Case Study

Smart farming secures livelihood: a case study of small farm from Himachal Pradesh

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ABSTRACT

Indian agriculture is dominated by small farms and maintaining these farms profitable is the biggest challenge. Under such circumstances diversified farming is the only option to sustain livelihood of small farms. This paper presents a case study of diversified farming system model in a small farm from Himachal Pradesh. The adoption of different cropping systems with dairy unit, use of organic formulations prepared from local resources and marketing model developed with buy-back option have been the major contributing factors for the success of this small farm. The case can be useful for further replication among small farms of similar agro-climatic conditions for experiential learning.

Keywords: Case study; diversified farming; small farm; livelihood security

INTRDUCTION

Indian agriculture is dominated by small farms and maintaining small farms profitable for livelihood security is the biggest issue among the persons involved in agricultural development in the country. The increasing population is responsible for further fragmentation of landholdings encouraging the conversion of semi-medium and medium group of farmers into small and marginal farmers. Under such circumstances diversified farming is the only option to sustain livelihood of small farms. The small farmer can intensify biodiversity resulting in higher productivity and sustainability of agriculture. Himachal Pradesh is a hilly state of India where crop husbandry, horticulture and livestock rearing are integral part of hill farming. It accounts for over 30 per cent of the state's net domestic product and provides employment to about 71 per cent of its population (Chaudhary et al 2015). Around 86 per cent of the holdings are marginal to small where cereal-based cropping pattern has become non-remunerative enterprise to secure the livelihood of farm families. The small farmers, the most important human resources are shying away from agriculture in search of better avenues due to decreasing profitability in agriculture sector. Under present scenario the biggest challenge to developmental agencies engaged in agriculture and allied sectors is indeed to secure the livelihood of small holders in farming by diversifying the present agricultural system towards more remunerative business enterprise.

The marginal and small holders are engaged in subsistence farming and mostly devote their land to produce low value cereal crops. Further non-adoption of innovative and improved technologies is the major reason for low income of these farmers; consequently their livelihood security is at a stake. Many studies have also confirmed the inverse relationship between farm size and productivity per hectare. Small farmers are characterized by smaller applications of capital but higher use of labour and other family-owned inputs and a generally higher index of cropping intensity and diversification. Diversification of crops in agriculture sector has been realized as an important strategy for agricultural development in India in the recent years (Nain et al 2013) and importance of horticultural crops as a means of diversification and creation of additional employment opportunities in rural areas has been well accepted in the country.

Small farmers have the potential to raise their income by switching from cereal-based production systems to high-value agriculture. The high-value agriculture is expected to contribute more to the wellbeing of the smallholders as it requires more labour and generates higher returns than cereals (Joshi et al 2006). The production of high-value agriculture is labour-intensive and thus more suitable for smallholders. However higher marketing risks due to low volume of marketable surplus and poorly developed infrastructure in remote areas are the major constraints responsible for sustaining viability of small farms. Various researchers have suggested that for ensuring sustainable viability of marginal and small farmers the creation of job opportunities in rural areas along with suitable policy support for development of livestock sector and other allied activities would be the solution for resource-poor farming community in the future (Chandra 2001). There are several successful cases of marginal and small farmers who have secured the sustainable livelihood in agriculture and allied activities. The documentation of such cases is of paramount importance for motivating and inspiration to other fellow farmers for experiential learning. Hence the present case study of a small farmer from a remote area of Mandi district of Himachal Pradesh in western Himalayas is an attempt in this direction who has established himself as a successful entrepreneur by adopting diversified farming system for secured livelihood.

METHODOLOGY

The present study was conducted in Mandi district of Himachal Pradesh. A progressive farmer from Karsog block of Mandi district was purposively taken as a case for the present investigation due to the reason that he had adopted the diversified farming systems. An explorative case study approach was adopted using a combination of home visits and semi-structured interview schedule for documenting the data. Various visits were carried out during 2015 to collect the data. Production and profitability data under different cropping systems and live production system for the last five years was recorded. Further the data were analyzed and interpreted in terms of gross and net returns and benefit-cost (B-C) ratio. The formulae used for calculating these economic parameters were:

