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Integrated Farming System: Profitable Farming to Small Farmers

Kamble Anand Shankar*, L.N. Yogeesh, S.M. Prashant, P. Sheik Peer and B.K. Desai

Agricultural Research Station, Hagari 583111, Ballari, University of Agricultural Sciences, Raichur, Karnataka, India
**Corresponding author*

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A B S T R A C T

Indian Scenario 80% of Small and Marginal farmers out of 115 operational land holding growing monocarp or commercial crop having less profitable due many constraints. From field study conducted on performance of integrated farming system over farmers practice system for one ha. Area at Agricultural Research Station, Hagari, Ballari, Karnataka for four successive years of 2010-11 to 2013-14 in deep black soils to explore the productivity and profitability under irrigated condition. Among the system evaluated integrated farming system has recorded higher average net returns (Rs. 64380) and benefit cost ratio (10.35) over the conventional method. Higher Profitability and productivity with lesser cost of cultivation of integrated farming system when compared to farmers practice.

Introduction

In the present scenario the demand and supply for food has changed due to higher population and the shift of people in the cropping pattern. The per capita availability of land is decreasing day to day because of increasing in the population. So in order to meet out the demand of increasing population to produce more quantity by maintaining the quality of food in limited area. By adopting the integrated farming system which requires lesser space and ensures higher productivity of the system is the only option which left out for us. The practice of cash return farmers will improve the economic condition of the farmers. The integrated farming system includes dairy, poultry, goat rearing and fruit trees with dominant cropping systems in order to judicious use of inputs and natural resources to provide the regular income and employment to small and marginal farmers.

In Karnataka, majority of the farmers holds less than 2 ha of land. These farmers generally practice conventional farming, where they need to produce continuous reliable and balanced supply of food as well as cash for basic needs and recurrent farm expenditure. So these need to develop suitable integrated farming system for farmers to avoid the crop loss and to generate employment and income generation throughout year. Integrated farming system

lead the way to increase the production of the small farmers. Multi enterprise farming has the chance to decrease the production cost by synergetic recycling of product of various components to provide the income and employment. Keeping the view, an experiment was conducted at Agricultural research station farm, Hagari to study the comparison between the farmers practicing system and integrated farming system under irrigated condition.

Materials and Methods

Experiment was conducted at Agricultural research station farm, Hagari to study profitability and productivity of Integrated Farming System for four successive years of 2010-11 to 2013-14. The Agricultural research station farm, Hagari is situated in Northern Dry Zone (Zone 3) of Karnataka state with an altitude of 1000 meters above the mean sea level. The soil was deep black with a pH of 8.32. The available Nitrogen, phosphorous and potassium were 60.2, 25.4, 141.5 kg ha^{-1}, respectively.

The experiment consist of growing of field crops for one ha (conventional method) and integrated farming system (IFS). The IFS model consisting of one ha.land holding with the components viz., Crop and Cropping sequence (9000 m^2), Livestock (300 m^2), Farm pond (300 m^2), Composting unit, storage (250 m^2) and Farmhouse (150 m^2).

IFS Model for irrigated ecosystem (1 ha Area), Hagari

All along the border-planting of Jamun, Sapota on the bunds and creeping vegetables on the fence were planted. Between the segments are planted with improved varieties of Drumstick, Curry leaf and fodder crops. On the border of land we have planted the fodder crops.

Composting unit, storage godown, threshing floor etc: 150 m^2area

To sustain the productivity the residues obtained in the system was recycled. The productivity of the farmers practice method and integrated farming system was based on the quantity of marketable produce obtained during all four years. A multi-disciplinary research team representing the disciplines of agronomy, soil science, animal science, farm power machinery engineering and agricultural economics was involved for in-depth analysis of data.

