Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(3): 180-185
Received: 27-03-2018
Accepted: 28-04-2018

Mudasir Iqbal
Ph.D. Scholar, Division of Agricultural Economics and Statistics, SKUAST-Jammu, Jammu and Kashmir, India

Jyoti Kachroo
Professor, Division of Agricultural Economics and Statistics, SKUAST-Jammu, Jammu and Kashmir, India

Huma Sehar
Ph.D. Scholar, Division of Agricultural Economics and Statistics, SKUAST-Jammu, Jammu and Kashmir, India

Dileep Kachroo
Professor and Head, Division of Agronomy and Chief Scientist, Farming System Research Centre, SKUAST-Jammu, Jammu and Kashmir, India

Correspondence
Mudasir Iqbal
Ph.D. Scholar, Division of Agricultural Economics and Statistics, SKUAST-Jammu, Jammu and Kashmir, India

Income and employment increasing potentiality in various farming systems of various zones of Jammu regions

Mudasir Iqbal, Jyoti Kachroo, Huma Sehar and Dileep Kachroo

Abstract
The present investigation was conducted in three agro-climatic zones namely temperate, intermediate and sub-tropical zones of Jammu region during the year 2011. The optimal plan allocation indicated the shift of land from cereals to other enterprises. The optimal plan allocation resulted in the increase in the income as well as employment of the family in all the farming systems of all the zones. By the optimal plan income of the farmers can be increased by 184, 340 and 165 percent for cereal based farming system and 23, 222 and 134 for livestock based farming system in case of temperate, intermediate and sub-tropical zones, respectively. Similarly, by the optimal plan employment of the farmers can be increased by 197, 61 and 413 percent for cereal based farming system and 32, 104 and 160 for livestock based farming system in case of temperate, intermediate and sub-tropical zones, respectively. In case of fruit based farming system the optimal plan can result in 20 percent increase in the income of farmers and 12 percent increase in the employment.

Keywords: Farming system, income and employment, linear programming

Introduction
India, one of the largest emerging economies of the world accounts for some 2.4 percent of the world's landmass but is home to about 17.52 percent of the global population (Anonymous, 2011a) [2]. The Indian economy is predominantly agrarian and agriculture is a primary source of livelihood providing employment directly or indirectly to 58 percent of its population (Anonymous, 2012a) [1]. According to the recent census of India 2011, the population of the country has increased by more than 181 million during the first decade of the 21st century. Simultaneously the agricultural land is decreasing day by day due to the diversion of the agricultural land towards other sectors particularly the industry leading to the decline in per capita availability of land from 0.5 ha in 1950-51 to 0.15 ha by the turn of the century and a projected further decline to less than 0.1 ha by 2020. In the state of Jammu and Kashmir as well the agriculture occupies an important place in the economy. The share of agriculture and allied sectors in the Gross State Domestic Product stands at 28.61 percent. On the other hand nearly 70 percent of the population in the state derives its livelihood directly or indirectly from the agriculture sector (Anonymous, 2011b) [3]. Due to the rapid increase in the population and the decrease of agricultural land, no single farm enterprise is likely to be able to sustain the small and marginal farmers without resorting to integrated farming systems for the generation of adequate income and gainful employment year round (Mahapatra, 1994) [7]. Further, the resources should be optimally utilised so as to increase the productivity of the land which will result in the increase in the income of the farmers and increase their bargaining power. The agriculture in the state is mainly for the subsistence purposes which have resulted in the low productivity of the major crops of the state. The climate of the state is varied particularly Jammu region and this region falls under three agro-climatic zones as classified by NARP. Also this remains the major reason for the sub-optimal utilization of the land and other resources. Keeping in view the above facts, this study was taken so as to propose the optimum model for each agro-climatic zone of the region.

Materials and Methods
The present study was conducted in all the three agro-climatic zones of Jammu region of the state of Jammu and Kashmir (India) as per the NARP classification. Jammu division of the state as per NARP classification is divided into three agro-climatic zones namely subtropical zone, intermediate zone and temperate zone. A three stage random sampling was adopted for the selection of samples, with blocks as the first stage sampling unit, villages as the second stage sampling units and respondents as third stage sampling in all the three zones.

