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Economic Analysis of Integrated Farming Systems in Uttar Kannada District of Karnataka

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ABSTRACT

Background: The present study was conducted in Uttar Kannada district of Karnataka as a project on integrated farming systems was implemented in this district by University of Agricultural Sciences, Dharwad during the year 2013-15. It was considered for study in master's research.

Methods: Under the study three taluks *viz.*, Sirsi, Mundagod and Bhatkala were selected with an overall objective of identifying and analyzing and the economics of integrated farming systems. The relevant data collected from primary sources through personal interview method were analyzed by tabular and production function techniques. Four main integrated farming systems followed by majority of the farmers in the study area are selected for study, *viz.*, Integrated Farming System-I,II,III,IV.

Result: The study revealed that the total cost under Integrated Farming Systems-III was highest with Rs. 129023, while it was Rs. 115388, Rs.115266 and Rs. 97434 respectively in Integrated Farming Systems-I,II and IV. net farm returns was highest under Integrated Farming Systems-I which was Rs. 86351. In all the different integrated farming systems, the labour and seed cost had significant influence on gross returns. The seed and feed were underutilized, fertilizer, FYM and land were over utilized.

Key words: Cost, Integrated farming system, Production function, Returns.

INTRODUCTION

Indian agriculture is characterized by inter and intra linking crop production activities with one or more agricultural and allied enterprises like cattle, sheep, goat, pigs, sericulture, poultry, fishery, bee keeping *etc.* (Alagumani and Anjugam, 2000). Under the given situation, Indian farming is not commercialized to a large extent on one hand and on the other hand the farmer has to make decisions regarding his business of farming, with a view to attain sustainability. In this regard, the farming system activities provide suitable environment in arriving at solutions to the problems encountered in agricultural production process (Naik, 1998).

Integrated farming is a farm management approach that combines the ecological care of a diverse and healthy environment with the economic demands of agriculture to ensure a continuing supply of wholesome, affordable food. It is not prescriptive because it is a dynamic concept, it must have the flexibility to be relevant on any farm in any country and it must always be receptive to change and technological advances (Naik and Sastry, 2008). Above all integrated farming system (IFS) is a practical way forward for agriculture that will benefit all society, not just those who practice it. Integrated farming makes a vital contribution to sustainable development by adding consideration of economic, ecological and social objectives to the essential business of agricultural food production.

MATERIALS AND METHODS

The present study was undertaken in Uttar Kannada district of Karnataka the district come under Agro-climatic Zones of 9 (Hilly zone) and 10 (Coastal zone) of Karnataka. Uttar Kannada district is selected purposivlely for the study because, a project on Integrated Framing Systems was implemented in this district by University of Agricultural Sciences Dharwad during the year 2013-2015. A multistage sampling technique was adopted for selecting the taluks, villages and sample farmers. Sirsi, Mundgod and Bhatkala taluks were selected for the study. 40 Farmers from each of these taluks were selected purposively for the study.

Functional analysis

To study the resource productivity and allocative efficiency in identified different Farming Systems, a modified Cobb-Douglas type function was fitted separately. This was done with a view to quantify and to determine the extent to which the important resources, explain the variability in the gross returns of the Integrated Farming Systems and to determine whether the resources are optimally used in these Farming Systems (Kandasamy, 1998; Ganesh, 2000; Naik, 1998).

The general form of the function is

$$Y = aXi\ bi$$

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Where

'Xi' is the variable resource measure, 'Y' is the output, 'a' is a constant and bi estimates extent of relationship between X and Y and when X is at different magnitudes. The 'b' coefficient also represents the elasticity of production. The returns to scale can be estimated directly by getting the sum of 'bi' coefficients. Resource use efficiency is the ratio of the Marginal Value Product (MVP) and Marginal Factor Cost (MFC) of individual resources were used to judge the allocative efficiencies.

For evaluating the specific objectives of the study, required primary data was collected by personal interview method from the sample farmers data was analyzed by using tabular analysis, gross income, gross cost and net returns, production function analysis were worked out.

