

Comparative Economics of Tropical Rice Cultivation Across Farm Sizes: A Study of Nalgonda District of Telangana State

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Abstract: The present study was carried out in Nalgonda district of Telangana State which has a typical tropical climate to investigate the cost of cultivation and profitability of rice particularly across different farm sizes during 2013-14. Multistage stratified random sampling technique was adopted for selection of the sample where rice cultivators were stratified into five groups based on the size of operational holding. The cost of cultivation for all the farms was found to be Rs.78159.65 ha⁻¹ with lowest on marginal farms (Rs.72692.82 ha⁻¹) and highest on large farms (Rs.85214.48 ha⁻¹) implying that cost of cultivation increased with increase in farm size. Human labour constituted the major component (35.44%) of the total cost of cultivation. The cost incurred on hired labour was found to increase with farm size whereas the cost incurred on family labour decreased with increase in farm size. The amount spent on fertilizers and plant protection chemicals was highest on large farms and least on marginal farms. Marginal farms in the study area were found to be more profitable in rice cultivation than large farms.

Keywords: Cost of cultivation, Farm sizes, Nalgonda, Profitability, Rice, Telangana

INTRODUCTION

Rice is the most important and extensively grown tropical food crop in the world. Because of its importance in providing national food security and generating employment and incomes for the low-income sectors of society, most Asian governments regard rice as a strategic commodity (Hossain and Narciso, 2004).

Rice is a primary food source for more than one-third of the world's population and grown in 11 per cent of the world's cultivated area. India is one of the leading rice producing countries in the world with a cultivated area of 43.94 million hectares and production of 106.54 million tonnes in the year 2013-14.

Rice cultivation requires large quantities of inputs, particularly water, fertilizer and pesticides,

contributing to high cost of cultivation. The management practices adopted in rice cultivation and costs incurred towards these practices have been on the rise over the years due to high cost of inputs. A general idea of cost of cultivation per hectare of various operations would help in estimating the returns and to find out the disparities, if any across the farm sizes. Returns from crop cultivation are essential not only for the survival of farmers but also facilitate reinvestment in agriculture (Narayanamoorthy, 2013). Hence the present study was taken up with the aim of investigating cost of cultivation and returns per hectare of rice according to farm size.

Rice is of key importance to the economy of the state of Telangana and its people wherein a large percentage of labour force earns a living from agriculture by cultivating rice. The state has

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significant strengths in rice production enjoying the right conditions for growing rice which is predominantly irrigated and is grown in all the districts of the state. Considering the importance of rice cultivation in promoting agricultural development in the country in general, in the newly formed state of Telangana in particular and Nalgonda district in specific, an attempt has been made in this study to estimate the costs and returns from rice cultivation across farm sizes.

MATERIAL AND METHODS

Multistage stratified random sampling technique was adopted for selection of the sample with district as the first stage unit, mandals/ tehsils as the second stage units, villages as the third stage units and farm holdings as the final and ultimate stage units.

In the first stage, a district with highest production of rice was selected from Telangana state based on the average rice production of preceding five years' i.e., from 2008-09 to 2012-13. Accordingly Nalgonda district was chosen for the study (Fig. 1). The climate of Nalgonda district is typical tropical climate, with summer temperatures soaring to more than 45° C and winters are generally cold and dry. Rainfall is received through South West monsoon with an average rain fall of 730.2 mm. Two mandals namely Miryalaguda and Nidamanur were selected from the district based on three years' average rice production i.e., from 2010-11 to 2012-13. From each mandal three villages were selected randomly. Thus a total of six villages were selected for the study.

In each selected village, rice cultivators were stratified into five groups based on the size of operational holding viz., marginal (<1 ha), small (1-1.99 ha), semi-medium (2-3.99 ha), medium (4-9.99 ha) and large (>10 ha) following the classification given by Agriculture Land use census, Ministry of Agriculture. From each farm-size group, four rice farmers were selected randomly making a total of twenty farmers from each selected village. Thus the sample consisted of 1 district, two mandals, six villages (three villages from each mandal) and 120 rice farmers (twenty from each village).

