

A STUDY ON INCOME, EXPENDITURE AND RESOURCE USE PATTERN OF PADDY IN TIRUVANNAMALAI DISTRICT

ABSTRACT

Recently a study entitled "A study on income, expenditure and resource use pattern of paddy in Tiruvannamalai district" is conducted by a student with a view to analyze the performance of paddy in terms of cost and returns, resource use efficiency, and employment generation. The sample of 30 farmers growing paddy were selected at random from the Thanipadi, Vazhavachannur, Keezhsirupakkam, Perunduraipattu, Thandrapet, Veppur, and Andapattu villages. Average and percentage analyses were used to examine cost of cultivation, labour hours used, quantity of materials used and machine hours used by farmers in each crop production. Regression analysis was employed to measure the influence of selected explanatory variables on independent variables. Joint family constitutes about 43 percent and nuclear family was 57 of the total sample households. Average size of holding of 2.29 acre. Total cost of cultivation for paddy is Rs.17172.08/acre. Gross income from paddy is Rs.38919.09/ac. Benefit Cost Ratio (BCR) of paddy cultivation is 2.27. Farmers sell the produce at aggregators, regulated market and mill owners. The human labors were used for sowing & transplanting, cultural operation and chemicals. FYM, chemicals, fertilizer and seed are the major material used in crop production. Rotavator and harvester are the machine used for crop production. About 77 percent of variation in dependent variables explained by the selected independent variables such as labor hours for inter cultural operation and quantity of seed and hours per irrigation.

Key word: Income, Expenditure , Resource Use Pattern , Paddy

INTRODUCTION:

"Agriculture in India is one of the most important sectors of the economy. Agriculture is the primary and critical sector of our country giving livelihood and employment opportunities for vast majority of Indian population. At present Indian agriculture is at crossroads and one of the major challenges is to reverse deceleration in agricultural growth. Main reason for deceleration in agricultural growth is declining investment particularly, public investment in agriculture research and development and irrigation, combined with inefficiency of institutions providing inputs and services including rural credit and extension, post-harvest losses of food grains at 10 percent of the total production or about 20 MT" [1. 2]. In Tiruvannamalai, agriculture and silk weaving are the important occupation. Even though there are no perennial rivers in the district, tanks and dug wells are the major sources of irrigation. Paddy is one of the major crops grown in the district. Tiruvannamalai district is leading producer of Paddy.

The study attempts to analyze the cost of cultivation, maximum returns, highest resource use efficiency and more employment generation from Paddy cultivation in Thiruvannamalai district.

Objectives

The core objective of the study is to analyze the performance of Paddy grown in Thiruvannamalai District with the following specific objectives.

- To analyses input utilization pattern, cost and returns in production of Paddy in study area.
- To analyze resource use efficiency in production of Paddy.
- To identify constraints faced by the farmers in production of Paddy.
- To analyses the Employment Generation capacity of Paddy in Thiruvannamalai district.
- To suggest the alternative crops based on the economic advantage of Paddy

The **hypothesis** are

- Returns are higher than cost in the cultivation of Paddy.
- Farmers are not utilizing the resources efficiently in **the** production of Paddy.
- In cost of cultivation, the material cost would be higher than machine and labor cost.
- Among the inputs, the labor use efficiency would be higher than others.
- In cultivation of crops, women employment would be more than men.
- Farmers who choose the crops based on economic criteria will be more benefited with high benefit.

Review of Literature

A review of past research helps in identifying the conceptual and methodological issues relevant to the present study.

Jwala Parte [3] "total cost occurred in cultivation of paddy in SRI is Rs. 60809, in transplanting Rs. 49587, line sowing it is Rs. 43346 and broadcasting Rs. 42574". The similar findings were reported by Makaida *et al.*, [4], Shelke *et al.*, [5]. "The main yield quintal per hectare was found to be more in SRI i.e. 70 as compare to transplanting (55.62), line sowing (53) and broadcasting (38.2). SRI was found to be best sowing techniques because the planting design of SRI is such that every plant gets sufficient light, water and air which leads to profuse tillering which helps in getting higher productivity per unit area. The net return obtained in SRI was found to be maximum in case of SRI (Rs 61190.61), line sowing (Rs. 48253.7), transplanting (Rs. 46523.2) and broadcasting (Rs. 23565.14). which indicated that SRI is not only superior over the other sowing technique techniques in physical terms as it giver higher productivity but at the same time but at the same time it is giving better monitoring returns than other sowing techniques. The return per rupees was found to be more (Rs 2.11) in line sowing, (Rs 2) in SRI, (Rs. 1.93) in transplanting and (Rs. 1.53) in broadcasting" [6, 7].

