

Original Research Article

Doubling the Farmers Income by Shifting from Conventional to Diversified Farming System

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ABSTRACT

In present day, farmers in bihar as well as in India heavily depend on Rice-wheat cultivation. Remuneration obtained from Rice-wheat cultivation is not enough. As a result, farmers' income becomes stagnant. Probability of crop failure also poses heavy risk on the shoulder of farmer. Diversified farming system with adoption of poultry, dairy, vegetable cultivation play a great role in increasing farmers income simultaneously reduce the loss of farmers due to crop failure. The trial was conducted for three consecutive years (2014-15, 2015-16 and 2016-17) with different cropping pattern. In the year 2014-15, only rice wheat cultivation and two dairy animals were adopted and the cost benefit ratio (BC) ratio 1.38. The economic return of the year 2014-15, was considered as a control for comparison with the return of another second and third year. Second year, farmer adopted new variety of rice and wheat and started cultivation of vegetables in rabi season only. In small area fodder cultivation was started for animals. Return obtained from adoption of new variety of rice and wheat, vegetable cultivation, and dairy, enhance farmers income significantly. As a result, return in case of second year was significantly higher than first year and BC ratio was 1.63. Third year, farmer increased vegetable cultivation in both the rabi and kharif season and number of dairy animals. The return obtained in third year was significantly higher and BC ratio was 1.8. BC ratio increased from 1.38 to 1.8 from 2014-15 to 2016-17 i.e. during three consecutive years. We can conclude that farmers income has reached almost close to double during three consecutive years.

Keywords

Conventional to
Diversified
Farming System

Introduction

Now a days agriculture has earned the same status as industry. Government of India is highly focussed on the growth of agriculture. In spite of several government policy and various facility, still this sector is not as much remunerative. This results in plight of large mass of farmers from village to metro cities. Apart from this, rising of food prices also create trouble for

government and public. Green revolution takes place in 1960 and it makes country self-sufficient in food grain production. Green revolution placed us in the group of food grain exporting countries. The increase in benefit of farmers is not congruent with the increase in output of farmer. The actual fact is that the income of farmers has never risen enough and this is evident from

poverty level of farm household. According to NSSO, every one out of five rural household who are employed in agriculture comes below poverty line. Jharkhand was recorded with highest population level of 45.3 per cent below poverty line.

But how to achieve the dream of substantially increasing the farm income is a big question. Gulati (2016) said that the goal of achieving farmers income double by 2022 is completely unpractical and unrealistic. It appears that critics ignored the substantive facts and matter (Chand 2016b). Here we are not focussing on doubling farmer output rather on production. Our thrust area include following points:

Introduction of good quality seeds to the farmers

Introduction of more remunerative crops like vegetables to the farmers

Introduction of improved dairy animals to the farmers.

In India and Bihar, farmers are mainly practicing Rice-wheat cultivation and they are realising enough production. Rice-wheat cultivation has not remain much remunerative, in fact they are on the verge of stagnancy. The market price of rice and wheat has become stagnant over the years. In near future there is no probability of rise in price of rice-wheat.

There it has become our duty to encourage farmers to shift from conventional farming to diversified farming. Diversified systems consist of components such as crops and livestock that coexist with each other. In this case the adoption of varied crops and livestock primarily serves to minimize risk and not to recycle resources. Diversified systems are a combination of specialized

sub-systems that aim to reduce risk in conditions of variable but relatively abundant resources. Diversified farming includes cultivation of variety of crops and integration of livestock (Kremen *et al.*, 2012). The estimates showed that mixed cropping and livestock together meet the 50% of world's cereal demand, 60% of world's meat demand and 75% of world's dairy production (Herrero *et al.*, 2010).

Materials and Methods

The main objective of this investigation is shifting farmers from conventional farming to diversified farming system. Mrs. Nagmani devi was selected for case study. She had total 6 acre land for cultivation. She used to practice rice-wheat cultivation. Every year, she was sowing rice in Kharif and wheat in rabi in 6 acre of land. By selling the output of rice-wheat, she was earning her livelihood. She was also having one Jersey cross and one Sahiwal cow. This was the condition of Mrs. Nagmani devi in the year 2014-15. In 2014-15, rice cultivation was done over 6 acre of land in kharif season and cultivation of wheat over 6 acre of land. Rice, wheat and straw (obtained from rice and wheat) was sold. Milk obtained from dairy animal was also sold to earn livelihood. Cost of cultivation and gross return was calculated and cost benefit (B: C) ratio was derived. In the year, 2015-16, we encouraged her for diversified farming. Mrs. Nagmani devi, became ready to divide her land holding for different crop.

