



## Economics of Chilli Cultivation in Guntur district of Andhra Pradesh

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### ABSTRACT

Chilli (*capsicum annum L.*) is one of the most important commercial crops of India. The study was conducted in Guntur district of Andhra Pradesh in India. A total of twelve villages and ten farmers from each village *i.e.* total 120 farmers, who were poststratified into small, medium and large farmers were selected randomly for the study. Data collected were pertaining to the period 2015-16. Economic analysis of data indicated that cost  $C_2$  was found to Rs. 3,53,443.07, Rs. 3,90,393, Rs. 4,10,188.71 and Rs. 3,93,872.65 per hectare for small, medium, large and pooled farmers respectively. Net returns was Rs. 51,092.46, Rs. 68,970.17, Rs. 1,16,834.34 and Rs. 62,277.91 per hectare and net returns to total cost was 0.16, 0.18, 0.28 and 0.16 for small, medium, large and pooled farmers respectively.

**Key words :** Chilli, Cost of cultivation, Net returns, Operational cost and Fixed cost.

India the 'Land of spices' is the largest producer, consumer and exporter of spices with a mammoth share in the world trade. Chilli popularly known as 'wonder spice', is a major spice crop as well as vegetable crop grown in many countries (Rao and Rao, 2014). It gained its popularity through more than 400 varieties available all over the world with different pungency, size, shape and colors and its usage. India is the largest producer and consumer of chilli, and rich in almost 50 chilli varieties with the contribution of 36 per cent to the total world production. Chilli is an indispensable condiment and used in the daily diet of every Indian household in one or the other form. India is meeting approximately 25 per cent of the world's chilli requirement and is considered to be a leader in chilli exporting followed by China with 24 per cent. Indian chilli exports are mainly influenced by domestic demand and uneven production which is interrupted by erratic monsoon, drought and yield factors.

The most important chilli growing states in India are Andhra Pradesh (49%), Karnataka (15%), Maharashtra (6%) and Tamilnadu (3%), which constitute nearly 75 per cent of the total area under chilli (Jagtap, *et al.*, 2012). Andhra Pradesh, Karnataka, Maharashtra and Orissa together accounted major share in total area and total production of the dry chillies in the country during 2014-15. Andhra Pradesh, with an area of 1.35 lakh hectares and production of 7.39 lakh tonnes in 2014-

15 ranked first both in area and production among the chilli growing states in the country. Guntur, Prakasam and Krishna are the important chilli growing districts of Andhra Pradesh. The selected district, Guntur, ranked first in area and production of chillies among the districts of Andhra Pradesh with 0.63 lakh hectares of area and 4.08 lakh tonnes of production during the year 2014-15 ([www.indiastat.com](http://www.indiastat.com)).

Production of chillies play an important role in improving the economic conditions of farmer's, especially marginal and small farmers at one side and help to meet out the nutritional requirements of people on the others side. The present study was undertaken to analyze the costs and returns of chilli production.

### MATERIAL AND METHODS

The multistage random sampling technique was adopted in designing sampling frame for the study. In the first stage, Guntur district was selected based on the highest area under chilli cultivation in Andhra Pradesh. In the second stage, four mandals *viz.*, Veldurthi, Sattenapalle, Bollapalle, Medikonduru were selected based on the highest area under chilli. Similarly, in third stage, 3 villages were selected based on highest area under chilli and ten farmers from each selected village of the mandal were selected at random, in view of spread of chilli growers in villages. The sample size

constituting 120 farmers was post stratified into small, medium and large farmers comprising of 48, 39 and 33 respectively for the study. The primary data from sample farmers was collected by personal interview method by using pre-tested structured questionnaire. The primary data on cultivation of chilli from farmers pertained to 2015-16 agricultural year.

Costs and returns structure, farm income measures and various cost concepts were developed by different economists to assess the extent of the cost of cultivation. The cost concepts classification adopted by CACP (Commission on Agricultural Costs and Prices), New Delhi was used in the present study for estimating the cost of cultivation of chilli.