RESULTS AND DISCUSSION

During the study period, integrated farming systems were identified and Paddy- black gram + vegetables + ginger + pineapple + banana + dairy + vermicomposting, paddy + maize + banana + sapota + mango + vegetables + agro forestry + dairy enterprises, paddy-green gram + maize + mango + banana + arecanut + vegetables + azolla + dairy and paddy + sugarcane - black gram + vegetables + arecanut + banana + dairy were selected for study.

The average farm size in the identified integrated farming systems (Table 1) revealed that the farm size were found to be the largest in integrated farming system-II (3.36 acre) and smallest in integrated farming system-IV (2.10 acre).

The total number of dairy animals with the sample farmers was 271 in all the four Integrated Farming Systems (Table 2). The per cent share of possession of dairy animals was relatively more in integrated farming system-II (34.69%) followed by integrated farming system-III (23.25%), integrated farming system-I (22.51%) and integrated farming system-IV (19.56%) in the study area. The number of calves

Table 1: Average farm size of the sample farmers in the selected top four integrated farming systems in the study.

Particulars	Farm size
Integrated farming system I	2.55
Integrated farming system II	3.36
Integrated farming system III	3.27
Integrated farming system IV	2.10

Table 2: Livestock possession in different integrated farming systems in the study area.

Particulars	Livestock	
	Dairy	Calves
Integrated farming system I	61 (22.51)	34 (27.64)
Integrated farming system II	94 (34.69)	49 (39.83)
Integrated farming system III	63 (23.25)	20 (16.26)
Integrated farming system IV	53 (19.56)	20 (16.26)
	271	123

Table 3: Cost and returns of different enterprises in integrated farming system-I.

Particulars	Integrated farming system I							
	Paddy	Black gram	Vegetables	Ginger	Pineapple	Banana	Dairy	Vermi composting
Amortized establishment cost	-	-	-	-	-	2000 (1.74)	-	-
Total variable cost	9500 (8.23)	2870 (2.49)	4643 (4.02)	18795 (16.28)	17640 (15.28)	16750 (14.51)	16820 (14.57)	1300 (1.13)
Total fixed cost	3500 (3.03)	1600 (1.39)	1800 (1.56)	5470 (4.74)	3700 (3.21)	3000 (2.61)	4500 (3.89)	1500 (1.29)
Total cost	13000 (11.26)	4470 (3.87)	6443 (5.58)	24265 (21.02)	21340 (18.49)	21750 (18.84)	21320 (18.47)	2800 (2.42)
Gross returns	19800 (9.81)	9275 (4.59)	6107 (6.22)	48200 (23.89)	39000 (19.33)	(16.76) 12075	35100 (17.39)	3989 (1.97)
Net returns	6800 (7.87)	4805 (5.56)	12550 (7.07)	23935 (27.72)	17660 (20.45)	33825 (13.98)	13780 (15.96)	1094 (1.26)
Returns/Rupee expenditure	1.52	1.99	1.94	1.98	1.82	1.55	1.64	1.42
Farming system as a whole								
Total cost	115388							
Gross returns	201739							
Net returns	86351							

Note: Figures in parentheses indicate per cent share of individual enterprise to farming system as a whole.

Table 4: Cost and returns of different enterprises in integrated farming system-II.

Particulars	Integrated farming system II						
	Paddy	Maize	Sapota	Mango	Banana	Vegetables	Dairy
Amortized establishment cost	-	-	2800 (2.43)	3000 (2.60)	2300 (1.99)	-	-
Total variable cost	9900 (8.58)	3355 (2.91)	15690 (13.61)	15000 (13.01)	11820 (10.25)	5400 (4.68)	15920 (13.81)
Total fixed cost	2500 (2.16)	1800 (1.56)	6700 (5.81)	7000 (6.07)	5261 (4.56)	2760 (2.39)	4060 (3.52)
Total cost	12400 (10.75)	5155 (4.47)	25190 (21.85)	25000 (21.68)	19381 (16.81)	8160 (7.07)	19980 (17.33)
Gross returns	23500 (14.31)	10000 (6.09)	37500 (22.83)	-	33000 (23.14)	15750 (9.59)	39480 (24.04)
Net returns	11100 (22.66)	4845 (9.89)	12310 (25.14)	-	13619 (27.57)	7590 (15.50)	19500 (39.82)
Returns/Rupee expenditure	1.89	1.93	1.48	-	1.70	1.93	1.97
Farming system as a whole							
Total cost				115266			
Gross returns				159230			
Net returns				43964			