In the year 2015-16, she decided to cultivate Rice-wheat in 4.5 acre of land holding only. One acre of land was left for vegetable cultivation and 0.5 acre for fodder cultivation. In kharif for rice cultivation, she adopted variety Arize6444 in 2 acre of land and BPT-5204 in 2.5 acre of land holding. In rabi season, improved variety of wheat

namely HD-2967, was adopted and cultivated over 4.5 acre of land. In one acre of land, vegetable cultivation was resumed. She cultivated cauliflower in 0.5 acre of land and potato in 0.5 acre of land. She had one Jersey, one Sahiwal and one calf/heifer for milk production. Fodder cultivation to feed dairy animals was started in 0.5 acre of land. Cost of cultivation and gross return was calculated and cost benefit (B: C) ratio was derived.

In the third year 2016-17, in kharif rice cultivation was done like previous year (2015-16) i.e. for rice cultivation, she adopted variety Arize6444 in 2 acre of land and BPT5204 in 2.5 acre of land holding. In rabi season, improved variety of wheat namely HD-2967 was adopted and cultivated over 4.5 acre of land. In this year also, one acre of land was adopted for vegetable cultivation. But unlike the year 2015-16, vegetable cultivation was adopted in both the kharif and rabi season. In kharif season, cultivation of cauliflower in 0.5 acre of land and potato in 0.5 acre of land. In rabi season, cultivation of sponge gourd in 0.5 acre of land and snake gourd in 0.5 acre of land. In dairy animals, two Jersey and one Sahiwal was adopted for milk production. To feed farmers, fodder cultivation was done on 0.5 acre of land. Cost of cultivation and gross return was calculated and cost benefit (B: C) ratio was derived.

Results and Discussion

Land is the important resource in agriculture but success depends on how the area utilized for production. The farmer has 6 acres of land. Three years data (year 2014-15, 2015-16 and 2016-17) are collected from farmer's field and its statistics is presented in Table-1, Table-2 and Table-3. First year the farmer grow traditional rice-wheat crop during kharif and winter season in her total land

holding. She reared two dairy animal in inefficient way i.e. dairy animals were reared without any scientific guidance.

In the year 2014-15, rice variety BPT-5204 was sown and its input cost was Rs82600. the yield rate of rice was 16q/acre and total yield was 96 q. By selling paddy and straw total return obtained was Rs 115200 and Rs 4000 respectively. In rabi season, old wheat variety UP-62 was sown in 6 acre of land with input cost Rs 54700. Yeild rate of wheat was 8q/acre and total yield was 48 q.

Total return obtained by selling of wheat grain and straw was Rs 72000 and Rs 6000 respectively. Dairy animal Jersey cross and Sahiwal had lactation period of 250 days and their yield rate was 4L/day and 3.5L/day. The input cost of rearing of Jersey cross and Sahiwal were Rs 24000 and Rs 21525 resepectively. Total milk yield obtained from Jersey cross and Sahiwal was 1000L and 870L respectively. Total input cost of the year 2014-15 was Rs 182825 and total return was Rs 253300. Net return of the year 2014-15 was Rs 94475. BC ratio was calculated and it was 1.38.

In the year, 2015-16, rice was cultivated with two different variety Arize6444 and BPT-5204 occupying 2 acre and 2.5 acre of land. Input cost of Arize6444 and BPT-5204 were Rs 31500 and Rs 30100 respectively. Yield rate were 22q/acre and 16q/acre for Arize6444 and BPT-5204 resepectively. Arize6444 and BPT-5204 had total yield of 44q and 40 q respectively. The return obtained by selling both the variety of rice was Rs 53100 and Rs 47600 and the return obtained by selling of straw was Rs 2350. In rabi, improved variety of wheat HD2967, was cultivated over 4.5 acre of land with input cost Rs 44325. This variety of wheat had good yield potential with yield rate 10.1 q/ace and total yield was 45.45 q.

