

Improved Farm Plans for Marginal Farmers in Punjab State

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Paper no: 120 **Received:** 19 January, 2014 **Revised:** 10 February, 2014 **Accepted:** 25 March, 2014

Abstract

Punjab is an agriculturally developed state of India. The production pattern of marginal farmers is dominated by paddy-wheat rotation. The agricultural productivity has nearly stagnated and consistent rise in cost of production is resulting in to squeeze profit margin. There is low investment and thus low production on marginal farms. The present study showed that the marginal farmers suffered from lack of various resources in farm production. Capital was though one of the big constraints on these farms. Due to small size of holding, farmers were sharing their assets with others farmers and supplemented their income by doing agricultural labour, rearing milch animal etc. This paper examines that income from crop production can be raised by organizing their resources optimally. Thus, there is an urgent need to introduce new high yielding crop and other alternatives on the marginal farms.

Keywords: Marginal farmers, Income from crop production and milch animals, production, capital and resources

Agriculture is mainstay of the vast majority of rural population in India. About 65 per cent of population is still dependent on agriculture for their livelihood and employment. Marginal and small farmers accounted for nearly 83 per cent of the total operational holdings in the country, cultivating 44 percent of the net cultivated area in India during 2009-10 (Anonymous, 2011). The rapid increase in population and subdivision of land holdings on account of change in family system from joint to nuclear families have reduced the size of operational holding over time. This section of the farming community is embroiled in the vicious cycle of low saving, even dis-saving, low investments, low returns etc. The major problems of these farmers are surplus family labour and uneconomic size of farm holdings, which keep these people below poverty line (Pandey and Kaushal, 1980).

Punjab is an agriculturally developed state of India. The production pattern of farmers is dominated by paddy-wheat rotation. Mono-culture of this crop rotation over time has resulted into serious economic and ecological crisis. The agricultural productivity has nearly stagnated and consistent rise in cost of production is resulting in to squeeze profit margin (Singh and Kolar 2001). There is low investment and thus low production on marginal farms. Cost of cultivation on small farms is high due to more use of hired machinery and increasing transportation costs as compared to large farms. These farmers are

leasing out their land to other farm size groups as the crop raising is becoming other farm size group as the crop raising is becoming less remunerative. There was hardly any scope left for improving their income from the tiny holdings they have (Kaur *et al*, 2001). These farmers supplemented their income by doing agricultural labour rearing milch animal, and, so on (Asokan and Singh 2001).

To ameliorate the problems of these farmers, the various suggested options include corporatization of farming, diversification of agriculture, introduction of new generation cooperatives, contract farming, etc. (Singh, 2000). The adoption of dairy enterprise can raise the income levels of these farmers. The growth in dairy income was more perceptible. The share of dairy in farm business income improved from 43.4 per cent during 1987-90 to 54.6 per cent during 2000- 03 on marginal farms (Sidhu and Bhullar, 2004). It has also been conveyed that optimum combination of dairying along with existing cereal based production system has the potential to enhance the income of farmers (Kaur, 2001). This indicated that there exists a scope to increase the income level of farmers by organizing their resources optimally. The present paper has been conducted to explore the possibilities of increasing farm income by working out alternative plans for the marginal farmers keeping in view the resource constraints.

Materials and Methods

The study was conducted in Punjab state. Three stage stratified random sampling procedure was used for the selection of study sample. The whole state was divided into three homogeneous zones (Zone-I, Zone-II and Zone-III) based on concentration of marginal farmers in each district. The Zone-I included four districts of Hoshiarpur, Mohali, Gurdaspur and Roopnagar, Zone-II included the districts of Amritsar, Kapurthala, Ludhiana, Tarantaran, Nawanshahar and Fatehgarh and Zone-III covered nine districts of Faridkot, Muktsar, Bathinda, Patiala, Moga, Jalandhar, Sangrur, Ferozepur and Mansa. A total of twenty tehsils was selected as first stage sampling unit. These tehsils was allocated among the three zones with probability proportion to the number of marginal farmers in each zone. One village was selected randomly from each tehsil to obtain the second stage sampling unit. Again, sixteen farmers were randomly selected from each Village at the third and the ultimate stage sampling units. Thus, we have total sample of 160 farmers. The information collected pertained to the year 2009-10 for the analysis of data. Simple statistical tools such as averages, percentages, etc. were used to find out the availability of resources on the marginal farms and the profit maximizing model of linear programming was used to develop optimum plan for the marginal farmers.