Results and Discussion

Results of four years of conventional method and integrated farming systems are discussed here. The productivity of the farming systems was based on the quantity of marketable produce obtained during all four years. Integrated farming system method (IFS) recorded higher productivity and profitability than farmers practice method. The farmers practice method recorded net returns of Rs. 55000 with 2.85 B: C ratio (Table 1). IFS method records higher net returns and benefit cost ratio in all the four years because this method comprises the components like cropping, vermicompost, goat rearing and cattle (bullocks, cow and calves) rearing. At the end of third year IFS method contributed a net return of Rs. 72835 (average of 4 years) with benefit cost ratio of 2.87which gives 24.53 per cent higher net returns compared tofarmers practicemethod. Similar results were reported by Ugwumba *et al.*, (2010) and Ortega *et al.*, (2009 a). Higher net income generated during third year compared to first and second year due to increase in the milk yield by the livestock and proper recycling of farm resources each other through use of vermicompost contributed to good returns. These results are in accordance with Channabasavanna *et al.*, (2009) was stated

IFS approach recorded 26.3 and 32.3 per cent higher productivity and profitability respectively over conventional system in rice ecosystem. The results indicated IFS become more profitable during perennial years compared to single year.

Among components studied in irrigated IFS method, field crops + diary + vermicomposting unit was more profitable than growing of single crop. This system has recorded average net returns of Rs. 72835 with 2.87 B: C ratio (Table 1). Similar results reported by Jayanthi *et al.,* (2003), Channabasavanna *et al.,* (2009), Ugwumba *et al.,* (2010), Singh *et al.,* (2009) and Ravishankar *et al.,* (2007).

Among enterprises studied animal components recorded higher net income than crop and cropping sequences. These results are in accordance with Jahan *et al.,* (2011) and Sachinkumar *et al.,* (2012) reported inclusion of allied activity for small farms to increase income and promote ecological soundness. Similar results reported by Dey *et al.,* (2010) and Torane *et al.,* (2009).

Organic manures from livestock components of IFS method

The available quantity of organic manures obtained from the livestock components of IFS are presented in Table 2. Available organic manure on wet weight basis was 24.22, 27.77, 27.95 and 29.32 t and on dry weight basis available manure was 16.61, 14.84, 15.36 and 16.11 t from livestock unit. The nutrient content on dry weight basis of manure is presented in Table 3. In the integrated farming system farmers have practiced the poultry unit during 2012-13 and 2013-14. By the first year the income was less because of initial higher cost of cultivation for the establishment of the unit. During the second year higher net returns was recorded because there was no establishment cost for the poultry unit.

Table.2 Quantity of organic manures produced from livestock components

S. No	Year	Wet weight (t/year)	Dry weight (t/year)
1	2010-11	24.22	16.61
2	2011-12	27.77	14.84
3	2012-13	27.95	15.36
4	2013-14	29.32	16.11

Table.3 The nutrient content on dry weight basis of manure

S. no	Particulars	Nitrogen (%)	Phosphorous (%)	Potassium (%)
1	Cattle manure	0.71	0.44	0.91
2	Cattle urine	1.31	0.08	0.70
3	Goat manure	1.53	1.40	0.18
4	Goat urine	1.64	0.03	0.35

Table.1 Yield and economics of different cropping sequences under integrated farming systems in irrigated condition