The data of the selected rice farmers were obtained through personal interview method with

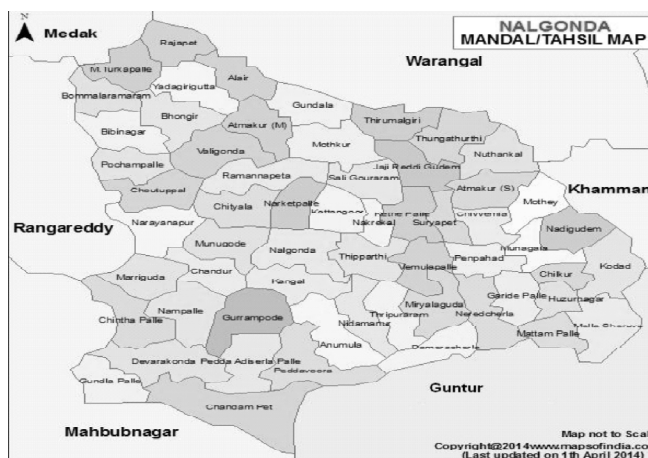


Figure 1: Mandal map of Nalgonda district

the help of pre-tested comprehensive interview schedule. The district level and mandal level data were collected from Directorate of Economics and Statistics, Hyderabad.

Costs and returns from rice cultivation were generated following the cost of cultivation scheme (CCS) under the Government of India.

RESULTS AND DISCUSSION

Cost of cultivation

The cost of cultivation for all the farms was found to be Rs.78159.65 ha⁻¹ with 80.64% and 19.36% of the total cost contributed by variable and fixed costs respectively. The lowest cost of cultivation was reported on marginal farms (Rs.72692.82 ha⁻¹) and highest on large farms (Rs.85214.48 ha⁻¹) implying that cost of cultivation increased with increase in farm size.

Human labour constituted the major component (35.44%) of the total cost of cultivation which confirms the labour-intensive nature of paddy cultivation followed by machine labour (22.41%), plant protection chemicals (11.18%), fertilizers (10.14%), manures (4.23%) and seed (1.93%) as seen in fig. 2.

The expenditure on hired human labour was found to be highest on semi-medium (Rs.24712.89 ha⁻¹) and large farms (Rs. 24495.94 ha⁻¹) and least on marginal farms (Rs. 14213.54 ha⁻¹) while the contribution of family labour was highest on

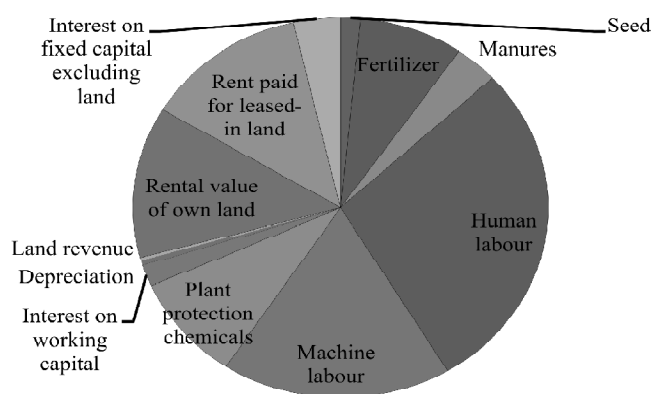


Figure 2: Break-up of cost of cultivation

marginal farms (Rs.8546.58 ha⁻¹) and least on semi-medium farms (Rs.2250.00 ha⁻¹). The use of family labour was not reported on medium and large farms.

The cost incurred on hired human labour was positively related to farm size whereas participation of own farm labour was negatively related to farm size. Anantaramverma (1981) and Ninan (1984) also reported that family labour was negatively related to farm size whereas hired labour was positively related to farm size.