Gross return (Rs)= Quantity of produce and byproduct x Sale rate

Net return (Rs)= Gross return – Gross cost

B-C ratio= Gross return ÷ Gross cost

RESULTS and DISCUSSION

Cropping systems and cropping pattern

The details of cropping systems and cropping pattern adopted by the farmer showed that four different cropping systems were practiced in farming in an area of 1.60 ha (Fig 1). Under cropping system I, broccoli/lettuce/summer squash/Chinese cabbage/ celery/parsley–peas–cauliflower were taken up in 0.48 ha area. Tomato-maize-peas were grown in 0.24 ha area under cropping system II. Under cropping system III, cauliflower–French bean-radish were grown in 0.48 ha. Cereal-pulse-based cropping system was adopted under cropping system IV in 0.40 ha of the area. The farmer expressed that adoption of different cropping systems served as a mean of crop diversification for maximizing returns and ensuring livelihood security from his small farm.

Area, production and profitability under different cropping systems

The details with respect to area, production and profitability under different cropping systems have been documented during the last five years. The data were analyzed and the results presented in Table 1 reveal that different exotic vegetables like brocolli, lettuce, summer squash, Chinese cabbage, celery and parsley were grown from February/March to June.

The exotic vegetables have a great demand in the markets of Chandigarh and Delhi and thus farmer harnessed the existing market demands for remunerative returns. A net return of Rs 84232 was got by growing these vegetables in 0.48 ha of area. After these crops green peas were grown (July-October) followed by cauliflower (October-February) and a net return of Rs 69066 and 22236 was earned respectively. Since the climate of the area is much congenial for growing off-season vegetables the green peas sown during July month and harvested during October provided off-season advantage and better returns. Tomato-maize-peas were grown in 0.24 ha area under cropping system II where tomato was the leading one in terms of net return (Table 1). Under cropping system III cauliflower crop provided maximum net return of Rs 77060 which was grown in February-May/June months. The French bean crop was ranked as second in terms of net return followed by radish under this system. The data also indicate that wheat

crop occupied the first position in terms of net return followed by maize and kharif pulses under cereal-pulse-based cropping system IV.

Production and profitability under livestock production system

The data with regard to livestock production system reveal that the farmer owned three lactating animals that provided 4980 liters of milk per annum apart from providing 182.50 q of cow dung (Table 2). The net return of Rs 33049 was obtained from livestock production system by the farmer. Dairy farming has also been considered as an important enterprise in Himachal Pradesh with total milk production of about 11.39 lakh ton and Mandi district stands second in milk production in Himachal Pradesh (Yadav et al 2014). Dairy farming has great potential for socio-economic transformation of farmers through entrepreneurship development in this sector. By integrating this system with other crop production systems can increase the farm productivity and profitability. The cow dung and cow urine blended with local herbs are used for making organic formulations like Jeevamrit and Panchgavya etc. According to the farmer it maintained soil fertility and controlled insect pests and diseases.

Net farm income

The net farm income earned by the farmer from different cropping and livestock production systems presented in Fig 2 reveals that cropping system I was most remunerative with net return of Rs 175533 followed by cropping system III with Rs 150728 per annum. A net return of Rs 71169 and 19099 per annum was obtained under cropping systems I and IV respectively. Overall a net return of Rs 416529 per annum was earned by following all cropping systems in 1.6 hectare of cultivated land. From the livestock sector a net return of Rs 33049 per annum was obtained. The overall net farm profitability from different cropping and livestock production systems was Rs 449578 per annum. It is concluded that the potential for diversification through high value cash crops has been found to be more favorable for the hilly regions where traditional crops have little growth potential. Thus horticulture-based cropping system contributed far much better in terms of net return to the farmer. Earlier some researchers also stated that horticulture sector has emerged as a driving force for agricultural development in India and this sector is the most profitable venture among all farming activities (Mittal 2007). Recent studies have also discovered the comparative profitability of horticultural crops over the traditional field crops (Sen and Raju 2006). Therefore switching over to commercial agriculture has been an effective strategy for saving the farmers from the vicious circle of low income and low investment prevalent in case of traditional agriculture.