Table.1											
Year 2014-15											
Season	Crop	Variety	Area (acre)/number	Input cost (Rs)	Yield rate	Yield	Return (Rs)	Gross cost	Gross Return	Net return	BC ratio
Khari	Rice	(BPT-5204)	6acre	82600.00	16 q/acre	96q	115200.00	182825.00	253300.00	94475.00	1.38
	Straw						4000.00				
Rabi	Wheat	UP-62	6acre	54700.00	8 q/acre	48	72000.00				
	Straw						6000				
Annual	Animal	Jersey cross	1	24000.00	4.0L/day for 250 days	1000 L	30,000.00				
		Sahiwal	1	21525.00	3.5L/day 250 days	870 L	26100.00				
Total				182825.00			253300.00				

Table.2											
Year 2015-16											
Season	Crop	Variety	Area (acre)/number	Input cost (Rs)	Yield rate	Yield	Return (Rs)	Gross cost	Gross Return	Net return	BC ratio
Khari	Rice	Arize6444	2	31500.00	22q/acre	44 q	53100.00	203282.16	331217.50	127935.34	1.63
		BPT-5204	2.5	30100.00	16q/acre	40 q	47600.00				
		Straw					2350.00				
Rabi	Wheat	HD-2967	4.5	44325.00	10.1 q/acre	45.45q	72720.00				
		Straw					12320.00				
Rabi	Vegetable	Cauliflower	0.5	23545.06	107.2 q/acre	53.6 q	32160.00				
		Potato	0.5	18642.1	97.50 q/acre	48.75 q	31687.50				
Annual	Animal	Jersey cross	1	23050.00	4.1 L/day for 280 days	1148 L	34440.00				
		Sahiwal	1	22050.00	3.8 L/day for 280 days	1064 L	31920.00				
		Calf/Heifer	1	1700.00							
		Fodder	0.5 acre	8370.00	160q/acre	80 q	12920.00				
Total				203282.16			331217.50				

Table.3

Year 20116-17											
Season	Crop	Variety	Area (acre)/number	Input cost (Rs)	Yield rate	Yield	Return (Rs)	Gross cost	Gross Return	Net return	BC ratio
Kharif	Rice	Arize6444	2	32500.00	22.5q/acre	45q	54000.00	244448.27	440584.35	196816.08	1.80
		BPT-5204	2.5	30400.00	16.2q/acre	40.4q	48480.00				
		Straw					1544.00				
Rabi	Wheat	HD-2967	4.5	43425.00	10.2 q/acre	45.9 q	73440.00				
		Straw					11300.00				
Kharif	Vegetable	Sponge gourd	0.5	10992.11	74.2 q/acre	37.1 q	17808.13				
		Snake gourd	0.5	11846.00	53.26 q/acre	26.63 q	31956.00				
Rabi	Vegetable	Cauliflower	0.5	23945.06	105.2 q/acre	52.6 q	41500.72				
		Potato	0.5	16842.1	97.34 q/acre	48.67 q	31635.5				
Annual	Animal	Jersey cross	2	44050.00	9.5L/day for 280 days	2660L	79800.00				
		Sahiwal	1	22080.00	4.5 L/day for 280 days	1260L	37800.00				
		Fodder	0.5 acre	8368.00	160q/acre	80 q	12000.00				
Total				244448.27			441264.35				

By selling of wheat and straw, return obtained were Rs 72720 and Rs 12320. In rabi season, an initiative was taken to adopt vegetable cultivation over one acre of land. In rabi vegetable, cauliflower was cultivated over 0.5 acre of land and potato was cultivated over 0.5 acre of land. Input cost of cauliflower and potato cultivation were Rs 23545.06 and Rs 18642.1. The yield rate of cauliflower and potato were 107.2 q/acre and 97.5 q/acre respectively. Total yield obtained from cauliflower and potato were 53.6 q and 48.75q respectively. By selling the produce of cauliflower and potato, total return obtained were Rs 32160 and Rs

