



## A Comparative Study on Semi-Mechanized and Traditional Practices of Paddy Farming with Benefit-Cost Analysis

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### ABSTRACT

The study was conducted in Guntur district during 2015-2016 to make comparative cost benefit analysis of per acre rice production of different farming practices like Semi-Mechanized and Traditional practices. Primary data was collected through structured questionnaire. Three villages from three tehsils namely Narsaraopeta, Chilakalutipeta and Sattenapalli were randomly selected. A sample size of 60 farmers was used and the respondents were randomly selected. For comparison, Total cost of production, yields, Net returns and Cost-benefit analysis approach was used. Total cost of production, under the Semi-Mechanized farming practices amounted to Rs.132300 in comparison with the Traditional farming practices, which was of Rs.106650. Yields obtained per acre under the Semi-Mechanized farming practices accounted for 4900kg with respect to 3950kg for Traditional farming practices. Net Returns under Semi-Mechanized farming practices was found to be 40% extra over the Traditional farming practices. The highest Benefit-cost observed in the semi-mechanized practices is 2.52 over traditional farming (1.81). The higher benefit-cost ratio indicted that mechanized practices are profitable in terms of net production. Awareness about the cultivation of Semi-Mechanized Practices is found to lacking and identified as major problem in promotion of beneficial practices in the selected area.

Key words: Costs, Paddy Comparison, Revenue, Rice Varieties, Paddy in Guntur.

Rice is the staple food for the world 2.7 billion populations mostly resides in Asia. Asia produces and consumes 90% of the world rice. India is an agricultural country blessed with a climate favorable for rice production i.e. fertile soil, vast irrigated land and considerable manpower. Agriculture is an important source of national income, employment, foreign exchange earnings, food supply and industrial raw materials in the country. Agricultural sector is the main stay of the local community of Guntur district and most of population is depended either directly or indirectly on this sector. The economy of the district is predominantly agriculture-based. Rice occupies a pivotal place in Guntur's domestic food and livelihood security system. Rice has become particularly important in the diets of the poor community. It is grown under diverse soil and climatic conditions in the District Guntur.

BPT 2270 (Bhavapuri Sannalu) and BPT 2231 (Akshaya) Varieties are the most popular varieties of the district, which are found to grow in an area of more than 300 hectares in both seasons. It is well known fact that paddy production differs

from Semi-mechanized practices and Traditional Practices, in terms of costs, revenue and net production. Santha (1993), studied the economics of rice cultivation and carried out comparative analysis of production cost, input use and profitability of rice production. Dash et al (1995) studied per hectare cost and return and level of input used in production for summer rice. It was observed that on an average, per hectare cost of cultivation was Rs. 17113. Maximum net return/hectare was obtained by rice/rice/black gram [*Vina mungo*], rice/rice/sesame and rice/rice/green gram [*Vigna radiate*] sequences. Reddy (1996) assessed the performance in terms of yield per hectare, unit cost and total factor productivity. The analysis revealed that there exists relatively lower prices for modern inputs compared to traditional inputs and thereby obtained higher yields at lower costs. Upendra (1999) studied that per hectare net return was comparatively higher in an irrigated rice ecosystem (Rs. 3270.13) followed by rain fed upland rice (Rs. 1424.42), rain fed lowland rice (Rs 521.56) and deep water (Rs 471.35). The average per ton cost of production of rice was Rs. 1898.2, Rs. 2266.6, Rs.

1601.1 and Rs. 2202.5 under rain fed upland, rain fed lowland, irrigated and deep-water situation respectively. Many researchers have used Cobb-Douglas functional form as the function to use for analysis of production cost because of its reasonable theoretical assumptions, good record, simplicity of form and the limited degrees of freedom available (Fuss, *et al.* 1978).

The present study has been taken up to compare the cost and revenue of different farming practices, using benefit cost ratio technique. Study was aimed at assessing the traditional practices and semi mechanized techniques followed in paddy cultivation. The study will be helpful for farmers and agriculture economists in terms of knowing about the cost and revenue parameters in Guntur district of Andhra Pradesh, India.