Productivity levels under different cropping systems

The productivity levels achieved by the farmer under different cropping systems have been presented in the Fig 3. As evident from the data the productivity under vegetable-based cropping systems was much higher than the cereal-pulse-based cropping system. The hilly areas have a lot of potential for development of horticulture sector due to varied topographical and agro-climatic conditions. The present findings are in conformity with those researchers who opined that infrastructure and environmental advantages are the key factors for shift towards high value cash crops under horticulture-based crop diversification (Weinberger and Lumpkin 2007).

Innovative marketing model

Mr Tej Ram started exotic vegetable cultivation about 20 years back. Initially he mobilized 15-20 farmers in the village to grow exotic vegetables. Further with his efforts the agreement made with buyers for providing seeds of improved exotic and other vegetables with buyback option flourished the exotic vegetable cultivation in the village. As there was a good demand for exotic and other off-season vegetables in big city markets the produce from the area directly went to Azadpur and Okhla markets. He initiated and developed the marketing model with buyback option where farmer had a definite liaison with the particular commission agent in the market. The produce was usually sent in HRTC night buses which was collected by the deputed personnel of the agent for further auction in the market. After deducting commission the payment to the farmer was made through draft/direct deposits in the farmer's bank account. The whole process worked on mutual understanding. This innovative intervention proved a boon to other fellow farmers and many farmers came forward to practice this venture for livelihood security.

Spread effect on fellow farmers

More than 1500 families of surrounding villages were involved in the exotic and other off-season vegetable cultivation in Karsog block of the district. About 500 ha area was under exotic vegetable cultivation in Karsog block only resulting

Table 1. Area, production and profitability under different cropping systems (2010-11 to 2014-15)

Cropping system	Crop	Area (ha)	Production (q)	Cost of cultivation (Rs)	Net return (Rs)
I	Broccoli (*Brassica oleracea* var *italica*)	0.16	14.6	9517	22883
	Lettuce (Iceberg) (*Lactuca sativa*)	0.08	11.8	5614	20536
	Summer squash (*Cucurbita pepo*)	0.08	9.2	7146	16254
	Chinese cabbage (*B rapa* subsp *pekinensis*)	0.08	7.3	3894	11506
	Celery (*Apium graveolens*)	0.04	2.1	1378	5172
	Parsley (*Petroselinum crispum*)	0.04	3.3	1519	7881
	Pea (*Pisum sativum*)	0.48	34.4	28334	69066
	Cauliflower (*B oleracea* var *botrytis*)	0.48	37.4	33864	22236
II	Tomato (*Solanum lycopersicum*)	0.24	64.0	13224	47676
	Maize (*Zea mays*)	0.24	7.8	5863	3867
	Peas (*P sativum*)	0.24	24.3	12594	19626
III	Cauliflower (*B oleracea* var *botrytis*)	0.48	50.8	35940	77060
	Frenchbean (*Phaseolus vulgaris*)	0.48	35.7	33114	50286
	Radish (*Raphanus sativus*)	0.48	48.8	25418	23382
IV	Maize (*Z mays*)	0.32	10.4	7818	5102
	Kidney bean (*P vulgaris*)	0.04	0.39	1175	1715
	Horse gram (*Macrotyloma uniflorum*)	0.04	0.42	638	1562
	Wheat (*Triticum aestivum*)	0.40	13.7	11480	10720

Gross return includes price of produce and byproducts

Table 2. Production and profitability under livestock production (2010-11 to 2014-15)

Lactating animals	Milk production (l)	FYM (q)	Cost of production (Rs)	Gross return (milk + FYM) (Rs)	Net return (Rs)	B-C ratio
3	4980	182.50	57816	90865	33049	1.57

B-C ratio= Gross return/Cost of cultivation

in good monetary benefits to farmers. Other farmers of nearby districts also started the cultivation of exotic vegetables. This noble innovation had been fetching good returns to the resource-poor hill farmers in strengthening their socio-economic status besides generating enormous employment avenues.

Mr Tej Ram had a strong linkage with Krishi Vigyan Kendra, Mandi, Himachal Pradesh and was awarded at different platforms at district and state level. Many developmental agencies such as Department of Agriculture, Department of Horticulture, Japan International Cooperation Agency (JICA) working in the state, district administration, NABARD etc had been taking his expertise as a resource person for further mobilizing the farmers to adopt the diversified farming as a vocation. Many farmers visited his farm for experiential learning and to seek his guidance.

