

## AN ECONOMIC ANALYSIS OF RAINFED PADDY- A STUDY IN SHIVAMOGGA DISTRICT OF KARNATAKA, INDIA.

### ABSTRACT

Rice is the important human food crop in the world, directly feeding more people than any other crop. Tunga Bhadra Project (TBP) command area is called as Rice bowl of Karnataka. The study was conducted in Shivamogga district of Karnataka, India during 2020-21 mainly for economic analyze of cost and returns of rainfed paddy. Purposive sampling technique was used for selection of study area. Two taluks of Shivamogga district were selected and from each taluk, two villages were selected and from each village 15 farmers were selected who were paddy growers. Thus, the total sample constitutes 60 respondents. The total cost of rainfed paddy cultivation was Rs. 26,330.65 in that fixed cost was accounted for 19.02 per cent (Rs. 5,007.20) of the total cost and overall variable cost accounted for 79.92 per cent (Rs. 21,043.45) of the total cost of cultivation. Grain yields realized 15.23 quintals per acre and gross returns comprised of returns from both main-product (grain) and by-product returns (straw) is Rs. 34,689.78. Rainfed paddy gave a net return of Rs. 8,359.13 and returns over variable cost were Rs. 13,367.33. Returns per rupee of expenditure was 1.32. The study recommended that, rainfed paddy cultivation required less cost of cultivation which helps farmer to earn better income.

**KEYWORDS:** *Rainfed paddy, Cost and return, Economic analysis*

### INTRODUCTION

Paddy is the most prominent and widely cultivated food crop in the world. It is staple food for about 60 per cent of the world's population. Rice is primarily grown and consumed throughout the Asian continent. India has the world's largest area under paddy, ranks second in paddy production after China and it became a significant rice consumer. Paddy has been grown in India since the beginning of time. According to De Candolle and Watt, cultivated paddy originated in south India however Vavilov says that India and Burma should be considered the origins of cultivated paddy. Rice (*Oryza sativa* L.) belongs to Graminea family. On the continents of Asia, Africa, and America, there are around 18 wild species of paddy. While *Oryza sativais* is grown throughout Asia and the Americas, *Oryza glaberrium* is solely grown in Africa. In the world, there are three subspecies of paddy: Indica (long grain), Japonica (round grain), and Javanica are the three types of rice (medium grain). Indica rice is primarily

**Comment [MO1]:** Explain data gathering procedures and data analysis methodologies

**Comment [MO2]:** Describe the work that has been done in the field up to this point so that the originality of your study can be appreciated.

grown in the warm temperature zones of Indochina, India, Pakistan, Thailand, Brazil, and the southern United States of America, whereas Japonica rice is primarily grown in the cold climate zones of Northern China, Korea, Japan, and California. Javanica is only grown in Indonesia (Anjaneyalu, 2015).

Paddy is important cereal crops in world. In a resolution passed by the United Nations General Assembly, the year 2004 was designated as the "International Year of Rice," This has huge ramifications for food security. It eloquently argued for greater understanding of the importance of rising temperatures in reducing poverty and malnutrition. India is dealing with the issue of feeding its rapidly increasing population. By 2030, it is expected that 260 million tonnes of food grain will be required to meet global demand. The "Green Revolution" was sparked by modern technologies launched in the mid-1960s. The goal of new agricultural technology is to change traditional agriculture into a modern one. This technical change was met with enthusiasm in India. Food production is critical to the country's economic and human development. It is a crucial part of the food security mission. The importance of food security has progressively increased over the last few decades. Food security is now one of the world's most widely discussed and recognised issues. Rice is a major cereal crop in many parts of the world. Many traditional foods, including as sorghum, millet, and most root and tuber crops, are often preferred to rice. Rice is most important food crop for over 2.89 billion people in Asia, 40 million in Africa, 150.30 million in America, and 120 million in Nigeria, and is consumed by over 4.8 billion people in 176 countries (Bharath and Pandey, 2005).