#### MATERIALS AND METHODS

The study was carried out in the Guntur district during the year 2015. Three tehsils of Guntur district (Narsaraopeta, Chilakaluripeta and Sattenapalli) were selected for the relevant information. Three villages from each Tehsil were randomly selected and a sample size of sixty farmers was used. The farmers were also selected randomly. Primary data was personally collected from the respondents through structured questionnaire. The data about different farming practices of rice and their costs and revenues were collected in the farmer's fields, homes or in community centers. Benefit Cost Ratios of different farming practices has been calculated for finding the most profitable rice farming practices in terms of total and net revenue. More specifically the Benefit Cost Ratio (BCR) for each practice was:

$$\text{BCR} = \text{FPNR} / \text{TC} \quad \text{---(1)}$$

where, FPNR = Farming Practice net revenue and TC = Total cost of the Production. More the value of Benefit Cost Ratio, more will be the net return.

Furthermore, basic arithmetic's, averages, classification and tabulation were used for the analysis. For calculation of total production value, gross profit, productivity and net return, the following formulae were used.

$$\text{Total production value} = \text{Paddy yield (kg/acr)} * \text{Paddy price (Rs/kg)} \quad \text{---(2)}$$

$$\text{Gross profit} = \text{Total production value (Rs/acr)} - \text{Total production costs (Rs/acr)} \quad \text{---(3)}$$

$$\text{Productivity} = \text{Total production costs (Rs/acr)} / \text{paddy yield (kg/acr)} \quad \text{---(4)}$$

$$\text{Net return} = \text{Total production value (Rs/acr)} - \text{Total production costs (Rs/acr)} \quad \text{---(5)}$$

$$\text{Benefit/cost ratio} = \text{Total production value (Rs/acr)} / \text{Total production costs (Rs/acr)} \quad \text{---(6)}$$

The data obtained and analysis results are described in the succeeding section.

#### RESULTS AND DISCUSSION

The major cost items which were involved in the Semi-Mechanized Framing Practices were land preparation, raising nursery, fertilizers, transplanting with paddy trans planters, irrigation, insecticides, fertilizer spraying, harvesting with combine harvester, and land rent. According to Table 1. The total production cost of the paddy under the Semi-Mechanized Farming Practices was found to be Rs.52500 per acre. The major costs items which were involved in the Traditional Framing Practices were land preparation, raising nursery, fertilizers, transplanting, irrigation, insecticides, fertilizer spraying harvesting, threshing, cleaning and land rent.

The information collected for traditional farming through survey is tabulated in Table 2. According to this, the total production cost of the paddy under the traditional farming practices were amounted Rs.58900 per acre.

The economics of the Semi-Mechanized farming practices of production of paddy is presented in Table 3. It reveals that the production cost of paddy per acre is Rs.52500 which includes the variable and fixed costs. The production value is obtained by multiplying the total production with the selling price of paddy / kg, which works out to be Rs.132300. Net return was estimated as Rs.79800 and the Benefit-cost ratio was calculated as 2.52.

Table 3 also represents the economics of the traditional farming practices of production of paddy. It reveals that the production cost of the paddy per acre is Rs.58900 which includes the variable and fixed costs. The production value is obtained as explained earlier and found to be Rs.106650. Net return was amounted to Rs.47750 and the Benefit-cost ratio was calculated as 1.81.