Maximize

$$z = \sum_{j=1}^n P_j x_j \quad j = 1, 2, \dots, n$$

subject to

$$\sum a_{ij} x_j \leq b_i \quad i = 1, 2, \dots, m$$

and

$$x_j \geq 0 \text{ for all } j$$

where

Z = Total gross margins

p_j = Gross margins per unit of the j^{th} activity

x_j = Level of j^{th} activity

a_{ij} = Input of the i^{th} resource per unit of the j^{th} activity

b_i = Availability of i^{th} resource

n = Number of real activities

m = Number of resource constraints

$x_j \geq 0$ indicate non-negativity restriction for the j^{th} activity.

The improved plans for the marginal farms were developed by using linear programming. In Plan-I, the resources available with the farmer were re-allocated among the various alternative activities already being considered by the farmer at the existing level of technology in order to find out the rationale of the farmers in allocation of resources. In Plan-II, the various resource constraints, *viz.*, human labour, tractor and working capital were relaxed to find out the increase in income by employing additional resources if needed. In Plan-III, the new crop activities feasible in the relevant zone were also introduced along with relaxation of the resource constraints in order to find out the extent to which the returns can be increased on the marginal farms in different zones of Punjab. Resource constraints were discussed below in brief:

1. **Land:** It was found to be one of the most limiting resources on these farms and defined as the operational area which included owned land plus leased-in land minus leased out land.
2. **Human labour:** To calculate availability of human labour on the marginal farms, family labour and attached farm labour available on the farm were taken into consideration. Assuming that a person available, on an average, works for 25 days in a month and 8 hours a day, the availability of human labour was worked out for the peak labour periods. And, keeping in view the cropping pattern followed in each zone, the peak labour periods were identified. These periods were: period-I (13th of April to Mid May), period-II (Mid June to Mid July) and period-III (Mid October to End November).
3. **Tractor:** A very few farmers had their own tractor while most of the marginal farmers arranged tractor on custom hiring basis to get their work done timely. This resource was, therefore, taken as a constraint for the development of optimal plan.
4. **Irrigation:** The availability of irrigation was found to be scarce on the sample farms. The farmers either did not have any source of irrigation or the source of irrigation owned by the farmer was shared with the other farmers. The irrigation resource with the farmers proved to be insufficient, particularly, in the months of June, July and August when paddy and other kharif crops required more water for irrigation.
5. **Working capital:** The working capital was required to produce the crop and dairy activities

raised at the farm. It was another important resource identified as constraint on all the farms. To find out credit requirements of the marginal and the small farmers, a capital borrowing activity was introduced in the linear programming model.

Maximum limit on production of animals: The marginal farmers did not have sufficient capital in order to keep large number of milch animals. Keeping this in view, a maximum restriction on number of milch animals to be raised at the farm was imposed in optimum plan depending upon the resource availability and risk bearing ability of the farmers as opined by them.

Results and Discussion

Basics Features of the Sample Households

The basic features of the sample households included information on the family size of the sample farmers, distribution of the marginal farmers by age and education in the various zones of the Punjab. The information pertained to the year 2009-10.