In the year 2019-20, China was first in paddy production (30 %) in global production followed by India (24 %), Bangladesh (7 %), Indonesia (7 %), Vietnam (5 %) and Thailand (4 %) (FAO, 2019). India has a production potential of 117.47 million tonnes per year 2019-20. Paddy is one of the prime crops in eastern and southern regions of India. During the 2018-19, India's rice production reached a high of 116.42 million tonnes. Rice production increased by 3.66 million tonnes in 2017-18 and is now 8.62 million tonnes greater than the five-year average (107.80 million tonnes). Karnataka is India's largest rice-growing state, with an area of 1.32 million hectares and an annual production of 3.5 million tonnes in 2017-18 (FAO, 2019). In Karnataka, Shivamogga district is one of the major districts for rainfed paddy cultivation and having area about 33,659 ha, production (576.25 tonnes) and productivity (17.12 q/ha) (Annual report, Department of Agriculture, Shivamogga, 2020-21).

The present study focuses on cost and returns of rainfed paddy in Shivamogga district comes under Southern Transition Agro-climate Zone in Karnataka which receive average annual rainfall 1813 mm. In this area farmers prefer to take up rainfed paddy cultivation because as this area receives more rainfall and also paddy crop requires more water for cultivation so to encourage farmers in order to save

local cultivars and to increase area under rainfed cultivation as area under rainfed cultivation decreasing year after year that is from last 10 years area under paddy declined from 15 lakh ha to 12 lakh ha. Rice is high water demanding crop and today's world sustainability and intergenerational equity is given huge importance both nationally and internationally, merely by cultivating irrigated rice using borewell or canal irrigation is not at all sufficient in today's world, we have to look at other options, if we continue to do so, water the most scarced resource on earth will be exhausted, myopic use and extraction of water is not the answer.

## **2. METHODOLOGY**

### **2.1 Study Area**

The study was conducted in Shivamogga district of Karnataka state as the district comes under southern transition agro-climate zone of Karnataka. The climate and soil is suitable for rainfed paddy cultivation hence, most of the farmers cultivate the crop. The preliminary survey revealed that there are ample numbers of farmers cultivating rainfed paddy in Shivamogga district i.e. 33,659 hectares (Annual report, Department of Agriculture, Shivamogga, 2021).

### **2.2: Data sources and sampling**

#### **2.2.1: Primary data**

Data on cost incurred and returns obtained in rainfed paddy production, collected from the farmers using a pre-tested schedule by personal interview method.

#### **2.2.2: sampling frame**

Two villages each were chosen purposively from two taluks viz. Shikaripura and Soraba in the Shivamogga district then 15 farmer respondents from each village were selected i.e., Chikkajambur, Hirejambur Andige and Ulavi.

### **2.3: Analytical tools**

The analytical tools and techniques employed for assessing the objectives of the study are given below.

- Measures of central tendency
- Standard cost and returns

#### **2.3.1: Estimation of cost and returns**

Costs were classified into variable and fixed costs. Variable costs include cost of inputs (seed, FYM, fertilizer and plant protection chemicals etc.), labour cost, bullock and machine labour and interest on working capital. Fixed cost includes land revenue, depreciation on farm implements, rental value of land, and interest on fixed cost. The measurement and definitions of various cost components are as follows. Similar study carried out by Suwanmaneepong S. *et al.* on Cost and return analysis of organic and conventional rice production in Chachoengsao province, Thailand.

a) Variable cost: The variable cost includes the following component

b) Variable cost = Input cost (cost of seedlings, farm yard manures, fertilizers and plant protection chemicals) + Labour cost (Land preparation, puddling, manures, fertilizers, inter cultural operation and weeding) + Bullock and machine labour + Interest on working capital.

c) b) Fixed cost: The fixed cost contains the following components

Fixed cost = Depreciation of assets + land rent + land revenue + interest on fixed capital

### 3. RESULTS AND DISCUSSION

#### 3.1: Labour utilization pattern in rainfed paddy cultivation(per acre)

Table 1 shows number of workers employed in various operations such as land preparation, sowing/transplantation, FYM, fertilisation application, weeding, plant protection, harvesting, and post-harvest operations. From field preparation to post-harvest operations, 26.72 mandays of labour were used. The highest use of labour was for sowing/transplantation (8 mandays), followed by weeding (7.22 mandays), manure and fertilizer application (3 mandays) and land preparation (3 mandays) and showed a breakdown of labour as 29.94 per cent, 27.02 per cent, 11.23 per cent and 11.23 per cent respectively. Similar study carried out by Kumar *et al.* Economic analysis of cost and return for basmati rice cultivation in Jammu district of J&K state, India.