## RESULTS AND DISCUSSION

To facilitate discussion and comparison of economics of chilli cultivation, an attempt has been made to project the results of the study on a comparative basis according to farm size.

### 1 Human labour utilization

A close scrutiny of Table 1 revealed that, on an average, human labour employed was 344.84 man days per hectare in chilli production in which the family labour contribution was 71.55 man days (20.75%) and the rest 273.29 man days (79.25%) by hired labour. The total human labour utilized per hectare of chilli was 299.98, 331.62 and 364.51 man days for small, medium and large farmers respectively. Thus, the human labour utilization had direct relationship with farm size. The family labour utilization was 76.57 man days (25.42%), 72.07 man days (21.73%) and 70.62 man days (19.37%) on small, medium and large farmers respectively. The hired human labour utilization in chilli cultivation was 223.43 man days, 259.54 man days and 293.89 man days for small, medium and large farmers respectively which showed direct relationship with farm size.

It is also clear from Table 1 that, among all the operations, harvesting involved more human labour (196.75 man days per hectare) on an average followed by irrigation (56.12 man days per hectare), plant protection chemicals application (29.20 man days per hectare) and transplanting (23.31 man days per hectare). Other operations where human labour was employed were weeding, fertilizer application, drying and grading, manuring, bund formation, packing and nursery bed preparation accounted for 10.7, 9.56, 7.41, 4.89, 3.83, 2.46 and

0.61 per cent respectively of the total human labour utilization. More or less same trend persisted in all the size groups with reference to human labour utilization.

It is inferred from Table 1 that total human labour utilization in chilli was high in large farmer group followed by medium and small farmers. However the family labour component was high both in percentage and units in small farm category, followed by medium and large farmers. Of all the operations, harvesting consumed more than 50 per cent of total labour utilization in all the groups including pooled farmers.

### 2. Cost of cultivation of chilli

From Table 2, the total cost of cultivation (TCOC) of chilli was worked out to be Rs. 3,93,872.67 per hectare for pooled farmers. The average per hectare cost of cultivation increase with the increase in size of the holdings from Rs. 3,53,443.07 for small farmers, Rs. 3,90,393.17 for medium farmers to Rs. 4,10,188.71 on large farmers indicating direct relationship with the size of the holding. This was due to intensive use of inputs by large farmers. These results are consistent with Reddy *et al.* (2011) where per acre cost of cultivation was found to be Rs. 1,31,520.

It was found that variable costs accounted for a major share in the TCOC on all categories of farms. The total per hectare operational costs ranged from Rs. 3,07,831.87 (87.10%) on small farmers, Rs. 3,40,858.62 (87.31%) on medium farmers to Rs. 3,57,266.15 (87.10%) on large farmers, with an overall average of Rs. 3,43,863.98 (87.30%) on pooled farms. These results are in line with Patel *et al.* (2015) and Reddy *et al.* (2011)

It is evident from Table 2 that, cost of human labour was the major cost component among variable costs with an amount of Rs. 1,17,137.69 per ha. accounting for 29.74 per cent of TCOC on pooled farmers. The same was Rs. 1,01,895.32 on small farmers, Rs. 1,12,226.51 on medium farmers and Rs. 1,24,218.65 on large farmers accounting for 28.83, 28.75 and 30.28 per cents of their respective TCOC.

The next important item of operational cost was irrigation charges which accounted to an amount of Rs. 86,707.83 on pooled farmers i.e., for 22.01 per cent. The same was Rs. 78,951.46 (22.34%) on small farmers, Rs. 83,735.57 (21.45%) on medium farmers and Rs. 90,555.41 (22.08%) on large farmers. The other items of expenditure in the order of importance were plant protection

chemical costs (10.29%), fertilizers costs (8.00%), Machine labour cost (7.05%), seed cost (5.47%), manure (2.12%), interest on working capital (1.75%), miscellaneous expenses (0.83%) and bullock labour (0.03%) respectively for pooled farms. More or less same trend was followed across all the size groups, which was almost similar with the study of Rajure *et al.* (2008).