Table 1
Farm-size wise cost of cultivation in Nalgonda district (Rs/ha)

Particulars	Marginal	Small	Semi-medium	Medium	Large	All Farms
Seed	1587.50 (2.18)	1538.54 (2.06)	1492.71 (1.91)	1509.38 (1.89)	1418.75 (1.66)	1509.38 (1.93)
Fertilizers	6785.78 (9.33)	7727.86 (10.32)	7999.32 (10.25)	8265.21 (10.34)	8851.56 (10.39)	7925.95 (10.14)
Manures	3255.21 (4.48)	3453.70 (4.61)	3377.98 (4.33)	3428.03 (4.29)	3080.36 (3.61)	3308.04 (4.23)
Human labour	22760.13 (31.31)	24060.66 (32.14)	26962.89 (34.53)	23829.99 (29.80)	24495.94 (28.75)	27701.77 (35.44)
• Hired labour	14213.54 (19.55)	20052.31 (26.79)	24712.89 (31.65)	23829.99 (29.80)	24495.94 (28.75)	21460.94 (27.46)
• Family labour	8546.58 (11.76)	4008.35 (5.35)	2250.00 (2.88)	-	-	6240.84 (7.98)
Machine labour	17515.73 (24.10)	17320.31 (23.14)	17388.02 (22.27)	17291.15 (21.63)	18049.48 (21.18)	17512.94 (22.41)
Plant protection chemicals	7903.96 (10.87)	8627.31 (11.53)	8316.23 (10.65)	9086.23 (11.36)	9758.05 (11.45)	8738.36 (11.18)
Interest on working capital	1729.15 (2.38)	1824.58 (2.44)	1859.20 (2.38)	1846.59 (2.31)	1931.12 (2.27)	1838.13 (2.35)
Operational Costs	59367.31 (81.67)	62227.40 (83.13)	63832.61 (81.76)	63399.73 (79.29)	66301.78 (77.81)	63025.77 (80.64)
Depreciation	144.04 (0.20)	155.27 (0.21)	345.89 (0.44)	627.23 (0.78)	691.43 (0.81)	441.51 (0.56)
Land revenue, cess or taxes	223.48 (0.31)	227.95 (0.30)	227.50 (0.29)	222.39 (0.28)	235.22 (0.28)	227.30 (0.29)
Rental value of own land	12869.63 (17.70)	11451.56 (15.30)	12514.69 (16.03)	12502.08 (15.64)	13265.42 (15.57)	12553.04 (16.06)
Rent paid for leased-in land	11193.75 (15.40)	12192.19 (16.29)	11334.38 (14.52)	12775.00 (15.98)	14575.00 (17.10)	12408.98 (15.88)
Interest on fixed capital excluding land	1601.19 (2.20)	1678.24 (2.24)	2207.75 (2.83)	4996.74 (6.25)	5130.83 (6.02)	3573.91 (4.57)
Fixed Costs	13325.51 (18.33)	12627.31 (16.87)	14245.02 (18.24)	16558.89 (20.71)	18912.71 (22.19)	15133.89 (19.36)
Total Cost	72692.82 (100.00)	74854.71 (100.00)	78077.63 (100.00)	79958.62 (100.00)	85214.48 (100.00)	78159.65 (100.00)

Note: Figures in parentheses indicate the percent to respective column total.

The cost incurred on machine labour was highest on large farms (Rs. 18049.48 ha⁻¹). Among the farmers who owned tractors 40.00% were large farmers which might have been the reason for high use of machine labour by large farmers. The amount spent on seed ranged between Rs.1418.75 ha⁻¹ on large farms and Rs.1587.50 ha⁻¹ on marginal farms.