#### 3.2: Bullock and machine labour utilization pattern in rainfed paddy cultivation (per acre)

Table 2 shows the operation wise bullock and machine labour used. The results showed that bullock labour was used only for field preparation (1.2 days) while machine labour used in rainfed paddy land preparation to harvesting. The total amount of machine labour used was 5.59 hours with maximum demand for machine labour (4.42 hours) for land preparation operations such as puddling, levelling, and crushing. Machine labour was used for harvesting (0.72 hours) and spraying (0.45 hours). In total machine labour used, harvesting and spraying machine labour accounted for 6.84 per cent and 0.17 per cent respectively. Bullock and machine labour was 1.2 days and 5.59 hours, respectively.

### **3.3: Resource use pattern in rainfed paddy cultivation (per acre)**

Table 3 shows the overall breakdown of resource consumption in rainfed paddy cultivation. The total human labour used for rainfed paddy cultivation per acre was 26.72 mandays with a value of Rs. 7,164. Total bullock labour per acre was 1.2 days and machine labour was 5.59 hours worth of Rs. 1,344 and Rs. 4,850.6 correspondingly. This led to the conclusion that for rainfed paddy production, human labour was more valuable than bullock and machine labour. The seed demand per acre was 22.81 kg worth of Rs. 342.15, FYM requirement was 1.23 kg worth of Rs. 3,013.5, fertiliser requirement was 150.50 kg worth of Rs. 3,330.50 and pesticide requirement was 1.33 kg worth of Rs. 704.90. It was deduced that fertiliser was required in greater quantities for rainfed paddy production than FYM, seed, or pesticides.

### **3.4: Cost and return in rainfed paddy cultivation**

#### **3.4.1: Fixed costs**

In the cost of rainfed paddy cultivation fixed cost was Rs.5,007.20 and accounted for 19.02 per cent of the total cost. Among the different components of fixed cost, the highest component was the rental value of land (Rs. 4,250 per acre) followed by interest on fixed capital, land revenue and depreciation, which totalled Rs. 455.20, Rs. 48 and Rs. 254 respectively.

#### **3.4.2: Variable costs**

The overall variable cost was Rs. 21,043.45 and accounted for 79.92 per cent of the total cost of cultivation. Human labour was expensive Rs. 7,164 while bullock and machine labour together accounted for Rs. 6,149.6. Fertiliser accounted for Rs. 3,330.50 followed by FYM accounted for Rs. 3,013.5 followed by interest on working capital were also significant variable costs (Rs. 648.8), Pesticide (Rs. 704.9) and Seeds (Rs. 342.15). Total cost required for rainfed paddy cultivation was Rs. 26,330.65.

#### **3.4.3: Yield and returns**

Table 5 contains information on yield and returns from rainfed paddy agriculture. Grain yields realized 15.23 quintals per acre. Gross returns comprised of returns from both main-product (grain) and by-product returns (straw). The gross returns per acre were Rs. 34,689.78. Rainfed paddy gave a net return of Rs. 8,359.13 and the returns over variable cost were Rs. 13,367.33. A return per rupee of expenditure was 1.32.

**Table 1: Labour use pattern in cultivation of rainfed paddy (Per acre)**

Sl. No.	Particulars	Men (Mandays)	Percent	Women (Mandays)	Percent	Total (Mandays)	Percent
1.	Land preparation	3	16.48	0	0	3	11.23
2.	Sowing/Transplantation	5	27.47	3	35.21	8	29.94
3.	Manure and fertilizer application	3	16.48	0	0	3	11.23
4.	Weeding	3.2	17.58	4.02	47.18	7.22	27.02
5.	Plant protection	1	5.49	1.5	17.61	2.5	9.36
6.	Harvester	1	5.49	0	0	1	3.74
7.	Post- harvest operation (loading and unloading)	2	10.99	0	0	2	7.49
	<b>Total</b>	<b>18.2</b>	<b>100</b>	<b>8.52</b>	<b>100</b>	<b>26.72</b>	<b>100</b>

Comment [MO3]: Mention the source of the data.

**Table 2: Bullock and machine labour utilization pattern in rainfed paddy cultivation (Per acre)**

Sl. No	Particulars	BP (Days)	Per cent	Machine (Hr.)	Per cent
1.	Bullock (Days)	1.2	100	0	0
2.	Harvesting (Hr.)	0	0	0.72	12.65
3.	Tractor (Hr.)	0	0	4.42	77.68
4.	Sprayer (Days)	0	0	0.45	7.90
	<b>Total</b>	<b>1.2</b>	<b>100</b>	<b>5.69</b>	<b>100</b>

Comment [MO4]: Mention the source of the data.