Fixed costs per hectare were estimated at Rs. 45,611.21, Rs. 49,534.45, Rs. 52,922.55 and Rs. 50,008.68 accounting for 12.90 per cent, 12.69 per cent, 12.90 per cent and 12.70 per cent of TCOC on small, medium, large and pooled farmers respectively as shown in Table 2

The overall analysis of TCOC of chilli crop revealed that, large farmers incurred higher costs than small farmers and medium farmers. This was mainly because of intensive use of human labour, more number of irrigations and excess amount of pesticides used by the large farmers compared to small and medium farmers.

The above findings indicated that chilli crop in general was high labour intensive crop besides major requirement of Irrigation. This finding was in conformity with the results obtained by Srikala *et al.* (2016) where the cost of human labour constituted 40 per cent of total cost of cultivation. Rajure *et al.* (2008) and Shukla (2010) revealed that labour costs occupied more than 36 per cent in the total cost of cultivation.

Though the variable costs, fixed costs and total costs were varying in the three groups of farmers, the per cent contribution of variable costs and fixed costs to total costs remained same in all the three size of farmer groups. The large farmers incurred high cost of cultivation, followed by medium and small group of farmers, inferring that total cost of cultivation was varying directly with the farm size.

### 3. Cost concepts in chilli production

The cost of cultivation of chillies was also dealt by adopting the cost concepts, as suggested by CACP. The cost concepts were Cost A<sub>1</sub>, Cost A<sub>2</sub>, Cost B<sub>1</sub>, Cost B<sub>2</sub>, Cost C<sub>1</sub>, Cost C<sub>2</sub> and Cost C<sub>3</sub> were worked out in the study.

On an average, the cost C<sub>2</sub> (TCOC) of chilli per hectare was Rs. 3,93,872.65 on pooled farmers. It was highest on large farmers (Rs. 4,10,188.71) as compared to small farmers (Rs. 3,53,443.07) and medium farmers (Rs. 3,90,393.17) indicating direct relationship with farm size. These findings were consistent with Rajure *et al.* (2008)

and Olayiwola (2014) in their analysis, cost of cultivation was more in large farmers and less in small farmers. Same trend was showed in Cost C<sub>1</sub> and Cost C<sub>3</sub>.

It can be observed that Cost A<sub>1</sub> ranged between Rs.2,80,642.21 on small farms to Rs.3,32,709.47 on large farms with an average of Rs.3,18,678.91 per hectare. The high value of cost A<sub>1</sub> on large farmers was due to higher expenditure incurred on items like hired human labour, Irrigation, fertilizers, plant protection and machine power. Cost A<sub>2</sub> was minimum (Rs.3,25,120.47) on small farms and increased with increase in farm size. It was Rs.3,64,539.06 per hectare for the pooled farmers.

Cost B<sub>1</sub> was of the order of Rs. 2,81,099.77, Rs. 3,16,995.77 and

Rs. 3,39,042.32 on small, medium and large farmers respectively, with an average of Rs. 3,22,190.80 per hectare for the pooled farmers. Cost B<sub>2</sub> was Rs. 3,25,578.03, Rs. 3,65,180.27, Rs. 3,84,661.93 and Rs. 3,68,050.95 on small, medium, large and pooled farmers respectively.