Note: Figures in parentheses indicate per cent share of individual enterprise to farming system as a whole.

Table 5: Cost and returns of different enterprises in integrated farming system-III.

Particulars	Integrated farming system III								
	Paddy	Green gram	Maize	Vegetables	Mango	Arecanut	Banana	Dairy	Azolla
Amortized establishment cost	-	-	-	-	3650 (2.83)	5920 (4.59)	3600 (2.79)	-	1200 (0.93)
Total variable cost	8738 (6.77)	2800 (2.17)	4010 (3.11)	4222 (3.27)	15980 (12.38)	14880 (11.53)	13320 (10.32)	17000 (13.17)	1200 (0.93)
Total fixed cost	2200 (1.71)	1600 (1.24)	3490 (2.70)	2500 (1.94)	3200 (2.48)	2800 (2.17)	4600 (3.57)	4590 (3.56)	2300 (1.78)
Total cost	10938 (8.47)	4400 (3.41)	7500 (5.81)	6722 (5.21)	22830 (17.69)	23600 (18.29)	21520 (16.68)	21590 (16.73)	4700 (3.64
Gross returns	16475 (9.10)	7650 (4.23)	13685 (7.56)	12825 (7.08)	-	43890 (24.25)	42375 (23.41)	36119 (19.96)	6980 (3.87)
Net returns	5537 (10.65)	3250 (6.25)	6185 (11.89)	6103 (11.74)	-	20290 (39.04)	20855 (40.12)	14529 (27.95)	2280 (4.38)
Returns/Rupee expenditure	1.51	1.73	1.82	1.91	-	1.85	1.97	1.67	1.48
Farming system as a whole									
Total cost					129023				
Gross returns					180999				
Net returns					51976				

Note: Figures in parentheses indicate per cent share of individual enterprise to farming system as a whole.

Table 6: Cost and returns of different enterprises in integrated farming system-IV.

Particulars	Integrated farming system IV						
	Paddy	Sugarcane	Black gram	Vegetables	Banana	Arecanut	Dairy
Amortized establishment cost	-	-	-	-	3800 (3.90)	2250 (2.31)	-
Total variable cost	7355 (7.55)	10250 (10.52)	1000 (1.74)	5780 (5.93)	9990 (10.25)	15480 (15.88)	16520 (16.95)
Total fixed cost	2000 (2.05)	2340 (2.40)	980 (1.01)	2480 (2.55)	3590 (3.68)	6700 (6.87)	4900 (5.03)
Total cost	9355 (9.60)	14590 (14.97)	1980 (2.03)	8279 (8.49)	17380 (17.84)	24430 (25.07)	21420 (21.98)
Gross returns	15975 (9.82)	23237 (14.28)	3232 (1.98)	17125 (10.52)	24720 (15.19)	46615 (28.65)	32000 (19.66)
Net returns	6620 (10.14)	8647 (13.24)	1252 (1.91)	8846 (13.55)	10340 (15.84)	22185 (33.98	20660 (31.64)
Returns/Rupee expenditure	1.71	1.59	1.63	1.99	1.42	1.90	1.68
Farming system as a whole							
Total cost				97434			
Gross returns				162724			
Net returns				65290			

Note: Figures in parentheses indicate per cent share of individual enterprise to farming system as a whole.

Table 7: Resource use efficiency under integrated farming system I and II.