Venkobarao [8] "paddy cultivation is revealed that maximum of 216 respondents with 34.4 percent have Machine labour. Bullock pair followed by 206

respondents with 32.8 percent, Next to this, 153 of the total respondents to the tune of 24.4 percent has women labour and 53 labours with 8.4 percent having men. Generally both male and female members are participating in all the farm activities whereas either the family labour or hired labour to be used on the basis of the availability of labour force in the study area. Usually daily labourers work for eight hours in a day and the amount of male and female labour days needed to perform the above operations in the study area. For farming operations like sowing, harvesting, managing and plant protection works piece rates are given. The piece rate wages for the same activity vary from one locality to another locality in the same village and in the same locality itself it shows differences based on the size of the paddy land holdings and bargaining power of the farmers. During the last summer crop season the prevailing rates per acre in the study area were Rs 60 to 80 for sowing and Rs 70 to 90 for managing. For spraying weedicides and insecticides the existing rates per container was 8 to 12 and 15 to 18 respectively. 182 In addition to normal wages, about 70 percent of the sample farmers in the study area used to give incentives. In addition to normal wages, about 70 percent of the sample farmers in the study area used to give incentives to their workers in the forms of refreshments and conveyance charges. All farmers on the basis of the size of area they cultivate share costs on the repair of ring bunds and dewatering. On an average the sample farmers of the study area had spent 11,600 per acre as human labour costs”.

Anitha Jose [9] “72 percent respondents have 3-6 family members, 19 percent respondents have 7-10 family members, 6 percent respondents have 11-13 family members and 3 percent respondents have 14 - 17 family members Number of the family members is more their needs will also increase and vice Versa most of them belong to Small family six only. 36 percent respondents’ income is Rs. 40,000, 34 percent respondents’ income is Rs. 40,000 – 80,000, 19 percent respondents’ income is Rs. 80,000 – 1, 20,000 and 11 percent respondents’ income is above Rs. 1, 20,000. Thus, the Earning capacity of the sample respondents is good. 53 percent respondents have only one acre agricultural land, 17 percent respondents have 2 acres land, 12 percent

respondents have 4 acres land and 9 percent respondents have 3 and 5 more acres land. Most of the Land owners have a small piece of land to the extent of the maximum of one acre”.

Sowndariya [10] indicates that “11 respondents earn less than Rs.30000 in a year. 9 respondents earn a yearly income of Rs.30000- 45000. 25 respondents earn a yearly income ranging from Rs.45000 to 60000. 20 respondents earn up to Rs.60000 to 75000 in a year”.

“The average total cost incurred by farmers was 10,428,363 IDR per hectare. The average yield of rice per hectare was 66853.16 kg. The average price of paddy rice per kilogram is IDR 4200. After-sales, farmers receive 27,562,016 IDR on average per acre. The difference between receipts and total expenses or costs was referred to as revenue. Farmers made an average of 17,267,844 IDR per hectare on each farm. This value is lower than the average income of lowland rice farmers for one planting season in Gorontalo Regency of IDR 37,217,960 ha/MT with different dry grain prices” [11].

“The cost of cultivation was higher for small farmers, mainly due to higher labor costs owing to their small land holding, and fragmented and scattered land. The total variable cost of the cultivation was found to be NRs. 154886 ha⁻¹ (Table 4). The higher cost of the cultivation was associated with the requirement of huge labor for different agro-nomic operations like uprooting, planting, weeding, harvesting and threshing, and the use of bullocks for land preparation” [12].