This model of diversified small farm of integrated vegetable, cereal, pulse crops and livestock is a key to sustainable development in small farms. The multiple cropping and farming system adopted on 1.6 ha farm by growing seasonal and off-season vegetables including exotic vegetables, cereals and pulses supported with a small dairy unit played a major role in the successful integrated farming model. The marketing model developed with buy back option not only ensured remunerative returns but also opened the doors to other fellow farmers a best marketing platform for selling of farm produce at reasonable rates. The case of smart farming could be useful for researchers,

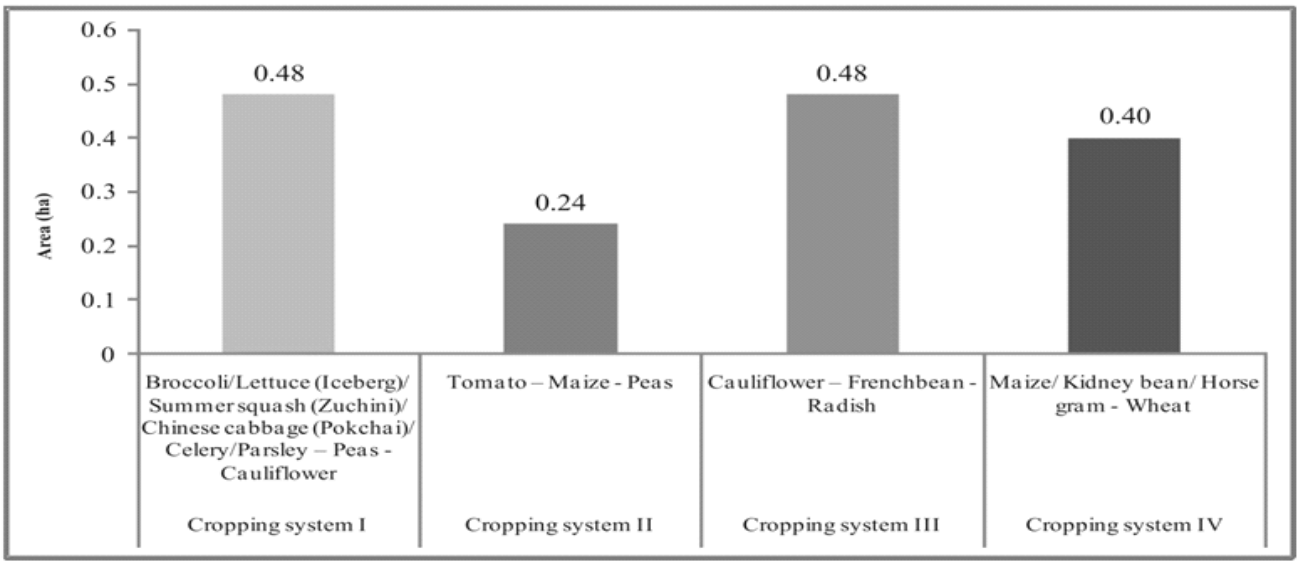

Fig 1. Cropping systems adopted by the farmer

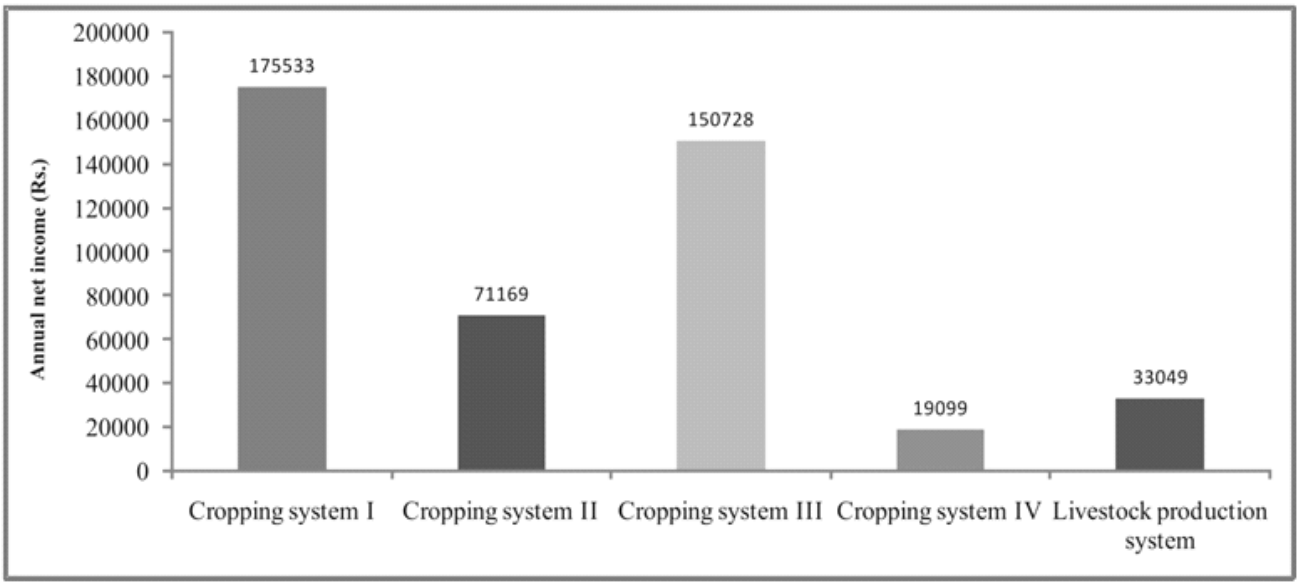

Fig 2. Overall net farm income from different cropping systems and livestock production

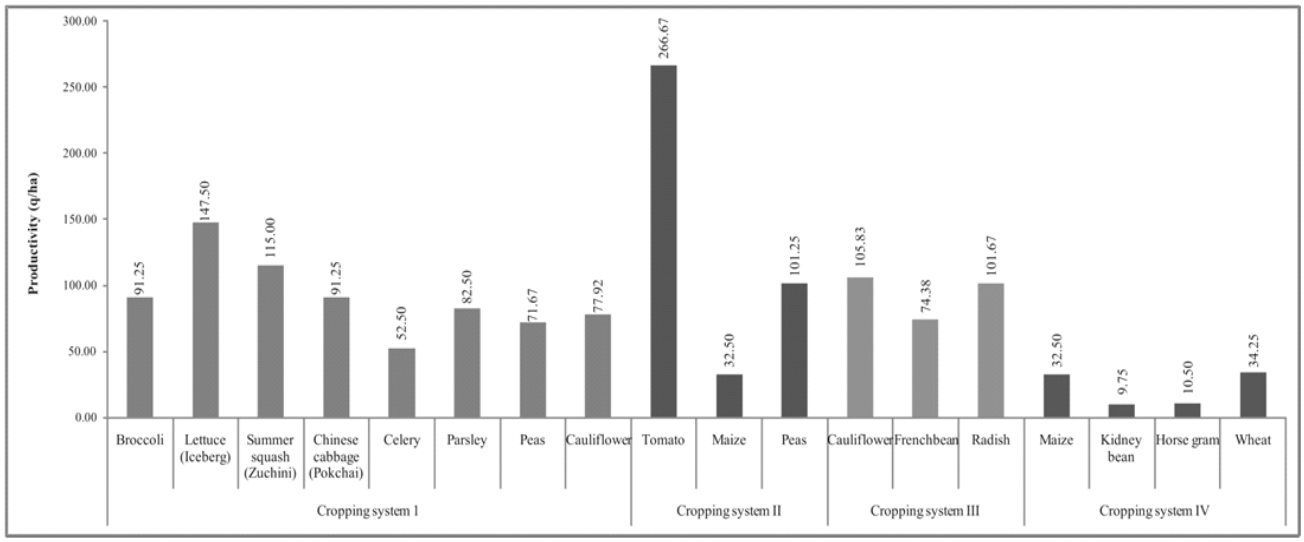

Fig 3. Productivity levels achieved by the farmer under different cropping system

subject matter specialists in KVKs and field extension officers for further replication among those small farms in the country where similar agro-climatic conditions prevailed. This model could also serve as a reference to other fellow farmers in the country for further experiential learning.

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