 45 small farmers. Among the cluster mandals one village from each selected cluster ensuring heterogeneity in the village where maximum numbers of paddy, cotton and chilli farmers under small and marginal category were there and are selected for the present study.

Tools of analysis

Variable Costs

These were the costs varies with size of the enterprise, which were productive and were used towards labour and material costs.

Seeds

The actual purchase price plus transportation costs, incurred if any, and farm produced seeds were imputed at prevailing market rates.

Fertilizers

Cost incurred in the purchase of fertilizers actual prices plus transport and other incidental charges.

Plant Protection Chemicals

The actual purchase price of plant protection chemicals, purchased by the respondents.

Labour

Hired labour was accounted for at the actual wages paid by the farmers. Family human labour was imputed at the prevailing wage rates. Labour in all the enterprises were converted into man days by multiplying female labour by 0.7 Bullock labour, both owned and hired was accounted at the prevailing hire rates.

Variable costs include cost of feed, dry fodder, green fodder and veterinary charges.

Miscellaneous Costs

These were the other incidental costs incurred in the operation of enterprises. These included cost on implements like ropes, baskets, repairs and maintenance of implements used, etc.

Interest on Working Capital

This was calculated on the entire working cost of the enterprise at the prevailing bank rate of interest @ 14 per cent per annum and was computed for half of the cropping period.

Medical charges (Health care)

These include actual expenses incurred on disease control, deworming, deticking and preventive vaccinations against incidence of diseases.

Fixed Costs

Land Revenue

Where field crop enterprises were involved, the land revenue was accounted at the rates fixed by the government.

Land Rent

The prevailing land rents for agricultural, dairy enterprises were taken for the sample of tenant farmers.

Depreciation

The depreciation rates of various assets calculated by taking 5% to10% of total value of assets.

Depreciation on fixed capital

Depreciation was worked out using straight line method for the items like tractors, cattle shed, water troughs, buckets, milking cans, feeding troughs, ropes etc.

Interest on Fixed Capital

This was calculated at the rate of 6 per cent per annum.

Returns

The returns from crop and livestock were estimated at the actual price obtained by the farmer. The same method was followed for the evaluation of income for all the enterprises in the farming system. Main products and by products are valued at prevailing prices in market of diseases.

Cost concepts

Cost concepts were used to estimate the cost of cultivation of major millets and minor millets with their competing crops. Cost of cultivation was generated from the following cost concepts. The cost concepts *viz*., Cost A1, Cost A2, Cost B1, Cost B2, Cost C1, cost C2 and cost C3 were used in the present study and these are derived as follows.

Cost A1

This includes all actual expenses in cash and kind incurred in production by the farmers

i. Value of hired human labour
ii. Value of bullock labour (both hired and owned)
iii. Value of machine power (both owned and purchased)
iv. Value of seeds (both owned and purchased)
v. Value of insecticides
vi. Value of manures (both owned and purchased)
vii. Value of fertilizers
viii. Depreciation of implements and farm buildings
ix. Irrigation charges
x. Land revenue, cesses and other tax
xi. Miscellaneous expenses (electricity charges etc)
xii. Interest on working capital

Cost A2

Cost A1 + rent paid for leased in land

Cost B1
Cost A2 + imputed value of owned land + interest on owned capital assets (excluding land)

Cost B2
Cost B1 + rental value of owned land

Cost C1
Cost B1 + imputed value of family labour.

Cost C2
Cost B2 + imputed value of family labour.

Cost C3
Cost c2 X 1.10%(10% of cost C2 is added to cost C2)

Cost of production
Cost C3 - Value of by-product / Yeild

Return per rupee investment
RRI = Gross income / cost of cultivation

Results and Discussion
Costs and returns of major crops (paddy, cotton and chilli)
The sample farmers in the categories of small and marginal farmers in the three selected clusters seemed to grow three crops namely paddy, chillies and cotton crops. An attempt has been made to work out the returns from each crop will be present in detail.