Abhay Kumar [13] “Cost of cultivation of paddy was higher in Punjab than Bihar during the period under study due to higher variable and fixed expenditures incurred in paddy cultivation in Punjab. But annual increase in cost of cultivation was comparatively higher in Bihar (38%) than Punjab (33%), mainly due to low base of expenditure in Bihar. Moreover, the farmers of Bihar also started adopting modern technologies in paddy production. Fixed and variable costs increased in Punjab and Bihar during 1983-2013 but proportion of variable cost in total cost of cultivation increased from 55.5% to 74.0% at TE 1983 and 2013, respectively in Bihar whereas the proportion of variable cost to total cost showed a decreasing trend in Punjab. The much lower expenditure in cultivation

of paddy in Bihar up to TE 2003 was mainly due to low use of fertilizers, machine power and modern seeds. On the other hand higher fixed cost in paddy cultivation in Punjab was only due to complete mechanization of paddy cultivation, irrigation through deep tube wells and higher rental value of land. Cost of paddy production was identical at ` 102/q in 1981-82 in both the states under study but the increase in cost of production was faster in Bihar than Punjab, mainly due to low productivity in Bihar. Cost of paddy production increased to ` 1081/q in Bihar at TE 2013, which was higher than the corresponding cost of cultivation in Punjab. Human labour and fertilizer are the most important inputs in paddy cultivation and expenditure on these two inputs constituted 58.2% of total operational cost in Bihar and 41.7% in Punjab at TE 1983 which increased to 71.9% and 56.22% at TE 2013, respectively”.

Bhakthavatsalam [14] “total cost incurred per hectare ` 30065, among which the variable cost accounted for more than three-fourth (88.21%). Among various components of variable cost, the expenditure incurred on human labour accounted (39.52%). This was followed by machine labour (11.60%) which is mainly due to the involvement of more labour at various stages of paddy cultivation. In traditional farmers, total cost incurred per hectare ` 32445 among this the variable cost accounted for more than threefourth (89.56%). Among various components of variable cost, the expenditure incurred on human labour was high accounted for (31%) which may be due to, more labour involvement in plant protection chemical (PPC) application and expenditure on PPC was very low among OFD farmers (Rs.2161) compared to traditional farmers (Rs.4721)”.

Agarwal [15] “The total cost of cultivation was higher in traditional method (Rs 14014.54./acre) than SRI method (Rs 12154.63 per acre) in paddy cultivation. Average variable cost was observed Rs. 8860.26 under SRI method while in traditional method it was observed Rs. 11139.47 per acre. Expenditure on seed was higher in traditional method due to high quantity of seed used. It was found that, human labour cost was the major variable component in both SRI and traditional method i.e., Rs.3721.95 and Rs.5198.37 per acre respectively. It was calculated on the basis of wage rate prevailing in study area”.

Ayush Kumar [16] "the overall cost of cultivation of Paddy was Rs. 34537.28. from the total cost of cultivation, 39.56 percent (Rs. 13662.5/ha) expenditure was incurred as operational cost, human labour constituted the most important component of operational cost with its share of more than 21.98 percent The material cost accounted 24.76 percent (Rs. 8552.75 /ha), among the material cost items 11.10 percent expenses incurred on manure and fertilizer and seed, irrigation and plant protection accounted 4.40, 7.07 and 2.20 percent respectively. The share of rental value of land accounted 21.72 percent (Rs. 7500/ha) and the remaining was accounted by land revenue, depreciation on implements, interest on working capital and interest on fixed capital of the total cost of cultivation".

Subhash Kumar Jawla [17] the costs according to cost concept under different size of farms the per farm average cost A1, B1, B2, C1, C2 and C3 were workout as Rs. 20446.22 Rs. 30640.17, Rs. 45434.78 Rs.4342.4.10 Rs.55256.18 and Rs.60781.79 respectively as a whole indicated increasing trends with size of holdings. The overall average gross returns per hectare of paddy was Rs. 80261.40, and it was highest on large category farmers Rs. 89300.10 followed by medium Rs. 84000.30, small Rs. 76595.10 and marginal farmers Rs. 71150.10, and the overall average cost of production was 1395.36 and it was highest on marginal category of farmers Rs. 1474.26 than followed by small category of farmers Rs. 1416.87, medium 1367.89 and large category of farmers Rs. 1340.12. Overall average net returns per hectare were Rs. 19479.10. Category wise net return was highest on case of large farmers was Rs. 24250.69 than followed by medium Rs. 21597.32, small Rs. 17738.24 and marginal category farms Rs. 14332.17.

Ravikumar [18] has analysed "socio economic background of the paddy cultivators in the selected villages of palakkad district and also analysed the problem of the paddy cultivators. The major causative factor identified by the social scientist is shortage of labour and low price for paddy. This paper emphasis the group management for improving the economies of paddy

cultivation through better management based on low cost technology, improvement in productivity selective mechanization and cost reduction”.

