Resource productivity in paddy cultivation in Bhadra command

■ **D.N. BASAVARAJAPPA, RAMAPPA PATIL, A.M. MARUTESHA AND AKMAL PASHA**

SUMMARY : This study was undertaken in the Bhadra command of Davanagere district in the Karnataka state during the year *Kharif* 2011-12, has examined the resource productivity of paddy production in three villages of Bhadra command namely Devarabelakere, Bevinahalli and Jigali-Kumbalur. The total cost of cultivation per hectare of paddy was Rs. 37,275. The inputs mainly seeds, manures fertilizers and plant protection chemicals accounted for higher cultivation cost. The chemical fertilizers particularly DAP and complex consuming much of the total cost compared to other expenses. The study has used the primary data collected from 60 rice farmers of the command area using the stratified random sampling. The net income from one hectare paddy is Rs. 24,325 and the B-C ratio is below one. The paddy cultivation has been affected by many factors especially labour and inputs. The harvesting, threshing, winnowing cost is comparatively very less since the introduction of mechanical paddy harvesters.

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BACKGROUND AND OBJECTIVES

Agriculture is the main occupation of the district major crops grown in the district are maize, paddy, jowar, ragi, redgram, greengram, groundnut and sunflower. The productivity of these crops can be increased by adopting some of the interventions. They are, use of quality seeds, bio-fertilizers, bio-pesticides and micronutrients in addition to the application of recommended dose of N P K fertilizers. The total number of farmers in the district is 267420 out of which 80428 (30%) are small, 12074 (17%) are marginal and 1694 (2%) are large. Bhadra command area in Davanagere district occupies an area of 5, 97, 597ha. Out of this, *Kharif* season covers an area of 340000ha, *Rabi* season 26,000ha and summer it is 60,000ha. The average productivity of paddy is 3500kg/ha. But in recent years the production is diminishing. Whereas, farmers incurring the more expenditure on chemical fertilizers mainly complex. Area irrigated in Davanagere dist is about 145578 ha. Majority of the area irrigated by canals (82300ha) and bore wells (53187ha), lift irrigation (5806ha) and 2741ha from other sources. The per cent irrigated area in Davanagere dist is 38 per cent as against the state average of 28 per cent. Area under water logging, salinity, alkalinity and acidic condition is increasing in Bhadra command area and excessive soil degradation and wide spread deficiency of micro nutrients mainly Zn due to mono cropping. People use fertilizers to introduce trace elements and nutrients into the soil so that plants can absorb them. The present study has been conducted to study the resource productivity in paddy.

RESOURCES AND METHODS

Ex-post method, by constructing structured questionnaire through survey and random samples of 60 farmers who are cultivating paddy in Bhadra command of Davanagere dist (Karnataka) were

selected. The study was conducted in Bhadra command of Karnataka state during the year *Kharif* 2011-12. Bhadra command was selected for the study as the farmers were applying more fertilizers than the recommended. From this taluk three villages were selected randomly in such a way that in these three villages namely Devarabelakere, Bevinahalli and Jigali-Kumbalur almost all the farmers in these three villages were applying more than recommended dose of fertilizers. Among these selected villages, 20 farmers from each village were selected randomly. In total there were 60 respondents from three villages in Bhadra command of Davanagere district. All the respondents were personally interviewed using interview schedule. The data were then compiled and statistical tools like descriptive statistics and frequency were used for analysis.

Cobb-Douglas type of production function of the following form was fitted to the data. Variables included in the function were labour cost, irrigation charges, chemical fertilizers, FYM, plant protection measures etc.

Resource productivity:

The production function approach was used to find out the productivity of resources used in paddy cultivation. For this purpose, the Cobb-Douglas production function was fitted. The single most advantage of this production function has been that the input co-efficients constituted the respective elasticties. The function was modified to include dummy variables. The modified form of Cobb-Douglas production function.

$$Y = aX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}X_5^{b5}X_6^{b6}X_7^{b7}....X_n^{bn}$$

where,

Y = Total returns from paddy cultivation (Rs)

X_1 = Area under paddy cultivation (ha)

X_2 = Value of seed (Rs)

X_3 = Tractor charges (Rs)

X_4 = Cost on human labour used in paddy cultivation (Rs.)

X_5 = Cost on chemical fertilizers (Rs.)

X_6 = Cost on farm yard manure (FYM) (Rs.)

X_7 = Cost on plant protection chemicals (PPC) (Rs.).

Table A shows that, majority of the farmers belonged to medium age category with high education level in the study area. More than 40 per cent of the respondents were in the age group upto 50 years having medium to high education showing positive association between age and knowledge. The farmers having 5 hectares of land were maximum constituting 41 per cent of the respondents when compared to low (25%) and high (33%) land holding. Since majority of the farmers were more than 50 years old, their farming experience was also more (41%) in the study area.