Type of family

The perusal of Table 1 showed that the number of nuclear families surpassed the number of joint families in all the three zones. Out of the total sample, 81.25 per cent were having nuclear family and remaining 18.75 per cent were joint family. The zone-wise analysis brought out that nuclear type of families were highest in Zone-I (85.71 per cent) and the number of joint families was highest in Zone-III (23.21 per cent). The table further showed that the average size of nuclear family was 4.01 and that of the joint type of family was 7.32 in the sample marginal farm households. The size of nuclear family of marginal farmers ranged between 3.79 and 4.13 and that of joint family ranged between 6.88 and 7.55 in the three zones.

Table 1: Distribution of Sample Farmers by Type of Family and Family Size, Punjab

Particulars /Zone	(Number)			
	I	II	III	All Zones
Type of Family				
Nuclear	48 (85.71)	39 (81.25)	43 (76.79)	130 (81.25)
Joint	8 (14.29)	9 (18.75)	13 (23.21)	30 (18.75)
Total	56 (100.0)	48 (100.0)	56 (100.0)	160 (100.0)
Family Size				
Nuclear	4.13	3.79	4.12	4.01
Joint	6.88	7.55	7.54	7.32
Overall Average	5.51	5.67	5.83	5.67

Note: Figures in parentheses are percentages of total

Education status

Education is an important parameter which plays a vital role in decision making. It may be observed from the Table 2 that about 35.00 per cent each of the farmers in the sample were illiterate. There were 41.88 per cent of marginal farmers having education up to matric level while those having above matric

qualifications were 23.75 per cent. The per cent of marginal farmers with above matric qualifications were found to be 37.50 per cent each in Zone-II which was higher than that of Zone-I and Zone-III.

Table 2: Distribution of Sample Farmers by Level of Education, Punjab

Particulars /Zone	(Number)			
	I	II	III	All Zones
Illiterate	20(35.72)	15(31.25)	20(35.71)	55(34.37)
Up to matric	22(39.28)	15(31.25)	30(53.57)	67(41.88)
Above matric	14(25.0)	18(37.50)	6(10.71)	38(23.75)
Total	56(100.0)	48(100.0)	56(100.0)	160(100.0)

Note: Figures in parentheses are percentages of total

Operational area

The results presented in Table 3 showed that the average operational area of marginal farmers in Zone-I at 0.56 hectare turned out to be smaller than that of Zone-II (0.64 hectare) and Zone-III 0.69 hectares. And, the area leased in by marginal farmers of Zone-II was relatively higher than that leased in by other two zones. The average area leased in by marginal farmers was estimated at 0.08 hectares.

Table 3: Holding Size of Sample Marginal and Small Farms, Punjab

Particulars /Zone	(Hectares)			
	I	II	III	Overall average
Owned land	0.50(89.28)	0.55(85.94)	0.61(88.41)	0.55(87.30)
Leased in land	0.06(10.72)	0.09(14.06)	0.08(11.59)	0.08(12.70)
Leased out	-	-	-	-
Operational area	0.56	0.64	0.69	0.63

Note: Figures in parentheses are percentages of total

Resource availability

The average number of different resources has been displayed in Table 4 that both male and female human labour were available to perform different operations related to crop and dairy farming. On an average, there were 1.01 persons available on marginal farm for crop production and 0.39 persons available for dairy production. The zone-wise analysis indicated that the availability of human labour on marginal farms in Zone-III for both crop and dairy production was maximum compared to that in Zone-I and Zone-II. On an average, number of owned tractor was 0.20 on the marginal farmers in Punjab. The marginal farmers owning tractor was 0.27 per cent in Zone-II compared to 0.23 and 0.10 in Zone-III and Zone-I, respectively. The average number of electric motor available with marginal farmers in Punjab was 0.51 and 0.88, respectively. The number was highest at 0.60 in Zone-II followed by 0.55 in Zone-III and 0.38 in Zone-I on the marginal farms.