Paddy
In order to understand the costs and returns of paddy in Khammam district, for the small and marginal farmers who grow paddy, was estimated and discussed in this section. Cost of cultivation and returns were calculated on per hectare basis separately for two categories of farmers namely, marginal and small farmers.
Cost of cultivation of paddy crop is the sum total of cost incurred on various inputs that are used and number of labour utilized. The components are variable costs which include expenses on labour employed for performing different cultural practices and expenses incurred on material inputs *viz*., seeds, FYM fertilizers, plant protection chemicals, etc. The fixed costs include depreciation on working assets, interest on fixed capital, rent on owned land, land revenue.
From Table 1 it could be observed that the total cost of cultivation was worked for the sample farms according to size of farms. The total cost of cultivation varied from ₹.82655.14 for small farmers to ₹.89404.03 on marginal farms.
The breakup of total cost of cultivation indicated that the total variable costs per hectare ranged from ₹.46726.06 (56.53 percent) in small farms to ₹.51874.03 (58.02 percent) on marginal farms. So, it can be understood that marginal farmers has high total variable costs compared to small farmers.
The human labour accounted for about 26.94 percent, 22.07 percent on both small and marginal farms respectively. While the machinery labour was found to account 4.21 percent, 4.82 percent marginal and small farms respectively. It is to be noted that high cost of human labour in small farms when compared to marginal farms was due to the fact that small farms employed many human labour for harvesting.
It is clear from the table that apart from labour fertilizers, plant protection chemicals and seed were among the major costs.
The expenditure towards fertilizers accounted to ₹.7016.25 (7.84 percent) to ₹.15576.25 (18.84 percent) on both small and marginal farms respectively.
The cost incurred on seed for small and marginal farmers found to be ₹.6183.33 (7.48) and ₹.2966.661 (3.31 percent) respectively.
The other items of cost among variable costs include FYM, green leaf manures followed by interest on working capital and miscellaneous charges.
The Gross returns obtained from paddy are ₹ .93600 and ₹ .93750 for both marginal and small farmers respectively. The net returns from paddy are ₹ .4195.97 and ₹ .11094.86 for both marginal and small farmers. Rate of returns per rupee investment is high for small farmers i.e ₹.1.13 compared to marginal farmers which has ₹0.083.
Human labour is a major cost component influencing the cultivation of any farm commodity. Successful completion of any farm operation requires human labour. The human labour required for each operation depends on the nature and size of the farm enterprise.

Cost concepts of Paddy
For analyzing, the revised methodology adopted for computing various costs under the comprehensive scheme for studying the cost of cultivation of principal crops by Ministry of Agriculture was followed. Cost A1, Cost A2, Cost B1, Cost B2 and Cost C concepts per hectare was calculated.
The information with regard to cost of cultivation according to cost concepts per hectare for paddy is presented in the Table 2 It can be seen from the data that cost A1 was ₹.51874.03 on marginal farms and ₹.46726.06 on small farms. The cost A2 is not worked for both marginal and small farmers because they do not hold well leased in land so, the cost A2 remains same as the cost A1. The cost B1 which ranged from ₹.53267.71 on small farms and ₹.59136.39 on marginal farms respectively. The cost B2 was ₹.79436.39 and ₹.73567.71 per hectare for both marginal and small farms respectively. The cost C1 varied from ₹.54841.04 on marginal farms to ₹.60976.39.The cost C2 worked out for both marginal and small farmers, it found to be ₹.81276.39 and ₹.75141.04 respectively. The Cost C3 varied from ₹.826551.4 on small farms to ₹.89404.03 respectively.

Table 1: Costs and returns from paddy enterprise (Per hectare)

Component of cost/Returns	Marginal farmers		Small farmers	
	Cost/Returns ₹/Ha	Percent to Total Cost C3	Cost/Returns ₹/Ha	Percent to Total Cost C3
Human Labour	19733.33	22.07	22267	26.94
Bullock Labour	498.6667	0.55	715	0.87
Machine labour	3768.33	4.21	3986.66	4.82
Seed	2966.66	3.318	6183.33	7.48
Fertilizer	7016.25	7.84	15576.25	18.84
Manure	3916.66	4.3	8500	10.28
Plant protection	391.66	0.43	850	1.03
Miscellaneous	708.33	0.79	740	0.90
Irrigation	1350	1.5	1350	1.63
Interest on working capital @ 14%	5813.44	6.5	5769.8	6.98
Depreciation@10%	3833.33	4.28	816.66	0.99
Cost A1	51874.03	58.02	46726.06	56.53
Interest on fixed capital	7262.364	8.12	6541.648	7.91
Cost B1	59136.39	66.14	53267.71	64.45
Land revenue	300	0.33	300	0.36
Rental value of owned land	20000	22.37	20000	24.20
Cost B2	79436.39	88.85	73567.71	89.01
Family labour	1971.42	2.2	54841.04	66.35
Cost C1	60976.39	68.2	1685.71	2.04
Cost C2	81276.39	90.9	75141.04	90.91
Managerial cost (10% of the total cost C2	8127.639	9.09	7514.1	9.09
Cost C3	89404.03	100	82655.14	100.00
Gross returns	75000		93750	
Net returns	-14404.03		11094.86	
Returns per rupee of investment	0.083		1.13	