A comparison of all available costs in both the selected methods of farming was performed and presented in table 4. The percentage wise

**Table 1. Rice Production cost under the Semi-Mechanized Farming Practices.**

Particulars	Unit	Quantity	Rates (Rs.)	No. of labours required	Amount/acre (Rs.)
Land preparation					
i) Ploughing with tractor	h	2	1000	Inclusive	2000
ii) Puddling with Rotavator	h	4	1200	Inclusive	4800
Raising nursery					
i) Seed	Kg	35	20		700
ii) Nursery bed preparation	Day	2	500	5	5000
iii) Nursery maintenance	Day	1	500	5	2500
iv) Nursery pulling, transport	Day	4	500	4	8000
Fertilizers Spraying	h	5	500	2	5000
Pesticide spraying	h	8	500	2	8000
Transplanting with paddy transplanter	h	2	2500	Inclusive	5000
Irrigation (Flood)	Day	4	500	2	4000
Harvesting with combine	h	1	2000		2000
Land rent	Yr	—	—		5500
<b>Total Cost</b>					<b>52500</b>

Sources: Field Survey

**Table 2. Average per acre cost under the Traditional Farming Practices.**

Particulars	Unit	Quantity	Rates (Rs.)	No. of labours required	Amount/acre (Rs.)
Land preparation					
i) Ploughing with bullock	h	4	500	1	2000
ii) Puddling with Bullocks	h	8	500	1	4000
Raising nursery					
i) Seed	Kg	50	20		1000
ii) Nursery bed preparation	Day	2	500	5	5000
iii) Nursery maintenance	Day	1	500	5	2500
iv) Nursery pulling, transport	Day	4	500	4	8000
Fertilizers application	h	5	500	2	5000
Pesticide spraying	hrh	8	500	2	8000
Irrigation (Flood)	Day	10	500	1	5000
Harvesting	Day	1	500	8	4000
Threshing with labors	Day	1	500	8	4000
Cleaning and Handling	Day	1	500	8	4000
Land rent	Yr	—	—		5500
<b>Total Cost</b>					<b>58900</b>

Sources: Field Survey

**Table 3. Economic analysis of paddy production under the Semi-Mechanized Farming Practices.**

Cost items	Semi-mechanized		Traditional farming	
	Unit	Value	Unit	Value
Variable costs	Rs/acr	47000	Rs/acr	53400
Fixed costs , (land rent)	Rs/acr	5500	Rs/acr	5500
Total production costs	Rs/acr	52500	Rs/acr	58900
Selling price	Rs/Kg	27	Rs/Kg	27
Paddy yield	Kg/acr	4900	Kg/acr	3950
Total production value	Rs/acr	132300	Rs/acr	106650
Gross profit	Rs/acr	79800	Rs/acr	47750
Productivity	Rs/Kg	10.7	Rs/Kg	14.9
Net return	Rs/acr	79800	Rs/acr	47750
Benefit/cost ratio	-	2.52	-	1.81

**Table 4. Growth rates of Semi-Mechanized Farming Practices over Traditional Framing Practices.**

Cost Item	Traditional Farming	Semi-Mechanized Farming	Percentage of Growth, %	Remarks
Variable costs	53400	47000	-13.6	Variable costs were reduced by 13.6%
Fixed costs	5500	5500	0	The fixed costs were not affected
Total production costs	58900	52500	-13.6	Total Production costs were reduced by 13.6%
Selling price	27	27	0	Selling price is same in both farming practices
Paddy yield	3950	4900	19.38	The Yields are increased by 19.38%
Total production value	106650	132300	24	Total Production Value is Increased by 24%
Gross profit	47750	79800	67	Total Gross-Profit is Increased by 67%
Productivity	14.9	10.7	72	Total Productivity is Increased by 72%
Net return	47750	79800	67	Total Gross-Profit is Increased by 67%
Benefit/cost ratio	1.81	2.52	139	Benefit-Cost Ratio Increased Largely by 139%

reduction in cost and increase in profit was calculated against each cost factor.

The net return obtained from the Semi-Mechanized farming practices are accounted higher than the net returns obtained in the case of Traditional Farming practices of production of paddy. Hence the Semi-mechanized system can be concluded as the system offering more profit to the farmers

### Conclusion and Recommendations

Having compared total costs, total production and total net production of per acre of paddy cultivation, the Semi-Mechanized Farming Practices are observed to be the most profitable of the selected district. Awareness about the cultivation of Semi-Mechanized farming practices should be created. The government should also arrange extension services programs for this purpose.

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