Table 4: Average Availability of Resources on Marginal farms, Punjab, 2009-10

Particulars /Zone	I	II	III	Overall average
Human labour (Crop production)	0.96	0.99	1.07	1.01
Human labour (Dairy production)	0.38	0.25	0.56	0.39
Electric motor	0.38	0.60	0.55	0.51
Tractor	0.10	0.27	0.23	0.20

Farm plans for marginal farmers in Zone-I

The Table 5 revealed that the farmers of this zone were raising paddy, sugarcane and maize during kharif season and only wheat in rabi season besides fodder crops in the existing farm plan. There was a small increase in area under paddy, wheat, kharif and rabi fodder and decline in area under sugarcane and maize crops. The area under sugarcane and maize declined in this plan but area under kharif and rabi fodder increased from the existing level. Also, it was found that buffaloes and local cows raised in the existing plan did not appear in Plan-I perhaps due to lower profitability. However, it included only crossbred cows to be raised for milk production.

It was further revealed that in Plan-II, area under paddy increased while area under maize and sugarcane disappeared totally. Area under fodder crops increased due to increase in the number of milch animals from 1.61 in the existing plan to 2 in plan-II. During rabi season, wheat emerged as a single major crop with 78.57 per cent of the operational area.

Only summer moong entered in the cropping pattern during pre-kharif season in Plan-III. Area under paddy showed a slight decrease from Plan-II. The kharif and rabi fodder occupied almost the same area as it was in Plan-II. Local cow or buffaloes did not enter. The number of cross-bred cows was restricted to 2.00 due to maximum restriction imposed on number of animals in this plan.

Table 5: Enterprise-mix in Different Plans on Marginal Farms in Zone-I, Punjab

(Ha)

Crop/animal	Existing plan	Plan-I	Plan-II	Plan-III
Paddy	0.17 (30.36)	0.19 (33.93)	0.41 (73.22)	0.40 (71.42)
Sugarcane*	0.10 (17.86)	0.05 (8.93)	0.00 (0.00)	0.00 (0.00)
Maize	0.23 (41.07)	0.20 (35.71)	0.00 (0.00)	0.00 (0.00)
Kharif fodder	0.04 (7.14)	0.10 (17.86)	0.13 (23.21)	0.14 (25.00)
Summer moong	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.40 (71.43)
Wheat	0.40 (71.43)	0.41 (73.22)	0.44 (78.57)	0.44 (78.57)
Rabi fodder	0.04 (7.14)	0.08 (14.28)	0.10 (17.86)	0.10 (17.86)
Buffaloes	1.29 (80.12)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Local cows	0.04 (2.48)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Crossbred cows	0.28 (17.39)	1.57 (100.0)	2.00 (100.0)	2.00 (100.0)
Total animals	1.61 (100.00)	1.57 (100.0)	2.00 (100.0)	2.00 (100.0)

Figures in parentheses are percentages of operational area/total number of milch animals

*Sugarcane covers area both during kharif and rabi season

Farm plans for marginal farmers in Zone-II

The perusal of Table 6 shows that the farmers in Zone-II were raising paddy during kharif and wheat during rabi besides fodder in both the seasons in the existing farm plan. There was no change in cropping pattern in Plan-I except that area under basmati in the existing plan was replaced by kharif fodder. Also, it was found that buffaloes and local cows were totally replaced by the cross-bred cows in this plan.

Further, the results revealed that the area under paddy and wheat decreased due to minor changes in area under kharif and rabi fodder. The number of milch animals increased from 2.40 in the existing plan to 3 in Plan-II. It was found that buffaloes and local cows were totally eliminated in Plan-II.

In plan-III, summer moong was introduced in the crop plan and potato found place in rabi season but the area under both paddy and wheat decreased. This may be attributed to higher area occupied by kharif and rabi fodder as the number of milch animals increased to 3.00 in this Plan from 2.40 in the existing plan.