**Table 3: Resource use pattern in rainfed paddy cultivation (Per acre)**

Sl. No.	Particulars	Quantity	Value (Rs.)
1.	Human labour (Man days)	26.72	7164.00
2.	Bullock labour (Days)	1.20	1344.00

3.	Machine labour (Hours)	5.69	4850.60
4.	Seeds (Kgs)	22.81	342.15
5.	FYM (Tonnes)	1.23	3013.50
6.	Fertilizers (50 kg bags)	150.50	3330.50
7.	Pesticides (Kgs)	1.33	704.90

**Comment [M05]:** Mention the source of the data.

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**Table 4: Cost of cultivation of rainfed paddy in Shivamogga district**

Rs. /acres

Sl. No.	Particulars	Quantity	Value (Rs.)	Percentage
1.	<b>Human labour</b>			
	Men (Mandays)	18.2	5460	20.74
	Women (Mandays)	8.52	1704	6.47
	<b>Total</b>		<b>7164</b>	<b>27.21</b>
2.	<b>Bullock labour and machine labour</b>			
	Tractor (Hrs)	4.42	3005.6	11.41
	Bullock (Days)	1.20	1344	5.10
	Harvesting (Hrs)	0.72	1800	6.84
	Sprayer(Days)	0.45	45	0.17
	<b>Total</b>		<b>6149.6</b>	<b>23.36</b>
3.	<b>Inputs</b>			
	Seed (kgs)	22.81	342.15	1.30
	FYM (Tonnes)	1.23	3013.5	11.44
	Fertilizer (50 kgs bags)	150.5	3330.5	12.65
	Pesticide (Lts)	1.33	704.9	2.68

	<b>Total</b>		<b>7081.05</b>	<b>26.89</b>
4.	Interest on working capital @ 7 per cent	-	648.8	2.46
	<b>Total variable cost</b>		<b>21043.45</b>	<b>79.92</b>
	<b>Fixed cost</b>			
1.	Depreciation	-	254	0.96
2.	Land revenue	-	48	0.18
3.	Rental value of land	-	4250	16.14
4.	Interest on fixed capital @ 10 per cent	-	455.20	1.73
	<b>Total fixed cost</b>	-	<b>5007.20</b>	<b>19.02</b>
	<b>Total cost of cultivation</b>	-	<b>26,330.65</b>	<b>100</b>

Comment [MO6]: Mention the source of the data.

**Table 5: Returns from cultivation of rainfed paddy in Shivamogga district**

Rs. /Quintal

Sl. No.	Returns	Quantity	Price/unit (Rs.)	Total (Rs.)
1.	Main product (Quintals)	15.23	1926	29332.8
2.	By product (tractor load)	1.44	3720	5356.8

3.	Gross returns (Rs.)	-	-	34689.78
4.	Net returns (Rs.)	-	-	8359.13
5.	Returns over variable costs (Rs.)	-	-	13367.33
	<b>Returns per rupee of expenditure</b>	-	-	1.32

**Comment [MO7]:** Mention the source of the data.

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## CONCLUSION

It was found that, for rainfed paddy production, human labour was more valuable than bullock and machine labour. The fertilizer requirement was more than FYM, seed and pesticide. The total cost of cultivation of rainfed paddy was Rs. 21,043.45, net returns was Rs. 8,359.13, returns over variable cost was Rs. 13,67.33 and returns per rupee of expenditure were 1.32. It can be inferred that rainfed paddy cultivation was less expensive because farmers using rain water in paddy cultivation and paddy is water demanding crop which helps to save the water resources and avoid irrigation cost. Hence there is an opportunity to educate people about rainfed paddy cultivation in order to improve the farmer's income and also government should encourage farmers towards rainfed paddy cultivation by providing subsidies on fertilizer which was required in greater quantities. As study showed usage of machine labour in rainfed paddy cultivation less than bullock and human labour hence farmers should be made aware of improved agricultural practices through workshops and training programmes to help to achieve higher yield.

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**Comment [M08]:** Include any applicable international journals.

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