Table 2: Cost of cultivation in paddy according to cost concepts

S. No	Cost component	Marginal	Small
1.	Cost A1	51874.03	46726.06
2.	Cost A2	51875.03	46726.06
3.	Cost B1	59136.39	53267.71
4.	Cost B2	79436.39	73567.71
5.	Cost C1	60976.39	54841.04
6.	Cost C2	81276.39	75141.04
7.	Cost C3	89404.03	82655.14

Costs and returns of chilli

Per hectare costs and returns of chilli were calculated and are presented in table 3 It is observed from the table that Cost of cultivation was ₹.163609.8 and ₹.210611 for both marginal and small farmers as presented in table 3

From table 3 it is seen that though marginal farmers used more number of human labour that is 29.66 percent require less amount for cost of cultivation compared to small farmers with less number of human labour 26.25 percent spent more amount for chilli cultivation.

On further examining the table it is clear that plant protection chemicals also took a considerable share in total cost of cultivation. It was 18.18 percent, and 13.95 percent of total cost of cultivation on marginal and small farms respectively.

The expenditure towards fertilizers accounted to ₹.4335 on marginal farms and ₹.16008.33 on small farms. Thus small farmers are spending higher amount on fertilizers followed by marginal farmers.

The Gross returns obtained from chilli are ₹.412500 and ₹.550000 for both marginal and small farmers respectively. The net returns from chilli are ₹.248891 and ₹.339389 for both marginal and small farmers. Rate of returns per rupee of investment are high for small farmers i.e. ₹.2.61 compared to marginal farmers which was ₹.2.52.

Cost concepts of chilli

Cost A1, Cost A2, Cost B1, Cost B2, Cost C1, Cost C2 and Cost C3 are the cost concepts per hectare were calculated for chilli cultivation.

From table 4 it can seen from the data the cost A1 was ₹121292.4 on marginal farms and ₹139016.9 on small farmers. The cost A2 is not worked because both the marginal and small farmers they do not afford for leased in land so, the cost A2 remains the same as cost A1. The cost B1 ranged from ₹122566.2 on marginal farms to₹159854.5 on small farms respectively. The cost B2 was ₹143336.2 and ₹180664.5 per hectare for marginal and small farms respectively. The cost C1 varied from ₹127966.2 on marginal farms to ₹177304.5 on small farms. The cost C2 on marginal farms was found to be ₹148736.2 and ₹191464.5 0n small farms respectively. The cost C3 varied from ₹163609.8 to ₹210611 on marginal and small farms indicated that small farmers obtained high amount for cultivation of chilli.

Table 3: Costs and returns from chilli enterprise (Per hectare)

Component of cost/Returns	Marginal farmers		Small farmers	
	Cost/Returns ₹/Ha	Percent to Total Cost C3	Cost/Returns ₹/Ha	Percent to Total Cost C3
Human Labour	48520	29.66	55300	26.25
Bullock labour	729.16	0.45	546.66	0.25
Machine labour	3844.16	2.35	4849.167	2.3
Seed	7641.66	4.67	4675	2.21
Fertilizer	4335	2.65	16008.33	7.6
Manure	4083.33	2.50	8333.33	3.95
plant protection	29750	18.18	29400	13.95
Miscellaneous	708.33	0.43	1075	0.51
Irrigation	1316.66	0.80	656.66	0.31
Interest on working capital @ 14%	14774.08	9.03	18248.74	8.66
depreciation@10%	460	0.28	460	0.21
Cost A1	121292.4	74.14	139016.9	66
Int on fixed capital	1273.8	0.78	20837.6	9.89
Cost B1	122566.2	74.91	159854.5	75.9
land revenue	770	0.47	810	0.38
rental value of owned land	20000	12.22	20000	9.49
Cost B2	143336.2	87.61	180664.5	85.78
Family labour	5400	3.30	10800	5.12
Cost C1	127966.2	78.21	177304.5	84.18
Cost C2	148736.2	90.91	191464.5	90.9
10% Managerial cost	14873.62	9.09	19146.45	9.09
Cost C3	163609.8	100.00	210611	99.99
Gross returns	412500		550000	
Net returns	248891		210611	
Returns per rupee of investment	2.52		2.61	