Table 6: Enterprise-mix in Different Plans on Marginal Farms in Zone-II, Punjab

(Ha)

Crop/animal	Existing plan	Plan-I	Plan-II	Plan-III
Paddy	0.53 (82.81)	0.53 (82.81)	0.51 (79.69)	0.40 (62.50)
Basmati	0.01 (1.56)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Kharif fodder	0.07 (10.94)	0.08 (12.50)	0.10 (15.62)	0.21 (32.81)
Summer moong	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.40 (62.50)
Wheat	0.54 (84.38)	0.54 (84.38)	0.53 (82.81)	0.40 (62.50)
Potato	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.05 (7.81)
Rabi fodder	0.07 (10.94)	0.07 (10.94)	0.09 (14.06)	0.16 (25.00)
Buffaloes	1.90 (79.17)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Local cows	0.05 (2.08)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Crossbred cows	0.45 (18.75)	2.34 (100.0)	3.00 (100.0)	3.00 (100.0)
Total animals	2.40 (100.00)	2.34 (100.0)	3.00 (100.0)	3.00 (100.0)

Figures in parentheses are percentages of operational area/total number of milch animals

Farm plans for marginal farmers in Zone-III

The Table 7 shows that area under paddy, wheat and fodder crops increased due to elimination of basmati crop and small reduction in area under cotton. In Plan-I included only cross-bred cows while existing plan included buffaloes and local cows as well.

In Plan-II, the area under paddy remained same as Plan-I while area under basmati and cotton were eliminated totally. Area under fodder crops increased due to increase in the number of milch animals.

When all the resource constraints were relaxed and new activities were introduced in Plan-III, summer moong was introduced in the cropping pattern during pre-kharif season. The area under paddy and wheat decreased in comparison to existing plan. The kharif and rabi fodder occupied 30.43 and 23.19 per cent of the operational area due to higher feed requirements of cross-bred cows. The number of cross-bred cows increased to 3.00 in third plan.

Table 7: Enterprise-mix in Different Plans on Marginal Farms in Zone-III, Punjab

(Ha)

Crop/animal	Existing plan	Plan-I	Plan-II	Plan-III
Paddy	0.55 (79.71)	0.57 (82.61)	0.57 (82.61)	0.47 (68.11)
Basmati	0.02 (2.90)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Cotton	0.05 (7.25)	0.04 (5.80)	0.00 (0.00)	0.00 (0.00)
Kharif fodder	0.06 (8.70)	0.07 (10.14)	0.11 (15.94)	0.21 (30.43)
Sumer moong	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.42 (60.86)
Wheat	0.62 (89.86)	0.64 (92.75)	0.61 (88.41)	0.52 (75.36)
Rabi fodder	0.06 (8.70)	0.04 (5.80)	0.07 (10.14)	0.16 (23.19)
Buffaloes	1.70 (81.34)	0.00 (0.00)	1.00 (33.33)	0.00 (0.00)
Local cows	0.18 (8.61)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Crossbred cows	0.21 (10.05)	1.90 (100.0)	2.00 (66.67)	3.00 (100.0)
Total animals	2.09 (100.00)	1.90 (100.0)	3.00 (100.0)	3.00 (100.0)

Figures in parentheses are percentages of operational area/total number of milch animals

Resource use in Zone-I

It was observed from Table 8 that in Zone-I, there was a decline in the use of human labour, electric motor and tractor in the crop production as area under labour intensive crops, viz., sugarcane and maize declined in Plan-I. In Plan-II, human labour and tractor use declined in comparison to that in existing plan. But the use of electric motor for irrigation and human labour in dairy production increased by 32.26 and 27.39 per cent, respectively. In Plan-III, human labour use increased due to the fact that the human labour requirements for the new activity of cross-bred cows introduced in Plan-III were relatively higher. The higher use of electric motor may be attributed to increased area under paddy in Plan-II, and introduction of paddy and summer moong with changed coefficients in Plan-III. The decline in tractor use in Plan-I and Plan-II compared to that in the existing plan may be due to decline in area under sugarcane and maize.