Particulars	Integrated farming system I			Integrated farming system II		
	Parameters	Coefficient	MVP:MFC ratio	Parameters	Coefficient	MVP:MFC ratio
Intercept	a	4.0879	-	a	4.7071	-
Land (ha)	b1	0.7666*(0.0844)	1.35	b1	0.1877**(0.0733)	7.34
Seed cost (Rs	b2	0.1932(0.1260)	1.99	b2	0.2982**(0.1052)	5.59
Fertilizer (Rs)	b3	0.0836(0.0538)	1.60	b3	0.2722(0.1911)	2.09
FYM (Rs	b4	0.1807(0.1746)	2.06	b4	0.3581(0.45392)	8.70
Labour cost (Rs)	b5	0.2144**(0.1051)	2.13	b5	0.1779(0.1045)	8.75
Feed cost (Rs	b6	0.2224*(0.0518)	7.86	b6	-0.0236(0.0861)	-3.74
Return to scale (sum of bi values)		1.48			1.40	
Coefficient of (R^2) determination		0.8657			0.8494	

Note: Figures in parentheses indicate their respective standard errors. * - Significant at 1 per cent level ,**- Significant at 5 per cent level.

Table 8: Resource use efficiency under integrated farming system III and IV.

Particulars	Integrated farming system III			Integrated farming system IV		
	Parameters	Coefficient	MVP: MFC ratio	Parameters	Coefficient	MVP: MFC ratio
Intercept	a	9.1730	-	a	2.9812	-
Land (ha)	b1	0.4575(0.2624)	69.06	b1	0.4282(0.8331)	0.69
Seed cost (Rs	b2	1.5345*(0.2574)	6.55	b2	0.5751(0.3228)	12.48
Fertilizer (Rs)	b3	-0.1757(0.3306)	-2.91	b3	0.3147*(0.0969)	0.23
FYM (Rs)	b4	0.1706(0.3301)	-2.52	b4	-0.1764(0.3214)	-2.63
Labour cost (Rs)	b5	1.0014(0.5458)	1.82	b5	0.2849**(0.1294)	0.32
Feed cost (Rs)	b6	0.0143(0.2204)	0.24	b6	0.2115**(0.0998)	6.87
Return to scale (sum of bi values)		1.64			1.81	
Coefficient of (R^2) determination		0.8761			0.8100	

Note: Figures in parentheses indicate their respective standard errors. * - Significant at 1 per cent level ,**- Significant at 5 per cent level.

in all the four integrated farming systems was 123. The per cent share of possession of calves in the study area was relatively more in integrated farming system-II (39.83%) followed by integrated farming system-I (27.64%), integrated farming system-III (16.26) and integrated farming system-IV (16.26%) in that order.

Cost and returns of identified integrated farming systems

From the Table 3, 4, 5 and 6 it is observed that the total cost under Integrated Farming System-III was highest with Rs. 129023, while it was Rs.115388, Rs.115266 and Rs. 97434 respectively in Integrated Farming Systems-I,II and IV. Net farm income was highest under Integrated Farming System-I which was Rs. 86351 while it was Rs. 43964, Rs.51976 and Rs.65290 respectively in Integrated Farming System-II, III and IV.

Resource use efficiency in different farming systems

From the Table 7 and 8 it is observed that in all the different integrated farming systems, the labour and seed cost had significant influence on gross returns. The seed and feed were underutilized, fertilizer and FYM and land were over utilized in majority of the farming systems. There was an increasing returns to scale.

CONCLUSION

From the study it was observed that integration of dairy with crop enterprise generated continuous income by which the farmers were able to combat against financial crisis (Manjunath *et al*, 2014). Integration maintains sustainable production without hindering resource base and enables recycling of wastes within the farming system where the crop wastes were used for dairy and the FYM was used for crops. Integration of enterprises provided balanced diet to family members, helped to reduce price risk because of diversification of enterprises and provided family employment throughout the year. Other than these prospects, integration of enterprises enabled the farmers to improve their standard of living and also helped them in linking production and marketing (Sekar *et al*, 2014). In addition, the farmers had the concern for protecting the environment and ecology by way of prospects in recycling of wastes on their farm.

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