Design of the Study

Designing a suitable methodology and selection of analytical tools are important for meaningful analysis of any economic problem. Thandrampattu block of Tiruvannamalai district is selected based on purposive sampling method (non-probability) for the present study since Agricultural College and Research Institute, Vazhavachannur is located in this block. Based on the discussion with extension officials the following villages were considered for the study viz., Valavachanur, Perunduraipattu, Vanapuram, Veppur, Thanipadi, Tandrapattu, Keelsirupakkam, Aandapattu. The sample of 30 farmers growing paddy were selected at random from the villages Thanipadi, Vazhavachanur, Keezhsirupakkam, Perunduraipattu, Thandrampet, Veppur, and Andapadu,.

Table: 01 sample size of the respondent

Sl. No,	Crop	Nature of the crop	Sample size	Selected Villages
1	Paddy	Cereals	30	1. Thanipadi, 2. Vazhavachannur, 3. Keezhsirupakkam, 4. Perunduraipattu, 5. Thandrampet, 6. Veppur, 7. Andapattu

Source: First-hand information.

Paddy occupies 90.4 percent of total area of the Cereals in Tiruvannamalai district. Secondary data were collected from the Department of Economics and Statistics which is used as the base for selection of crops for the study. Primary data for the study is collected by **face-to-face** survey method from 30 farmers using **a pre-prepared interview** schedule.

Tools of Analysis:

The choice of the statistical tool of analysis was decided regarding the objectives of the study and the nature of the data collected. The collected data were tabulated and analysed for drawing meaningful inferences. Average and percentage analyses were used to examine the nature of production, income and expenditure for crop production, labor hours used for different crop production activities, materials used; machine hours used by farmers in each crop production.

Regression Analysis

In this study, regression analysis was employed to measure the influence of selected explanatory variables on independent variables [19, 20].

Factors influencing the yield of the Paddy:

There are numerous factors, determining the yield of paddy in the sample households. The major independent variables influencing yield of paddy are irrigation, labor hours for intercultural operation, quantity of seed, quantity of FYM, quantity of chemicals, land holding size, quantity of fertilizer, . Hence, a linear type of production function was fitted to the data separately for paddy.

Paddy

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + e_t$$

Where,

Y = Yield of Paddy in kg

X₁ = Hours / Irrigation

X₂ = Labor hours for Intercultural Operation

X₃ = Quantity of Seed in Kg

a = Constant

e_t = Disturbance terms

b₁, b₂ and b₃ are Regression Coefficient

Garette's Ranking

To study the problems faced by farmers at armers market and factors that attract consumers to farmer market Garette's ranking technique was used [21, 22]. The order of merit assigned by the respondents was converted into ranks by using the following formula.

$$\text{Percent position} = \frac{(R_{ij} - 0.5) 100}{N_j}$$

Where,

R_{ij} = Rank given for i_{th} factor by j_{th} individual

N_j = Number of factors ranked by j_{th} individuals

By using Garette's score table the percent positions of each rank was converted into scores.¹ Then, for each factor, the score of individual despondence were added together and divided by the total number of respondents for whom scores were added. The mean scores of all the factors were arranged in descending order and ranks were given. The factor having the highest mean value was considered to be the most important.

Result and Discussion

General Characters of Sample Farm Households

Table: 02 Family Type of the sample households

Sl. No,	Family Type	Number of Households	% to Total
1	Joint family	13	43.33
2	Nuclear Family	17	56.67
3	Total	30	100.00

It is observed from the table 02 that about 43 percent of family live together as joint family. In the joint family system availability of family labor is more and they share

¹ Henry E. Garette, "Statistics in Psychology and Education (Bombay: Vakils, Feffer and Simons private limited, Eighth Indian print, 1973), pp. 328 -330.

the farm works. The remaining 57 percent of the family follow the nuclear type family systems.

Table: 03 Land holding pattern of the sample households

SL. No.	Particulars	Area in ac	% to total
1	Area owned in ac	68.78	94.96
2	Area leased in	3.65	5.04
3	Total area	72.43	100.00
4	Average size of holding	2.29	--

Land holding pattern of paddy growing farmers is presented in table03. The sample farmers owned about 68.78 acre of land with average size of holding of 2.29 acre. Area leased in is about 5.04 percent of the total area under cultivation.