31687.5. This year she adopted organised dairy with scientific nutritional management. Dairy animal Jersey cross and Sahiwal's lactation period was prolonged upto 280 days due to proper scientific management and their yield rate was 4.1L/day and 3.8L/day. The input cost of rearing of Jersey cross, Calf/Heifer (Jersey cross X Sahiwal) and Sahiwal were Rs 23050, Rs 1700 and Rs 22050 respectively. Total milk yield obtained from Jersey cross and Sahiwal was 1148L and 1064L respectively. Total return obtained by selling of milk from one Jersey cross and one Sahiwal were Rs 34440 and Rs 31920

respectively. In the rest of 0.5 acre of land, fodder production was adopted round the year. The input cost of fodder cultivation was Rs 8370 and the yield of fodder was 80q in 0.5 acre of land. Out of 80 q she kept 48q fodder for feeding her own dairy animal. Rest of 32 q fodder was sold and return obtained was Rs 12920. Total input cost of the year 2015-16 was Rs 203282.16 and total return was Rs 331217.5. Net return of the year 2015-16 was Rs 127935.34. BC ratio was calculated and it was 1.63.

In the year 2016-17, in kharif season rice cultivation was same as previous year i.e. rice was cultivated with two different variety Arize6444 and BPT-5204 occupying 2 acre and 2.5 acre of land. Input cost of Arize6444 and BPT-5204 were Rs 32500 and Rs 30400 respectively. Yield rate were 22.5 q/acre and 16.2 q/acre for UP6444 and BPT-5204 respectively. Arize6444 and BPT-5204 had total yield of 45q and 40.4q respectively. The return obtained by selling both the variety of rice was Rs 54000 and Rs 48480 and the return obtained by selling of straw was Rs 1544. Like previous year, in rabi improved variety of wheat HD2967, was cultivated over 4.5 acre of land with input cost Rs 43425. This variety of wheat had good yield potential with yield rate 10.2 q/acre and total yield was 45.9 q. By selling of wheat and straw, return obtained were Rs 73440 and Rs 11300. In one acre of land (which was kept for vegetable cultivation), was used for vegetable cultivation in both the rabi and kharif season. In rabi cauliflower and potato were cultivated over 0.5 acre and 0.5 acre of land while in kharif sponge gourd and snake gourd were cultivated over 0.5 acre and 0.5 acre of land respectively. Input cost of cauliflower and potato cultivation were Rs 23945.06 and Rs 16842.1. The yield rate of cauliflower and potato were 105.2 q/acre and 97.34 q/acre respectively. Total yield obtained from

cauliflower and potato were 52.6 q and 48.67q respectively. By selling the produce of cauliflower and potato, total return obtained were Rs 41500.72 and Rs 31635.5. For sponge gourd and snake gourd, Input cost of cultivation were Rs 10992.11 and Rs 11846. The yield rate of sponge gourd and snake gourd were 74.2 q/acre and 53.26 q/acre respectively. Total yield obtained from sponge gourd and snake gourd were 37.1 q and 26.63 q respectively. By selling the produce of sponge gourd and snake gourd, total return obtained were Rs 17808.13 and Rs 31956. The input cost of rearing of two Jersey cross and one Sahiwal were Rs 44050 and Rs 22080 respectively. Total milk yield obtained from two Jersey cross and one Sahiwal were 2660L and 1260L respectively. Total return obtained by selling of milk from one Jersey cross and one Sahiwal were Rs 79800 and Rs 37800 respectively. In the rest of 0.5 acre of land, fodder production was adopted round the year. The input cost of fodder cultivation was Rs 8368 and the yield of fodder was 80q in 0.5 acre of land. Out of 80 q she kept 50q fodder for feeding her own dairy animal. Rest of 30q fodder was sold and return obtained was Rs 12000. Total input cost of the year 2016-17 was Rs 244448.27 and total return was Rs 441264.35. Net return of the year 2016-17 was Rs 196816.08. BC ratio was calculated and it was 1.80.

Zhang *et al.*, (2007) grew multiple crop as a polyculture and showed the success of diversified farming. Using fruits, vegetables and other exportable crop gives high return and are good example of diversification led growth of Indian agriculture (Joshi *et al.*, 2007). On the basis of available estimates, mixed cropping and livestock together meet the 50% of world's cereal demand, 60% of world's meat demand and 75% of world's dairy production (Herrero *et al.*, 2010).

According to some researcher, diversification is a risk management practice but it was disproved by Jha *et al.*, (2009). All these result are in support of the findings of this investigation.

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