The variation in the price of seed might have been due to the variation in the sources of purchase by the farmers in the study area of Nalgonda district. The sources of seed included own seed, seed from private dealers in respective villages or Nidamanoor, Miryalguda or Halia, market yard at Nidamanoor or Miryalguda, Primary Agricultural Cooperative Societies (PACS), Agriculture department of the state government and AP State Seeds Development Corporation Limited located at Nidamanoor. Subsidized seed was available from AP State Seeds Development Corporation Limited, PACS, market yard at Nidamanoor and from the Department of Agriculture. Private dealers offered only unsubsidized seed which was poor in quality compared to subsidized seed.

The amount spent on fertilizers and plant protection chemicals was noted to be highest on large farms (Rs. 8851.56 ha⁻¹ and Rs. 9758.05 ha⁻¹ respectively) and lowest on marginal farms (Rs. 6785.78 ha⁻¹ and Rs.7903.96 ha⁻¹ respectively) indicating a direct relationship between the costs and farm size.

The total fixed cost for all the farms was Rs.15133.89 ha⁻¹ mainly contributed by rental value

of owned land (16.06%) and rent paid for leased-in land (15.88%). Highest and lowest fixed cost were observed on large and small farms (Rs.18912.71 ha⁻¹ and Rs.12627.31 ha⁻¹ respectively) indicating that the large farmers have good infrastructure and other resources.

These results are in conformity with those of Neelappa (2002), Basavaraja *et al.* (2008), Vinaykumar *et al.* (2008), Sita and Ponnarasi (2009), Raj and Azeez (2011), Santha (1993), Rama Rao (2011) and Shende and Bagde (2013) who also observed that variable costs constituted the major portion of the total cost of cultivation of which the expenditure on human labour was found to be the major item and per hectare cost of human labour was least on marginal farms.

As the cost of human labour is very high and found to be a major component of cost of cultivation low cost machines may be included in the government programs and extension activities. Research on the development and fine tuning of the existing machinery also must be encouraged.

The information regarding the cost of cultivation according to cost concepts is presented in Table 2. The lowest values of cost A₁, A₂, B₁, B₂, C₁, C₂ and C₃ were observed on marginal farms and highest on large farms. Thus a direct relationship was noticed between the costs and farm size. These results are in line with those of Yadav and Sinha (2004), Kumar *et al.* (2013) and Rahman *et al.* (2012) who also showed that costs were lowest on marginal farms and increased with increase in farm size.

Table 2
Cost of cultivation according to farm sizes

Farm size	(Rs/ha)						
	Cost A ₁	Cost A ₂	Cost B ₁	Cost B ₂	Cost C ₁	Cost C ₂	Cost C ₃
Marginal	51088.91	52954.54	51555.92	64146.24	60102.51	72692.82	79962.10
Small	58685.60	62749.66	59314.94	71013.38	63156.28	74854.71	82340.19
Semi-medium	64206.82	67984.94	65862.63	77983.88	65956.38	78077.63	85885.40
Medium	64057.14	67250.89	67388.31	79958.62	67388.31	79958.62	87954.48
Large	67132.19	70775.94	71621.67	85214.48	71621.67	85214.48	93735.93
All farms	61034.13	64343.19	63148.69	75663.32	65645.03	78159.65	85975.62