Cropping pattern

Table: 04 Cropping pattern of the sample households

SL. No.	Particulars	Area in ac	% to total
1	Area under paddy	37.73	52.09
2	Area under other crop	34.70	47.91
3	Total area under crop	72.43	100.00
4	Irrigated area under paddy	36.48	--

Cropping pattern of paddy growing farmers is presented in table 04. The Total under crop is 72.43 acre of which area under paddy is 52.09 percent while area under other crop occupies 47.91 percent. Irrigated area under paddy is 36.48 acre.

Varieties wise area under paddy

Table: 05 Varieties wise area under paddy

Sl. No	Variety	Area in Acre	Percent to total
1	BPT5204	8.73	23.14

2	White ponni	7.00	18.55
3	CO 45	10.00	26.50
4	ADT45	12.00	31.80
5	Total	37.73	100.00

Varieties wise area under paddy is presented in table 05. Paddy variety BPT5204 occupies 23.14 percent of total area under paddy followed by ADT45 with 31.80 percent of total area under paddy, CO45 with 26.50 percent of total area under paddy and white ponni with 18.55 percent of total area under paddy.

Cost of cultivation of paddy

Table: 06 Cost of cultivation of paddy in the sample households (Rs./ac)

Sl. No.	Particulars	Amount (Rs./ac)	% to total
1	Seed	3232.97	18.83
2	FYM	1787.70	10.41
3	Urea	463.67	2.70
4	DAP	1448.04	8.43
5	MOP	378.26	2.20
6	Complex	392.09	2.28
7	Gypsum	0.00	0.00
8	Growth regulators	0.00	0.00
9	Herbicides	0.00	0.00
10	Fungicides	675.30	3.93
11	Insecticides	1164.44	6.78
12	Combine harvester	1577.66	9.19
13	Rotavator	2404.06	14.00
14	Bund former	0.00	0.00
15	Earthling up	0.00	0.00

16	Transplanting	533.26	3.11
17	Weeding	1569.31	9.14
18	Harvesting	0.00	0.00
19	Transport	366.55	2.13
20	Packaging	1178.77	6.86
21	Total cost	17172.08	100.00

Cost of cultivation of paddy in the sample households is furnished in the table06. total cost of cultivation for paddy is Rs.17172.08/acre of which seed constitutes 18.83 percent of total cost of cultivation followed by rotavator with 14 percent, FYM with 10.41 percent, combine harvester with 9.19 percent, hand weeding with 9.14 percent, DAP with 8.43 percent, packaging cost with 6.86 percent, insecticides with 6.78 percent, fungicides with 3.93 percent, transplanting with 3.11 percent, urea with 2.70 percent, complex with 2.28 percent, MOP with 2.20 percent and transport with 2.13 percent of total cost of cultivation.

Income parameters of paddy

Table: 07 Income parameters of paddy in the sample households (Rs./ac)

Sl. No.	Particulars	Amount (Rs./ac)	% to Gross Income
1	Total cost (Rs./ac)	17172.08	44.12
2	Yield (kg/ac)	1687.00	--
3	Price (Rs./kg)	23.07	--
4	Gross income (Rs./ac)	38919.09	100.00
5	Net income (Rs./ac)	21747.01	55.88
6	BCR	2.27	--

Income parameters of paddy in the sample households is presented in the table07. Average yield of paddy is 1687 kg/ac and the price is Rs.23.07/kg. Gross income from paddy is Rs.38919.09/ac of which total cost constitutes 44.12 percent and net return occupies 55.88 percent. Benefit Cost Ratio (BCR) of paddy cultivation is 2.27. Accept the paddy cultivation since the Benefit Cost Ratio of paddy cultivation is greater than one.

Place of sale

Table: 08 Place of sale by paddy growing famers

Sl. No.	Place of Sale	Number of Farmers	% to total
1	Local Traders	0.00	0.00
2	Direct Procurement Centre	0.00	0.00
3	Aggregators	16.00	53.33
4	Regulated Market	7.00	23.33
5	Wholesale Market	0.00	0.00
6	Cooperatives	0.00	0.00
7	Mill Owners	7.00	23.33
8	Total Number of Farmers	30.00	100.00

Place of sale by paddy growing famers are presented in table08. The marketing place taken into consideration are local traders, Direct Procurement Centre, aggregators, regulated market, cooperatives, and mill owners. There are about 53.33 percent of paddy farmers preferred to sell their produce to the aggregators. Regulated Market were preferred by 23.33 pec cent of total farmers and the mill owners were preferred by 23.33 pec cent of total farmers.