### 4. Output and returns from chilli production

From Table 4, it is clear that, large farmers recorded higher yield of 42.29 quintals of chilli compared to small farmers (32.75) and medium farmers (36.97) per hectare, which accounted to 36.75 quintals on pooled farmers. High yields on large farmers was due to the efficient usage of fertilizers and more number of irrigations in the critical period of the crop growth. The gross returns obtained by small, medium, large and pooled farmers were Rs. 4,04,535.53, Rs. 4,59,363.37, Rs. 5,27,023.05 and Rs. 4,56,150.56 respectively. The net returns obtained by small, medium, large and pooled farmers were Rs. 51,092.46, Rs. 68,970.17, Rs. 1,16,834.34 and Rs. 62,277.91 respectively. Thus the gross and net returns from chilli crop were higher on large farmers compared to small and medium farmers and accordingly rate of return per rupee spent was also higher on large farmers (0.28) followed by medium (0.18) and small (0.14). At pooled level, the rate of return per rupee spent was 0.16. Thus, the rate of return per rupee investment increases with increase in farm size and in terms of cost, the cost of production decreases with increase in farm size as shown in Table 4 under economies of large scale production.

It could be inferred that though the cost of cultivation was increasing with farm size group, the cost of production was decreasing with increasing

**Table 1. Operation wise human labour utilization in chillies according to farm size  
(Man days ha<sup>-1</sup>)**

S.No.	Particulars	Small farmers	Medium farmers	Large farmers	Pooled farmers
1	Manuring	5.22 (1.74)	5.01 (1.51)	5.8 (1.59)	4.89 (1.42)
2	Nursery bed preparation	0.00 (0.00)	0.05 (0.02)	1.08 (0.30)	0.61 (0.18)
3	Transplanting	21.00 (7.00)	24.19 (7.29)	23.37 (6.41)	23.31 (6.76)
4	Bund formation	4.18 (1.39)	3.51 (1.06)	4.26 (1.17)	3.83 (1.11)
5	Weeding	12.84 (4.28)	11.83 (3.57)	9.65 (2.65)	10.70 (3.10)
6	Fertilizer application	9.64 (3.21)	10.67 (3.22)	9.72 (2.37)	9.56 (2.77)
7	Plant protection chemicals applying	26.93 (8.98)	30.29 (9.13)	29.31 (8.04)	29.20 (8.47)
8	Irrigation	45.74 (15.25)	51.73 (15.60)	59.67 (16.37)	56.12 (16.27)
9	Picking/ Harvesting	163.13 (54.38)	183.61 (55.37)	212.64 (58.34)	196.75 (57.06)
10	Drying and grading	8.86 (2.95)	8.28 (2.50)	6.53 (1.79)	7.41 (2.15)
11	Packing	2.44 (0.81)	2.45 (0.74)	2.48 (0.68)	2.46 (0.71)
	<b>Total</b>	<b>299.98</b> <b>(100.00)</b>	<b>331.62</b> <b>(100.00)</b>	<b>364.51</b> <b>(100.00)</b>	<b>344.84</b> <b>(100.00)</b>
	Owned labour	76.57 (25.42)	72.07 (21.73)	70.62 (19.37)	71.55 (20.75)
	Hired labour	223.43 (75.48)	259.54 (78.27)	293.89 (80.62)	273.29 (79.25)

Note: Figures in parentheses indicate percentages to the respective column totals

