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Productivity and Economics of Improved Interventions in Existing Farming System Modules of Punjab

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ABSTRACT

Crop production along with dairy is the main farming system of Punjab. The improper tapping of the potentialities of each component in the system can make the system unviable. Crops+dairy+vegetables enterprise gave maximum net returns (₹ 1,50,831) which were followed by crops+dairy (₹ 1,26,580) and gave 56.2 per cent higher net returns over crops and 19.2 per cent over crops+dairy during first year. The crops+dairy enterprise showed 31.1 per cent more economic returns over the alone cultivation of crops. In the second year, the crop component of existing farming system provided gross returns of ₹ 1,13,235/ha with input cost of ₹ 49,560 and gave net returns of ₹ 63,675/ha. The livestock and vegetable component gave net returns of ₹ 1,05,495 and ₹ 18,762, respectively. Three different interventions were incorporated into the system so as to maximize net return per unit area per unit time. As rice crop requires more irrigation water, it was replaced with basmati and provided gross returns of ₹ 1,42,705/ha with net returns of ₹ 82,550/ha. Interventions in livestock and organic kitchen gardening component gave net returns of ₹ 2,32,865 and ₹ 27,505, respectively.

Key words: Farming system, interventions, net return

INTRODUCTION

Punjab is considered to be the major contributor to the food bowl of the country. With 1.53 per cent of the geographical area of the country accounted for about 50-60 per cent of wheat and about 30-40 per cent of rice procured for the central pool of food grains during the last four decades or so. However, linear growth in population and unplanned colonization lead to rapid fragmentation of land holdings and shrinkage in fertile cultivated areas. Different farming systems have been evolved independently and being practiced by the farmers without any rationale for utilizing the wastes and residues arising out of cropping/animals and other associated enterprises at farm resulting in wastage of resources.

The income from average farmers from cropping alone is hardly sufficient to sustain his family. Dairy, irrespective of kind of animals and their breeds, has been an integral part of prevailing farming systems across the country. Due to this, farmers are considering farming as a non profitable occupation. Farming system is a resource management strategy to achieve economic and sustained production to meet diverse requirements of farm households while preserving resource base and maintaining a high level environmental quality (Lal and Millu, 1990). Although, the farmers of Punjab are adopting other enterprises like dairy, fishery, piggery, mushroom cultivation, honey bee and vegetable production etc. along with crops. But due to constraints like lack of knowledge, the risk involved, lack of funds and requirement of continuous care, the farmers avoid these occupations.

At the same time, the option of having rice-wheat system, which is comparatively easy to handle and gives much freedom to farmer also creates the disinterest about adopting other enterprises. In view of stagnation in production and income of the farmer, the scientists have realized that other enterprises of the farming system should be given due weightage and the extension worker of the state should create a favorable environment among the farmers, so that they may adopt these occupation and can enhance their income and contribute to Nation.

Keeping in view, the importance of Integrated Farming System in substantial increase in profitability of household an attempt was made to introduce and study the feasibility of best possible interventions in prevailing farming system of the state and create the awareness among farmers about these income generating enterprises.

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METHODOLOGY

The present study was conducted in Amritsar district of Punjab, to suggest which particular farming system module (crop, dairy and vegetables) can provide maximum benefit over the time and land under assured irrigation conditions. For this study, six experiments were initiated in the district during 2010-11 with three treatments viz. crops only, crops + dairy, and crops + dairy + vegetables and twelve farming families of the district were selected randomly during the year 2011-12. Prior to conductance of farming system experiment, bench mark data of the farming families were conducted through farmer participatory research in the system perspective by identifying the module wise constraints and addressing of the same with low or no cost interventions in three modules namely crop, livestock and optional.

Based on the information generated during the survey, the dominant farming systems identified were crop+dairy representing 80 per cent house hold of small farm group. To get maximum possible returns from different component enterprises with available farm resources of the small holders, low cost effective and also environmentally safe technological modules were prepared. As the small and marginal farmers in general were resource poor and economically weak, more realistic additional enterprises were introduced and evaluated. The three existing enterprises were rice-wheat (M01), livestock module having two buffaloes (M02) and optional module having kitchen gardening (M03) and corresponding additional enterprises in the exiting model were basmati rice-wheat (M1), two buffaloes+one cow (M2) and optional module organic kitchen gardening (M3). To get set objectives and wide adaptability among small farm holders, one hectare cultivated land with assured irrigation was taken. The allocation of land resource for accommodating different enterprises was done as per needs of the family and size/numbers of individual components of the system. All the required agri-inputs were supplied to the farmers by Department of Agronomy, PAU Ludhiana and were funded by Project Directorate for Farming Systems Research, Modipuram, Meerut, Uttar Pradesh.

RESULT AND DISCUSSION

On farm-farming systems' characterization survey conducted by the ECF center, Amritsar revealed that under irrigated farming situation, enterprises like agriculture, horticulture, dairying and animal husbandry are prevailing in the district. Rice-wheat crop rotation and livestock are the main farming system of the families. There are total 70705 families are engaged in farming. Out of which, 8690 are marginal (<1ha), 16965 are semi medium (2-4 ha), 26405 are semi-medium (2-4 ha), 16245 are medium (4-10 ha) and 2400 are large (<10 ha) land holders farm families engaged in farming in Amritsar district (Table 1). The average family sizes of farm families are four with average land holding of 2-4 ha. The per capita income obtained from farming was observed to be one lakh per year.