Resource use Efficiency

Human labor hour usage pattern

Table: 9 Human labor hours usage pattern in the paddy growing sample households

Sl. No.	Particulars	Hours	% to total
1	Sowing & transplanting	114.15	50.87
2	FYM	5.96	2.66
3	Fertilizer	2.01	0.90
4	Chemicals	7.50	3.34
5	Inter cultural operation	94.78	42.24
6	Total men hours	224.40	100.00

Human labor hour usage pattern in the paddy growing sample households is presented in the table 9. The human labors were evaluated for different farm operations such as sowing and transplanting, FYM, fertilizer, chemicals and intercultural operations. Total human labor hours in paddy cultivation is 224.40/ac. Sowing & Transplanting constitutes 50.87 percent of the total human labor hours followed by intercultural operations, Chemicals, FYM and fertilizer constitutes 42.24 percent, 3.34 percent, 2.66 percent and 0.90 percent respectively.

Material usage patterns

Table: 10 Material usage patterns in the paddy growing sample households

Sl. No.	Particulars	Quantity	% to Total
1	Seed (Kg/ac)	27.27	1.40
2	FYM (Kg/ac)	1239.07	63.76
3	Fertilizer (Kg/ac)	180.90	9.31
4	Chemicals (ml/gm/ac)	496.16	25.53

	Total Material	1943.40	100.00
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Material usage patterns in the paddy growing sample households is presented table10. FYM occupies 63.76 percent of total material usage followed by chemicals, fertilizer and seed constitutes 25.53 percent, 9.31 percent and 1.40 percent of total material usage respectively. All the paddy farmers use FYM as regular and mandatory practice.

Machine usage patterns

Table: 11 Machine usage patterns in the paddy growing sample households

Sl. No.	Particulars	Hours	% to total
1	Harvester	1.14	29.69
2	Rotavator	2.70	70.31
3	Bund Former	0.00	0.00
4	Total machine hours	3.84	100.00

Machine usage patterns in the paddy growing sample households is presented table11. Rotavator constitutes 70.13 percent of total machine hours followed by **harvesters** occupy 29.69 percent of total machine hours.

Table: 12 Estimates of regression model for factors influencing the yield of paddy

Sl. No.	Variables	Notation	Mean	Co-efficient	t Stat
1	Yield of paddy in Kg	Y	2122.40	-	-
2	Hours / Irrigation	X ₁	3.00	180.96 **	2.13
3	Labor hours for intercultural operation	X ₂	119.20	7.06 ***	3.01
4	Quantity of seed in Kg	X ₃	34.30	17.38 ***	3.00

Estimates of regression model for factors influencing the yield of paddy are furnished table12. Yield of paddy is dependent variable. Hours per irrigation, labor hours for inter cultural operation and quantity of seed used are the independent variables. Co-efficient of multiple regression is 0.77 which implies that 77 percent of variation in dependent variables explained by the selected independent variables. Labor hours

for inter cultural operation and quantity of seed is significant at one percent level. Hours per irrigation is significant at five percent level.

Intercept	:	142.17
Co-efficient of multiple regression (R^2)	:	0.77
F- Value	:	28.43
Number of observation	:	30.00
Significant at one percent level	:	***
Significant at five percent level	:	**
Significant at ten percent level	:	*

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + e$$

$$Y = 142.17 + 180.96 ** X_1 + 7.06 *** X_2 + 17.38 *** X_3 + e$$

Conclusion

The Average size of holding of is 2.29 acres. Total cost of cultivation for paddy is Rs.17172.08/acre. Gross income from paddy is Rs.38919.09/ac. Benefit Cost Ratio (BCR) of paddy cultivation is 2.27. Farmers sell the produce at aggregators, regulated markets and mill owners. The human labors were used for sowing & transplanting, cultural operation and chemicals. FYM, chemicals, fertilizer and seed are the major material used in crop production. Rotavator and harvester are the machine used for crop production. About 77 percent of variations in dependent variables explained by the selected independent variables such as labor hours for inter cultural operation and quantity of seed and hours per irrigation.

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