Four blocks from each zone were selected for the present study. Two villages from each block were selected randomly for the study. Then for each selected village, a list of farmers were prepared and farmers from each village were selected for the sample survey on the basis of proportional allocation so as to make the total sample size of 80 in each zone and overall total sample of 240 farmers. Linear programming technique was chosen because among the various analytical tools available for allocation of available limited farm resources among alternative enterprises, it was the most powerful and efficient tool of analysis.

The model is set up to maximize a sum of net value of production (net returns) of a set of cropping and non-cropping activities, subject to a number of constraints on resource endowments, food security needs, and other conditions faced by farmers in the study area. The problem is stated such that:

$$\text{MaxV} = \sum_{j=1}^{a} c_j x_j$$

Subject to resource constraints

$$b_i \leq \sum_{j=1}^{a} a_{ij} x_j$$

$$b_i \leq \sum_{j=1}^{a} a_{ij} x_j$$

$$b_i \leq \sum_{j=1}^{a} a_{ij} x_j$$

And non-negativity constraints

$X_i \ldots . x_n \geq 0$

Where:

V = Net returns from all crop activities included in the model

c_j = the per hectare net returns from the j^{th} activity

x_j = the level of j^{th} activity providing c_j returns per hectare.

B_i = the amount of the i^{th} resource available to the farmer for the activity x_j, where i=1...m, as well as the amount of own food production to be consumed, and

a_{ij} = the per hectare amount of the i^{th} resource required in j^{th} activity, also known as technical or input-output coefficients.

Resource Levels and Constraints

One of the most important components of the LP model is the identification of resource limitations (bj) in each Farming System. The total land owned by the farmer was taken as operational holding of the farmer as none of the farmers leased in any land. Whole land was classified as *Kharif* land and *Rabi* land. Family labour availability was estimated from the number of working family members. The restrictions with regard to family labour were imposed for both seasons, i.e. *Kharif* and *Rabi*. For the availability of capital in *Kharif* and *Rabi* season, the constraint was set as such that the cost C_1 in a particular season is to be fulfilled by the net returns from the previous season. The farming system wise average number of male, female and children were calculated and accordingly per family requirement for various food items were worked out as proposed by Jana, 2002. As per productivity of different enterprises in respective farming system, area/number required to be grown was estimated and it was imposed as minimum area restriction.

Results and Discussion

The existing and optimal plan for cereal based farming system in temperate zone of Jammu region and effect of optimal plan on the income and employment is given in table 1. It has been proposed that in the *kharif* season, the area of rice should be increased from the existing 0.13 ha to 0.31 ha, which is the minimum family requirement for the households. The model further suggests that the vegetables should be grown on an area of 0.62 ha as the vegetables fetches more income to the farmers in terms of net returns. However the proposed model suggests that maize should not be grown in the area as it was low income generating enterprise. In case of *rabi* season it was proposed that the wheat area which was predominant crop during the *rabi* season should be decreased from the existing 0.98 ha to 0.09 ha mainly because of the fact that it was low income generating and the minimal family requirement should only be cultivated. In *rabi* season also the vegetables were suggested to be increased from the existing 0.02 ha to 0.84 ha, as it is high income generating crop. The fodder area in *kharif* as well as *rabi* season should be 0.25 ha in order to feed the livestock whose number has been proposed as five. The number of poultry birds proposed to be reared on the farm was 20, which the maximum capacity of the respondents. The proposed model suggests the shifting of land from the cereal crops to other crops in both *kharif* and *rabi* seasons. Also observed that mixed farming with dairy had a positive effect on the income of the farmers of all the size groups which are in accordance to our results. The increase in income by the model was observed as `117.88 thousand over the `41.47 thousand as generated in the existing model. The increase in income was mainly from the vegetables and livestock thus highlighting the importance of simultaneous growing of crops and other enterprises. Such findings are in conformity with the results of Thakur *et al.* (1991) [11]. The employment also increased by the proposed model can help in the reduction of distressed employment of the farmers particularly the non-technical hands. The non-technical family members can work on the farms and also generate income. It was observed that on an average the family labour can be increased from 139.86 days to 415 days, thus giving year round employment to the family members. The suggested model can also help in the reduction of the migration of the family members for search of employment. The family labour requirement in the proposed model was maximum in case of livestock which can result in the increase in the female labour who do not generally work on the farms and thus female labour can be shifted towards the livestock while as, the men can work on the farms.