Table 8: Resource Use in Existing and Improved Plans on Marginal Farms in Zone-I, Punjab

(Hours/Farm)

Particulars	Existing plan	Plan-I	Plan-II	Plan-III
Human labour (Crop production)	277.25	208.17(-24.92)	212.99(-23.18)	184.44(33.48)
Human labour (Dairy production)	507.59	507.59(0.00)	646.61(27.39)	805.37(58.67)
Electric motor	56.11	48.76(-13.10)	74.27(32.36)	59.3(5.69)
Tractor	14.39	11.15(-22.52)	8.82(-38.71)	14.08(-2.15)

Note: Figures in parentheses indicate per cent change in improved plan over existing plan

Resource use in Zone-II

The results presented in Table 9 highlighted that the human labour use in crop production declined in Plan-I, Plan-II and Plan-III as compared to that in the existing plan. In dairy production, use of human labour remained same in Plan-I as in existing plan but increased in Plan-II and Plan-III, respectively, may be due to increase in the number of milch animals. The electric motor use for irrigation declined in

Plan-I, Plan-II and Plan-III. The tractor use also declined in Plan-I and Plan-II but increased in Plan-III due to introduction of summer moong in Plan-III. The use of human labour, and electric motor declined sharply owing to the change in cropping pattern in Zone-II.

Table 9: Resource Use in Existing and Improved Plans on Marginal Farms in Zone-II, Punjab

(Hours/Farm)

Particulars	Existing plan	Plan-I	Plan-II	Plan-III
Human labour (Crop production)	326.05	274.40(-15.48)	263.49(-19.19)	249.89(-23.36)
Human labour (Dairy production)	778.69	778.69(0.00)	1169.30(50.16)	1048.81(34.69)
Electric motor	102.74	94.83(-7.70)	91.49(-10.95)	71.99(-29.93)
Tractor	11.49	10.78(-6.18)	10.58(-7.92)	18.21(58.49)

Note: Figures in parentheses indicate per cent change in improved plan over existing plan

Resource use in Zone-III

Resource use in existing and improved plan in Zone-III presented in Table 10 that in this zone, the human labour use for crop production declined in all plan, may be due to reduction or elimination of area under labour intensive crops *viz.*, cotton and basmati in these plans. The human labour use in dairy production remained same in Plan-I but increased in other two plan due to increase in number of milch animals and, relatively higher human labour requirements of the animal activity introduced in Plan-III. The use of electric motor for irrigation declined in all plan due to decrease in area under paddy in Plan-III. The use of tractor also declined by 5.11 and 10.74 per cent in Plan-I and Plan-II, respectively but increased in Plan-III by 48.94 per cent due to introduction of summer moong crop in Plan-III.

Table 10: Resource Use in Existing and Improved Plans on Marginal Farms in Zone-III, Punjab

(Hours/Farm)

Particulars	Existing plan	Plan-I	Plan-II	Plan-III
Human labour (Crop production)	372.39	330.23(-11.32)	295.85(-20.55)	272.83(-26.74)
Human labour (Dairy production)	620.46	620.46(0.00)	974.58(57.07)	1259.22(102.95)
Electric motor	104.87	100.39(-4.27)	102.21(-2.54)	84.68(-19.25)
Tractor	13.69	12.99(-5.11)	12.22(-10.74)	20.39(48.94)

Note: Figures in parentheses indicate per cent change in improved plan over existing plan

Returns and variable costs of Zone-I

It was observed from the Table 11 that in Zone-I, when all the resources were re-allocated without relaxing any resource constraint, gross returns reduced in Plan-I. However, the gross returns in Plan-II and Plan-III increased by 22.60 per cent and 56.70 per cent compared to those from the existing farm plan. The variable costs declined in Plan-I, Plan-II and Plan-III compared to that in the existing plan. The decline in gross returns in Plan-I was only marginal but savings because of lower use of human labour, electric motor and tractor were worth consideration. The returns over variable costs increased by 1.39 per cent in Plan-I, 19.18 percent in Plan-II and 76.45 per cent in Plan-III in comparison to that in existing plan. This may be attributed to increase in area under paddy in Plan-II and III and area under new crop summer moong in plan-III.