**Table 2. Item wise cost of cultivation of chilli farmers**

S.No	Particulars	Small	Medium	Large	Pooled
A.	Variable costs				
i	Seeds	24812.9 (7.02)	27781.83 (7.13)	17372.07 (4.24)	21557.11 (5.47)
ii	Human labour	101895.32 (28.83)	112226.51 (28.75)	24218.65 (30.28)	17137.69 (29.74)
	a. hired labour	74030.27 (20.95)	87013.61 (22.29)	98691.87 (24.06)	91315.98 (23.18)
	b. family labour	27865.04 (7.88)	25212.90 (6.46)	25526.78 (6.22)	25821.70 (6.56)
iii	Bullock labour	195.87 (0.06)	208.82 (0.05)	71.88 (0.02)	131.23 (0.03)
iv	Machine labour	24875.74 (7.04)	27111.39 (6.94)	28960.12 (7.06)	27762.85 (7.05)
v	Insecticides, pesticides and herbicides	32051.97 (9.07)	40066.36 (10.26)	44357.42 (10.81)	40516.74 (10.29)
vi	Manure	7518.46 (2.13)	8352.67 (2.14)	8626.03 (2.10)	8366.24 (2.12)
vii	Fertilizers	28637.59 (8.10)	31480.95 (8.06)	32401.82 (7.90)	31521.2 (8.00)
viii	Irrigation charges	78951.46 (22.34)	83735.57 (21.45)	90555.41 (22.08)	86707.83 (22.01)
ix	Miscellaneous expenses	2733.41 (0.77)	3074.56 (0.79)	3554.50 (0.87)	3282.99 (0.83)
x	Interest on working capital	6159.15 (1.74)	6819.95 (1.75)	7148.24 (1.74)	6880.08 (1.75)
	Total variable cost	307831.87 (87.10)	340858.62 (87.31)	357266.15 (87.10)	343863.98 (87.30)
B.	Fixed costs				
i.	Depreciation	175.39 (0.05)	87.41 (0.02)	470.1 (0.11)	136.64 (0.03)
ii.	Land revenue/ cesses and other taxes	500 (0.14)	500 (0.13)	500 (0.12)	500 (0.13)
iii.	Rental value of owned land	44478.26 (12.58)	48184.50 (12.34)	45619.6 (11.12)	45860.15 (11.64)
iv.	Interest on fixed capital	457.56 (0.13)	762.54 (0.20)	6332.85 (1.54)	3511.89 (0.89)
	Total fixed cost	45611.21 (12.90)	49534.45 (12.69)	52922.55 (12.90)	50008.68 (12.70)
C.	Total cost (A+B)	353443.07 (100)	390393.17 (100)	410188.71 (100)	393872.67 (100)

Note: Figures in parentheses indicate percentages to the respective column totals.

**Table 3. Cost of cultivation of chillies as per cost concepts**

**(Rs. ha<sup>-1</sup>)**

S.No. Particulars	Size groups			
	Small	Medium	Large	Pooled
<b>I</b>				
<b>Cost A<sub>1</sub>: Cultivation costs</b>				
i Seeds	24812.90 (6.38)	27781.83 (6.47)	17372.07 (3.85)	21557.11 (4.98)
ii Hired human labour	74030.27 (19.04)	87013.61 (20.26)	98691.86 (21.87)	91315.98 (21.08)
iii Bullock labour	195.87 (0.05)	208.82 (0.05)	71.88 (0.02)	131.22 (0.03)
iv Machine labour	24875.74 (6.40)	27111.39 (6.31)	28960.12 (6.42)	27762.85 (6.41)
v Insecticides, pesticides and herbicides	32051.97 (8.24)	40066.36 (9.33)	44357.42 (9.83)	40516.75 (9.35)
vi Manure	7518.46 (1.93)	8352.67 (1.95)	8626.03 (1.91)	8366.24 (1.93)
vii Fertilizers	28637.59 (7.37)	31480.95 (7.33)	32401.82 (7.18)	31521.20 (7.28)
viii Irrigation charges	78951.46 (20.31)	83735.57 (19.50)	90555.41 (20.07)	86707.84 (20.01)
ix Depreciation	175.39 (0.05)	87.41 (0.02)	470.11 (0.10)	136.64 (0.03)
xii Land revenue	500 (0.13)	500 (0.12)	500 (0.11)	500 (0.12)
xii Interest on working capital	6159.15 (1.58)	6819.96 (1.59)	7148.24 (1.58)	6880.09 (1.59)
ix Miscellaneous expenses	2733.41 (0.70)	3074.56 (0.72)	3554.50 (0.79)	3282.99 (0.76)
<b>Cost A<sub>1</sub></b>	280642.21 (72.18)	316233.13 (73.64)	332709.47 (73.74)	318678.91 (73.55)
<b>Cost A<sub>2</sub></b>	325120.47 (83.62)	364417.63 (84.86)	378329.07 (83.85)	364539.06 (84.14)
<b>Cost B<sub>1</sub></b>	281099.77 (72.30)	316995.77 (73.82)	339042.32 (75.14)	322190.80 (74.36)
<b>Cost B<sub>2</sub></b>	325578.03 (83.74)	365180.27 (85.04)	384661.93 (85.25)	368050.95 (84.95)
<b>Cost C<sub>1</sub></b>	308964.81 (79.47)	342208.67 (79.69)	364569.10 (80.81)	348012.50 (80.32)
<b>Cost C<sub>2</sub></b>	353443.07 (90.91)	390393.17 (90.91)	410188.71 (90.91)	393872.65 (90.91)
<b>Cost C<sub>3</sub></b>	388787.38 (100)	429432.49 (100)	451207.57 (100)	433259.92 (100)