Table 4: Cost of cultivation in Chilli according to cost concepts

S. No	Cost component	Marginal	Small
1.	Cost A1	121292.4	139016.9
2.	Cost A2	121292.4	139016.9
3.	Cost B1	122566.2	159854.5
4.	Cost B2	143336.2	180664.5
5.	Cost C1	127966.2	177304.5
6.	Cost C2	148736.2	191464.5
7.	Cost C3	163609.8	210611

Costs and returns of cotton

Per hectare costs and returns in cotton production were calculated and are presented in Table 5. The total cost of cultivation for cotton is ₹.74201.23 and ₹.99523.53 on both marginal and small farms. It could be seen that human labour accounted for ₹.24.16 percent on marginal farms and ₹.26.39 on small farms. This is a major cost component influencing cultivation of cotton.

The expenditure towards fertilizers accounted to ₹.6975.83 on marginal farms and ₹.8406.66 on small farms. Thus small farmers are spending higher amount on fertilizers followed by marginal farmers.

The Gross returns obtained from cotton are ₹.275000 and ₹.343750 for both marginal and small farmers respectively. The net returns from cotton are ₹.200798.77and ₹. 244226.47 for both marginal and small farmers. Rate of return per rupee investment is high for marginal farmers i.e. ₹.3.70 compared to small farmers which has ₹.3.45.

Cost concepts of Cotton

Cost A1, Cost A2, Cost B1, Cost B2, Cost C1, Cost C2 and Cost C3 are the cost concepts per hectare were calculated for cotton cultivation.

The information with regard to cost of cultivation according to cost concepts per hectare for cotton is presented in the Table 6 It can be seen from the data that cost A1 was ₹.48562.33on marginal farms and ₹.71212.93 on small farms. The cost A2 is absent for both small and marginal farmers so, the cost A2 remains the same. The cost B1 which ranged from ₹.5336.33 on marginal farms, ₹.75642.6 on small farms. The cost B2 varied from ₹.65615.67 on marginal farms to ₹.65615.67 on small farms. The cost C1 values ranged from ₹.55205.67, ₹.78175.94 for small and marginal farms respectively. The cost C2 varied from ₹.67455.67 on marginal farms to ₹.9047594 on small farms. The cost C3 was ₹.74201.23 and ₹.99523.53 per hectare for marginal and small farms respectively.

Table 5: Costs and returns from cotton enterprise

Component of cost/Returns	Marginal farmers		Small farmers	
	Cost/Returns ₹/Ha	Percent to Total Cost C3	Cost/Returns ₹/Ha	Percent to Total Cost C3
Human Labour	17933.33	24.16	26266.66	26.39
Bullock labour	583.33	0.78	730.33	0.73
Machine labour	2630	3.54	3003.33	3.01
Seed	5937.5	8	15704.16	15.77
Fertilizer	6975.83	9.4	8406.66	8.44
plant protection	3375	4.54	3601.33	3.61
miscellaneous	725	0.97	650	0.65

Irrigation	850	1.14	850	0.85
Interest on working capital @ 14%	5719	7.7	8533.77	8.57
depreciation@10%	3833.33	5.16	3833.33	3.85
Cost A1	48562.33	65.44	71212.93	71.55
Interest on fixed capital	4983.33	6.715	4853.333	4.87
Cost B1	53365.67	71.92	75642.6	76
land revenue	450	0.6	300	0.3
rental value of owned land	15000	20.21	12000	12.05
Cost B2	65615.67	88.42	87942.6	88.36
Family labour	1840	2.47	2533.33	2.54
Cost C1	55205.67	74.39	78175.94	78.55
Cost C2	67455.67	90.9	90475.94	90.9
10% Managerial cost	6745.567	9.09	9047.594	9.09
Cost C3	74201.23	100	99523.53	100
Gross returns	275000		343750	
Net returns	200798.77		244226.47	
Returns per rupee of investment	3.70		3.45	

Table 6: Cost concepts of Chilli

S. No	Cost component	Marginal	Small
1.	Cost A1	48562.33	71212.93
2.	Cost A2	48562.33	71212.93
3.	Cost B1	53365.67	75642.6
4.	Cost B2	65615.67	87942.6
5.	Cost C1	55205.67	78175.94
6.	Cost C2	67455.67	90475.94
7.	Cost C3	74201.23	99523.53

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