Table 11: Returns and Variable Costs in Different Plans on Marginal Farms in Zone-I, Punjab

(₹/ Farm)

Particulars	Existing plan	Plan-I	Plan-II	Plan-III
Gross returns	97373.13	92052.40(-5.46)	119383.84(22.60)	152587.77(56.70)
Variable cost	42998.58	36924.02(-14.13)	54579.57(26.93)	56641.22(31.73)
Returns over variable costs	54374.55	55128.38(1.39)	64804.27(19.18)	95946.55(76.45)

Note: Figures in parentheses indicate per cent change in improved plan over existing plan

Returns and variable costs of Zone-II

Returns and variable costs are shown in Table 12 that in Zone-II, gross returns were found to be almost same in the existing plan and Plan-I. And in Plan-II and Plan-III, there was an increase in returns. The variable cost reduced by 1.79 per cent in Plan-I and increased in Plan-II and Plan-III, respectively. The increase in variable cost in Plan-III may be due to introduction of potato, summer moong and higher area under fodder crops. The returns over variable costs increased in Plan-II and Plan-III over the existing level. This, may again, be attributed to increased number of milch animals in Plan-II along with change in cropping pattern in Plan-III.

Table 12: Returns and Variable Costs in Different Plans on Marginal Farms in Zone-II, Punjab

(/ Farm)

Particulars	Existing plan	Plan-I	Plan-II	Plan-III
Gross returns	137155.38	136375.24(-0.57)	146932.08(7.13)	215759.65(57.31)
Variable cost	52781.56	51834.60(-1.79)	54543.20(3.34)	95726.85(81.36)
Returns over variable costs	84373.82	84540.64(0.20)	92388.88(9.50)	120032.80(42.26)

Note: Figures in parentheses indicate per cent change in improved plan over existing plan

Returns and variable costs of Zone-III

It was observed from Table 13 that in Zone-III, gross returns increased in Plan-II and Plan-III compared to that in the existing plan. The variable costs rose in Plan-II and Plan-III. The returns over variable costs increased in Plan-II and Plan-III. The relatively higher gross returns, variable costs and returns over variable costs in Plan-III for the marginal farmers in Zone-II can be attributed to relatively higher number of milch animals and introduction of summer moong in Plan-III. There was no change observed in the returns obtained and variable costs in Plan-I compared to that with the existing plan.

Table 13: Returns and Variable Costs in Different Plans on Marginal Farms in Zone-III, Punjab

(/ Farm)

Particulars	Existing plan	Plan-I	Plan-II	Plan-III
Gross returns	129744.73	129656.70(-0.07)	147034.27(13.22)	223165.76(72.00)
Variable cost	47723.03	47492.80(-0.48)	51208.00(7.30)	95290.46(99.67)
Returns over variable costs	82021.70	82163.90(0.17)	95826.27(16.83)	127875.30(55.90)

Note: Figures in parentheses indicate per cent change in improved plan over existing plan

Conclusion

The results of this paper revealed that marginal farmer is an important section of the farming community struggling hard for its survival. It was found that marginal farmers were resource poor. Due to relatively small size of operational holding, the farmers were sharing their capital assets with the other farmers and, for the timely agricultural operations, arranged to get it done on custom hire basis at the prevailing market rates in the villages. In order to improve the economic condition of marginal farmers, irrigation facilities to these farmers should be provided through government tube wells at lower tariff. Capital was though one of the big constraints on the marginal farms, the credit facilities were not being availed by many farmers. Income from crop production can be raised by using more of purchased inputs like fertilizers and insecticides on these farms. Hence, there was a need to ensure credit facilities to the poor farmers. There is an urgent need to introduce new high yielding crop and other alternatives on the marginal farms in order to harvest the full benefits of whatever scarce resources they have their own farms. It is evident from the above discussion that there exists ample scope for increasing the income of the marginal farmers in the Punjab state.

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