Table 2 presents the existing and proposed model for livestock based farming systems in temperate zone of Jammu division and the effect of the proposed model on the income and employment. The model also suggested that the land available after meeting the family requirements should be diverted from the cereal crops to the other enterprises which are in confirmation with the results Neelakanta Sastry (1993) [8], who also suggested the shifting of land from cereal crops to other enterprises. It was proposed that in *kharif* season the land for rice should be increased from 0.14 ha 0.35 ha which is required for family consumption, while as vegetables should be grown on 0.11 ha instead of 0.02 ha in the existing system. However, the model does not allow the cultivation of

maize mainly because of the low net income generated from the crop. In *rabi* season the maximum area was allotted to the vegetables because of their high income generating capacity. The wheat area was reduced to 0.10 ha from the existing 0.26 ha so as to minimise it only for family requirements. The fodder land for the livestock requirement was proposed as 0.10 ha in both the seasons for 3 animals. The number of poultry birds to be reared on the farm was increased from 7.04 in the existing model to 20 in the proposed model. The income generated from the existing model was `82.37 thousand which increased to `101.49 thousand in the proposed model. The increase in income was mainly because of the vegetable crops and livestock thus highlighting the importance of such crops in the farming system. The increase in the income of the family by the optimal plan allocation was also observed Goswami (1994) [6] hence confirming our results. The employment generation also increased to 205.80 man days in the proposed model from 156.39 days in the existing model. The increase in the employment was 19.36 man days from 7.47 days in case of rice, 8.23 man days from 1.25 man days in case of *Kharif* vegetables, 27.42 man days from 1.36 man days in *rabi* vegetables, 125.19 man days from 113.27 man days in livestock and 20 man days from 7.04 man days in case of poultry. The increase in employment in vegetables and livestock could help in the decrease in the distressed employment particularly of females who utilise most of their time in these activities.

The optimum and the existing plans of cereal based farming systems in intermediate zone of Jammu region and the effect of optimal plan on the income and family employment is presented in table 3. Wheat, vegetables and fodder crops in *kharif* season, maize vegetables and fodder were included in the plans, as these were the crops grown in the region. In addition to the crops, livestock and poultry enterprises were also included. The optimal plan suggested that land allocation should be 0.42 ha for wheat, 1.39 ha for kharif vegetables, and 1.81 ha for rabi vegetables along with four animals and 20 poultry birds. However in the existing plan the land allocation was 2.08 ha for wheat, 0.06 ha for kharif vegetables, 1.86 ha for maize and 0.10 ha for rabi vegetables with average of 0.72 animals and 4.85 poultry birds. Thus the optimal plan allocation resulted in the shifting of land from the cereal crops to vegetables along with fodder for the rearing of animals which are in accordance to the results of Fabusoron and Agbonlahor (2002) [5] who also proposed the reallocation of land and shifting of land from cereals to the other enterprises to increase the income of the family as well as the generation of more employment from the reallocation of land. The allocation of land for wheat was for meeting requirements of the family. The optimal plan allocation resulted in the increase in the family income from `24.93 thousand to `109.90 thousand. The major increase in the income was from the vegetables and livestock thus giving the importance of these enterprises in increasing the income of the family. Neelakanta Sastry (1993) [8] also observed rational use of existing technology enabled to realise higher net farm incomes compared to existing one hence confirming our findings. The family labour also increased from 281.01 man days in the existing plan to 452.22 man days in the optimum proposed plan. The optimum plan not only increased the family labour but also helped in its reallocation by shifting it from the cereals to the other enterprises thus increasing their productivity. It was observed that the family labour participation was decreased from 118.64 man days to 24.17 man days in wheat and shifting of the whole family labour from maize to the other enterprises. The increase in the family labour was 102.53 man days from 4.26 man days in kharif vegetables, 133.80 man days from 7.38 man days in rabi vegetables and 177.72 man days from 32.09 man days in livestock, thus can enhance the participation of more female labour in the agriculture. Alagumani and Anjugam (2000) [4] in their study on impact of dairy enterprises on income and employment in Madhurai district of Tamil Nadu also observed the increase in the employment with the optimal plan allocation thus confirming our results.