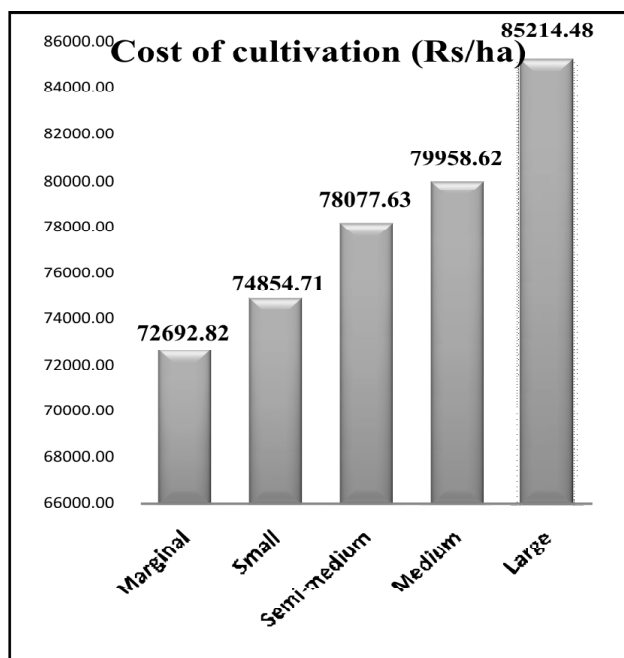


Figure 3: Cost of cultivation of rice farms

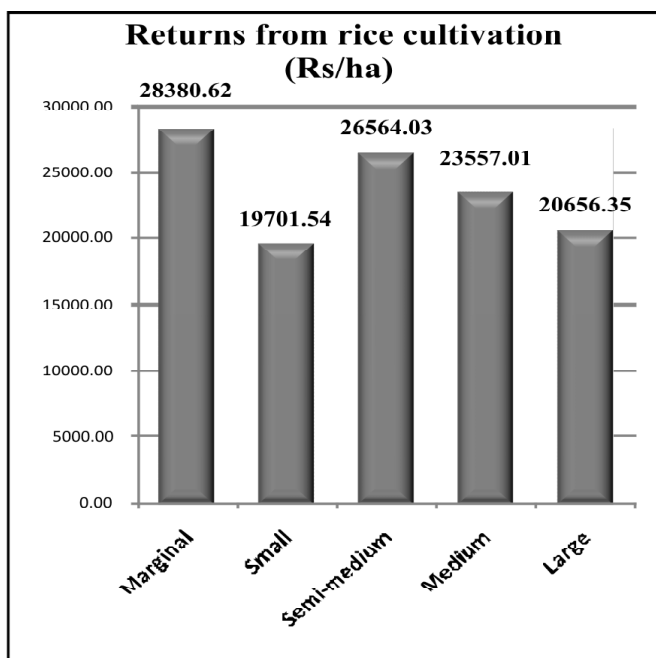


Figure 4: Returns from rice cultivation

Returns from rice cultivation according to farm-size

To find the profitability of farm business, gross income, net income, family labour income, farm business income and farm investment income were worked out and presented in Table 3. Net income, family labour income and farm investment income were found to be highest for marginal farms. Returns per rupee investment were highest for marginal farms (1.40) and least for large farms (1.24) indicating that marginal farms were profitable in rice cultivation compared to large farms. These results are in conformity with those of Kumar *et al.* (2013) and Rahman *et al.* (2012) who also found that

net returns and benefit-cost ratio were highest for marginal farms and declined with increase in farm size.

CONCLUSION

The study revealed that cost of cultivation of rice increased with increase in farm size. Human labour constituted the major component of the total cost of cultivation which confirms the labour-intensive nature of paddy cultivation. Hence low cost machines may be included in the government programmes, extension activities in addition to encouraging research on development and fine tuning of the existing machinery.

Table 3
Returns from rice cultivation

Farm size	Gross income	Net Income	Family labour income	Farm business income	Farm investment income	Returns per rupee investment
Marginal	101073.44	28380.62	36927.20	48118.90	39572.32	1.40
Small	94556.25	19701.54	23542.87	31806.59	27965.25	1.27
Semi-medium	104641.67	26564.03	26657.78	36656.73	36562.98	1.35
Medium	103515.63	23557.01	23557.01	36264.73	36264.73	1.31
Large	105870.83	20656.35	20656.35	35094.89	35094.89	1.24
All farms	101931.56	23771.91	26268.24	37588.37	35092.03	1.31

The cost incurred on hired labour was found to increase with farm size whereas the cost incurred on family labour decreased with increase in farm size. The amount spent on fertilizers and plant protection chemicals was highest on large farms and least on marginal farms. Farmers should be encouraged to use organic pesticides which can be made at the farmers' home thus simultaneously making use of the livestock instead of costly plant protection chemicals. Marginal farms were found to be more profitable in rice cultivation than large farms.

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