Table 1: Demographic detail of Amritsar district of Punjab

Number/Type	Total No.	Marginal (<1 ha)	Small (1-2 ha)	Semi medium (2-4 ha)	Medium (4-10 ha)	Large (>10 ha)
No of farming families	70705	8690	16965	26405	16245	2400
Area (ha)	217523	5669	23764	67307	89459	31324

In the year 2010-11, the economy of existing rice-wheat system was calculated under the crop component. In case of dairy, two productive buffaloes were taken as a unit. Ten per cent area was put under vegetable cultivation. The data presented in Table 2 showed that crops+dairy+vegetables enterprise gave maximum returns (₹ 1,50,831) which were followed by crops+dairy (₹ 1,26,580). The crops+dairy+vegetables gave 56.2 and 19.2 per cent higher net returns over crops only, and crops+dairy, respectively. The crops+dairy enterprise showed 31.1 per cent more economic returns over the alone cultivation of crops.

Table 2: Profitability of different farm enterprises for one hectare unit (2010-11)

Enterprises	Gross return	Cost /unit	Net returns (₹/unit)
Crops only	145930	49350	96580
Crops + dairy	295930	169350	126580
Crops + dairy + Vegetable	325116	174285	150831

Three different modules were incorporated into the system ranging from M1 to M3 (Table 3 and Fig 1) in the year 2011-12, to maximize the return per unit area. In crop module, the constraints of low yield crop cultivars, imbalanced fertilizer application, high incidence of pests in rice was addressed through replacement of paddy with basmati rice, balanced fertilizer application to basmati rice, integrated pest management practices with low cost yellow traps and adopting proper herbicide spraying technology. Though, farmers are raising crops and livestock together for centuries and for them livestock has been the integral part of system, however, there remains a significant challenge in promoting and supporting the widespread adoption of productive, remunerative, eco-friendly and self-sustaining integrated farming systems. Incorporation of M1 module obtained gross returns of

₹ 1,42,705/ha with net returns of ₹ 82,550/ha which is 26.0 and 29.6 per cent higher than rice–wheat (M01) system, respectively. Similarly, in livestock module, constraints of inadequate and imbalanced feeding and no vaccination was addressed through incorporation of mineral mixture for feed, use of albendazole for deworming and vaccination as per schedule. The dairy component was managed by farm family members and fodder was also produced on the farm itself. The maize and berseem were grown in kharif and rabi seasons, respectively. Feed and fodder in the ration of dairy animals do not contain all the essential minerals required for milk production.

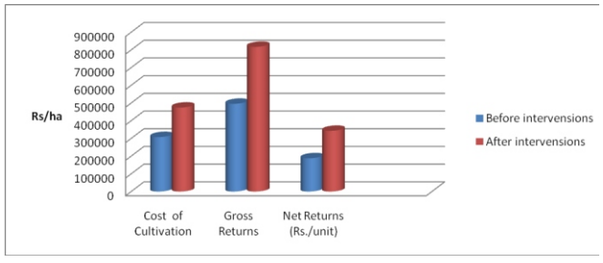
Therefore, livestock was fed with mineral mixture to cure mineral deficiency. The farmyard manure obtained from dairy component was utilized for raising crops and vegetables which not only reduce input cost of fertilizers but will also help to improve soil health and fertility. The M2 module provided net returns of ₹ 2,32,865/ha. Radha *et al* (2000) also revealed that three agricultural and livestock based farming systems *viz.*, dairy, poultry and sheep rearing generated more than three times additional employment over arable farming and agriculture + dairy was proved to be more promising than others. Optional module (M3) includes organic kitchen gardening, which gave net returns of ₹ 27,505/- with total cost of ₹ 5,930 and gross returns of ₹ 33,435/-.

Interventions incorporated in farming system M1 to M3 provided gross returns to the tune of ₹ 8,17,172/ha with input cost of ₹ 4,74,252/ha and net returns of ₹ 3,42,920/ha (Table 3 and Fig 1). The total additional cost of interventions in all the modules was only ₹ 1,66,557 per year which contributed for additional income of ₹ 1,54,988/year. Besides the higher income, the family met the nutritional requirement by in-house production of quality produce such as chemical free vegetables and milk. Nearby farmers are also evincing interest in adopting all the modules as these are of low cost in nature. The family gets additional employment due to the interventions made in farming system perspective. Singh et al (2011) conducted the study in western plain zone of Uttar Pradesh for a period of six years (2004-2010) and revealed that Integrated Farming System Approach applied on a piece of 1.5 hectare irrigated land, besides fulfilling all the requirement of 7 members household food and fodder demand (animals) inclusive cost of production, could create an additional average annual savings of ₹ 47000/- in first four years of its establishment and more than ₹ 50, 000 in subsequent years.

Table 3: Economic analysis of interventions incorporated in existing farming system modules (2011-12)

Modules	Cost of Cultivation (₹)	Gross Return (₹)	Net Returns (₹/unit)	B:C ratio
Conventional farming system modules				
M 01 (Rice-wheat)	49560	113235	63675	2.28
M 02 (Livestock module 2 buffaloes)	252845	358340	105495	1.42
M03 (Optional module) Kitchen Gardening	5290	24052	18762	4.55
Total	307695	495627	187932	1.61
Interventions in existing farming system modules				
M1 (basmati rice-wheat)	60155	142705	82550	2.37
M2 (2 buffaloes+1cow)	408167	641032	232865	1.57
M3 (Optional module) Organic Kitchen Gardening	5930	33435	27505	5.64
Total	474252	817172	342920	1.72

Fig 1: On-farm evaluation of interventions incorporated in existing farming system modules



CONCLUSIONS

It can be concluded that integrated farming system enhances productivity, profitability and nutritional security of the farmer. It is a resource management strategy to achieve economic and sustained agricultural production to meet diverse requirements of farm households and to ensure food and nutritional securities besides increasing farm income. As there is no scope of horizontal expansion of land for agriculture, only vertical expansion is possible by integrated farming systems, requiring less space and time, and ensuring reasonable return to farm families.

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