OBSERVATIONS AND ANALYSIS

The input utilized in paddy cultivation in the Bhadra

Table A : Characteristics of paddy growing farmers in bhadra command of Davanagere district

Characteristics	Per cent	No.
Age		
Young (upto 35years)	25.00	15
Medium (36-50years)	41.67	25
Old (above 50 years)	33.33	20
Education		
Low (below 7th standard)	25.00	15
Medium (7-9th standard)	41.67	25
High (10 standard and above)	33.33	20
Land holding		
Low (upto 2ha)	25.00	15
Medium (2-5ha)	33.33	20
High (5 and above)	41.67	25
Farming experience		
Low (less than 5 years)	25.00	15
Medium (5-10 years)	33.33	20
High (more than 10 years)	41.67	25

command area is given in Table 1. Since, only variable cost was important in the short-run in influencing the decision-making of the farmers, only these were considered for deriving the profit.

Table 1: Resource use in paddy cultivation (Rs. /ha)

Sr. No.	Inputs	Value	%
1.	Seeds and transplanting	6050	16.23
2.	Primary tillage	3825	10.26
3.	Human labour	6850	18.38
4.	Chemical fertilizers	6550	17.57
5.	Farm yard manure	8,000	21.43
6.	Plant protection chemicals	5200	13.95
7.	Total variable cost	37275	-
8.	Net returns	61600	-
9.	B:C ratio	0.65	-

The total variable cost in cultivation of paddy amounted to Rs 37,275 per hectare resulting in a total per hectare income of Rs. 24, 325 giving a BC ratio of 0.65. Among the inputs, the maximum share was accounted for by FYM (21.43%), followed by human labour (18.38%). This district had one of the highest wage rates, Rs. 200 for a male labour per 8 hour work and Rs. 150 for the females. Unlike many other states, the farmers in the Karnataka state applied more amounts of chemical fertilizers in the cultivation of paddy. In the Bhadra command area also, the expenditure on FYM was Rs. 8000/ha (21.43%) and on chemical fertilizer was Rs. 6550/ha (17.57%). Other inputs like seeds, tractor and PPC accounted for 16.23, 10.26 and 13.95 per cent of the total expenditure, respectively. The total return was Rs. 61,600 per ha, including both, the main product and by product. The resource productivity of input used in the cultivation of paddy in the command area is given in Table 2.

This table indicated that the areas under paddy, human labour, fertilizer for supplementary irrigation in the case of water-stress days were statistically significant. The area under paddy cultivation had an elasticity of 0.63, indicating that one per cent increase in the land area would bring 0.63 per cent increase in the production. The human labour and fertilizers applied in the cultivation had significant positive elasticity co-efficients of 0.19 and 0.22, indicating that at current level these resources were over-applied.

Table 2: Resource productivity in paddy in Bhadra command

Variables	Co-efficients	Standard error
Intercept	3.10	1.38
Land	0.63*	0.05
Seed	-0.10	0.52
Tractor	-0.02*	0.18
Human labour	0.19*	0.04
Chemical fertilizers	0.22*	0.19
FYM	-0.11	0.36
Plant protection	-0.21*	0.52

* Indicate significance of value at P=0.05

The values above are the simply regression coefficients of log Y on log X_1, log X_2 ….log X_7 or simply the elasticties of production with respect to these resource inputs, and the asterisk (*) indicate their statistical significance at 5 per cent probability levels, respectively. They tell the percentage increase in Y with one per cent increase in input X. For example, if we increase X_1 by one per cent, holding other resources at a constant level, Y will increase by 0.63 per cent, thus showing the diminishing factor returns with respect to land input. Diminishing factor returns were observed for seed, FYM and plant protection measures. For tractor, human labour, fertilizers and plant protection measures, the factor returns were negative and significant, which indicate excessive use of these resources. The sum of elasticties turn out to be more than one (1.48), which revealed increasing scale returns. Srikanthamurthy (1986) also carried out similar investigation on resource productivity in agriculture in Bengaluru district, Karnataka.

Conclusion:

The paddy cultivation in Bhadra command of Davanagere district of Karnataka state during *Kharif* 2011-12 had obtained net returns of Rs. 24,325 with the B:C ratio is below one. Human labour, FYM and chemical fertilizers accounted for the highest share in the total cost of cultivation *i.e.* 18.38, 21.43 and 17.57, respectively. The elasticity co-efficients for area under paddy cultivation, human labour, fertilizer and plant protection measures provided were 0.63, 0.19, 0.22 and 0.21, respectively. Farmers particularly in Bhadra command are addicted to chemical fertilizers and they think that overdose of fertilizers will definitely increase the yield. The study has called for an equitable distribution of canal water and enhanced extension services for resource management in the area.

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