Note: Figures in parentheses indicate percentages to the respective column totals.

**Table 4. Output and Returns of chilli farmers per hectare**

S.No. Particulars	Small farmers	Medium farmers	Large farmers	Pooled farmers
1 Yield (q ha-1)	32.75	36.97	42.29	36.75
2 Price per quintal	12352.23	12425.30	12462.12	12412.26
3 Gross returns(Rs ha-1)	404535.53	459363.34	527023.05	456150.56
4 Total costs(Rs ha-1)	353443.07	390393.17	410188.71	393872.65
5 Net returns(Rs ha-1)	51092.46	68970.17	116832.34	62277.91
6 Net returns to total cost	0.14	0.18	0.28	0.16
7 Cost of production (Rs. q <sup>-1</sup> )	10792.00	10560.00	9699.00	10718.00

**Table 5. Measures of farm income – chilli**

S.No. Particulars	Small farmers	Medium farmers	Large farmers	Pooled farmers
1 Gross income	404535.53	459363.34	527023.05	456150.56
2 Net income	51092.46	68970.29	116832.34	62277.91
3 Farm business income	123893.32	143130.21	194313.58	137471.65
4 Family labour income	78957.50	94183.07	142361.12	88099.61
5 Farm investment income	96028.28	117917.31	168786.80	111649.95

farm size, indicating the operation of economies of scale. Thus in chilli production, large farmers are more benefited than the other two groups. This was also confirmed with higher rate of return per rupee investment in large farmer, followed by medium group and small group of farmers

### 5. Measures of Farm Income

Gross income exhibited direct relationship with the farm size and it was of the order of Rs. 4,08,236.01, Rs. 4,59,363.46, Rs. 5,29,813.79 and Rs. 4,90,096.86 on small, medium, large and pooled farmers respectively. The gross income was more on large farmers because of highest productivity compared to other categories of farmers. Though the gross income is a measure to assess the efficiency of the farm business, it alone does not help us to gauge the success of the farm business. Therefore, another measure namely net income, which represents surplus of gross income over total costs was estimated. The net income showed a

direct relationship with the farm size. Large farmers recorded a net income of Rs. 1,16,832.34 against Rs. 51,092.46 and Rs. 68,970.17 on small farms and medium farmers respectively. The same was Rs. 62,227.91 on pooled farmers.

Farm business income, which indicate returns on owned resources like land, labour and capital was also more on large farmers (Rs. 1,94,313.58) as compared to small farmers (Rs. 1,23,893.32) and medium farmers (Rs. 1,43,130.21), which means large farmers were superior to small and medium farmers in effective usage of these resources. Family labour income and farm investment income are also expressing direct relation to the farm size.

### Conclusion

The area under chilli crop increased with increase in the size of holdings per hectare. The total cost of cultivation was higher in large farmers followed by medium and the small farmers group.

The gross returns per hectare increased with the increase in size of farms. In total cost of cultivation, operational costs are more than the fixed costs in all farm size groups. The major share of human labour was high in total cost of cultivation followed by irrigation charges in all farm size groups. The cultivation of chilli was labour intensive. Hence, there is a need to bring mechanization in the production and post harvest management of chilli. There is a need to organize the training programmes to increase the awareness among the farmers to use recommended doses of fertilizers and pesticides.

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