Year	2010-11						2011-12					2012-13					2013-14				
Cropping sequence	**Area**	**Yield (qt)**	**Cost of Cultivation**	**Gross returns**	**Net returns (Rs.)**	**B:C ratio**	**Yield (qt)**	**Cost of Cultivation**	**Gross returns**	**Net returns (Rs.)**	**B:C ratio**	**Yield (qt)**	**Cost of Cultivation**	**Gross returns**	**Net returns (Rs.)**	**B:C ratio**	**Yield (qt)**	**Cost of Cultivation**	**Gross returns**	**Net returns (Rs.)**	**B:C ratio**
Vegetable	0.08	15kg	180	600	420	2.3	22kg	220	1000	780	3.54	26kg	436	1300	864	1.98	.00	425	1650	1225	2.88
Fruit Crops+ Maize/ Bengal gram	0.20/ 0.40	--	--	--	--	--	--	--	--	--	--	9.5q	1465	13350	11885	8.1	4.50	1900	13500	11600	6.10
Sorghum-Chickpea	0.20	5q	1200	12500	11300	9.4	4q	1300	8000	6700	5.15	4.8q	470	10600	10030	17.59	--	--	--	--	--
Cotton-Greengram/ Sorghum	0.40	--	--	--	--	--	25kg	420	1100	680	1.61	6q	5792	21000	15208	2.62	7.25	1550	14500	12950	8.35
Total	**0.90**	**5.15**	**1380**	**13100**	**11720**	**8.4**	**4.47**	**1940**	**10100**	**2130**	**8160**	**20.56q**	**8163**	**46250**	**37987**	**4.65**	**11.86**	**3875**	**29650**	**25775**	**5.78**
Allied activities																					
Dairy	2 cows 3 calf	1577 .7 ltr	10000	34695	24695	2.46	1439 ltr	10000	31658	21658	2.16	3391.78	18720	74619	55899	2.98	3600ltr	22500	79200	56700	2.52
Poltry	32/42 birds	--	--	--	--	--	--	--	--	--	--	98kg	6937	11760	4827	0.69	1.10	4150	11000	6850	1.65
Vermicompost unit	3 units	30q	500	6000	5500	11.0	30q	600	6000	5400	9.0	90 q	--	9000	9000	--	60.0	1800	24000	22200	12.30
Azolla	3x2m^2	42.75	1950	--	--	--	42q	1680	--	--	--	--	1475	--	--	--	0.80	--	--	--	--
Green fodder on bunds	0.03 ha	80kg	200	--	--	--	76kg	200	--	--	--	87kg	200	--	--	--	0.86	200	--	--	--
Total		**--**	**12650**	**40695**	**30195**	**2.38**	**--**	**12480**	**37658**	**27058**	**2.16**	**--**	**27332**	**95373**	**69726**	**2.55**	**--**	**28650**	**114200**	**85750**	**5.49**
1st year	**1 ha**	**--**	**14030**	**53795**	**41915**	**2.98**	**2nd year**	**14420**	**47758**	**29188**	**2.02**	**3rd year**	**35495**	**141623**	**107713**	**3.03**	**4th year**	**32525**	**143850**	**112525**	**3.46**

Horticulture in IFS method

The raised dykes of the pond lead to generate additional income to the farming community. Income generated during particular year may vary because of seasonal market demand, availability of inputs, labour availability etc.

Vermicompost production in IFS method

During lean period activities viz., compost preparation and vermicompost production activities taken up in the IFS module to recycle the animal wastes, crop residues, grass and fodder tree wastes etc within the farm. In all four years on an average about 48.5 quintals vermicompost produced and used as farm input and also sold as the manures to farmers. The integrated farming system provides excellent opportunity for organic recycling, moreover, and it reduces farmer's dependency on external or market purchased inputs. It offers good scope for recycling of crop components to the animals and vice versa.

Survival of farm family

As per trial one farm family consisted farmer, his wife and two children were leaves in farm house. Both farmer and his wife use to work in IFS method. During all cropping Season farm family meeting their food requirements from farm produce. Farm family members satisfied they are getting diversified produces in their own farm and it includes nutritional vegetables, cereals, pulses, oilseeds, milk, fruits and others. So the family secure in terms of nutrition and food through integrated farming system method.

It is clear from the above results that IFS method for irrigated situations enhances productivity, profitability and nutritional security of the farmer and sustains soil productivity through recycling of organic sources of nutrients from the enterprises involved. In this system, animals are reared on agricultural waste and animal power is used for agricultural operation and voids are used as manure and fuel. The most notable advantage of utilizing low-cost/no-cost material at the farm level for recycling is that it will certainly reduce the production cost and ultimately improve the farm income considerably.

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