Table 4 presents the existing and proposed model for livestock based farming systems in intermediate zone of Jammu division and the effect of the proposed model on the income and employment. The model also suggested that the land available after meeting the family requirements should be diverted from the cereal crops to the fodder crops for feed to the livestock so as to obtain the maximum net returns. It was proposed that in *kharif* season the land for wheat should be decreased from 0.91 ha 0.41 ha which is required for family consumption, while as vegetables should be grown on 0.02 ha instead of 0.03 ha in the existing system so as to meet the requirements of the family. However, the model does not allow the cultivation of maize mainly because of the low net income generated from the crop. In *rabi* season the maximum area was allotted to the fodder so as to meet the feed requirements for the livestock because of their high income generating capacity. The vegetable area was reduced to 0.02 ha from the existing 0.04 ha so as to minimise it only for family requirements. The number of animals was proposed to be increased from 3.16 to 11 in the optimal plan. The number of poultry birds to be reared on the farm was increased from 6.29 in the existing model to 18 in the proposed model. The increase in income by the model was observed as `249.52 thousand over the `77.46 thousand as generated in the existing model. The increase in income was mainly from the livestock thus highlighting the importance of simultaneous growing of crops and livestock in the farming system. Such findings are in conformity with the results Shalander *et al*. (2006) [9] who also found that the income of the family can be increased by the optimal plans having combination of cereals and livestock. The family labour also increased from 235.75 man days in the existing plan to 481.08 man days in the optimum proposed plan. The optimum plan not only increased the family labour but also helped in its reallocation by shifting it from the cereals to the other enterprises thus increasing their productivity. It was observed that the family labour participation was decreased from 48.69 man days to 21.84 man days in wheat and shifting of the whole family labour from maize to the other enterprises. The increase in the family labour was 436.04 man days from 125.26 man days in livestock, which can enhance the participation of more female labour in the agriculture, as women can look after livestock thus increase their productivity.

The results of optimal and existing plans and their effect on the income and employment generation of fruit based farming systems in intermediate zone of Jammu region are presented in table 5. The optimal plan allocation proposed the shifting of land from cereal and fruits to vegetables mainly of their higher returns. The family requirements of cereals were not included in this model as such farmers were not growing such wheat and rice on their fields which are required by the family consumption. The optimal plan allocation proposed that the vegetables should be grown on an area of 6.91 ha in both kharif and rabi seasons while area allocated for fodder crops was 0.20 ha in both the seasons and for fruits the optimum

area was 10.89 ha. The number of animals proposed in the optimum model was increased to four from two in the existing plan. The optimal plan could result in the increase in income from `636.85 thousand to `765.15 thousand, however the increase in income was from vegetables and livestock. There was reduction in the income of farmers from fruits due to the suggested decrease in the area in fruit crops. The proposed model also resulted in the increase in the family labour employment from 2177.20 man days to 2439.87 man days. The increase in the family labour was mainly for the vegetables and livestock hence could also result in the decrease in the distressed female labour employment.

The existing and optimal plan for cereal based farming system in sub-tropical zone of Jammu region and effect of optimal plan on the income and employment is given in table 6. It has been proposed that in the *kharif* season, the area of rice should be increased from the existing 0.65 ha to 1.08 ha. In case of *rabi* season it was proposed that the wheat area which was predominant crop during the *rabi* season should be decreased from the existing 0.77 ha to 0.15 ha mainly because of the fact that it was low income generating and the minimal family requirement should only be cultivated. In *rabi* season mustard were suggested to be increased from the existing 0.03 ha to 0.93 ha. The fodder area in *kharif* as well as *rabi* season should be 0.20 ha in order to feed the livestock whose number has been proposed as four. The number of poultry birds proposed to be reared on the farm was 20, which the maximum capacity of the respondents. The proposed model suggests the shifting of land from the wheat to other crops in *rabi* season. Srinivasa *et al*. (2005) [10] also favoured the shifting of land from the subsistance crops to other enterprises which are in accordance to our results. The optimal plan allocation resulted in the increase in the family income from `13.88 thousand to `36.87 thousand. The major increase in the income was in rice, mustard and livestock thus giving the importance of these enterprises in increasing the income of the family. Shalander *et al*. (2006) [9] also found that the income of the family can be increased by the optimal plans having combination of cereals and livestock hence confirming our findings. The employment generation also increased to 284.90 man days in the proposed model from 55.49 days in the existing model. The increase in the employment was 39.73 man days from 17.97 days in case of rice, 18.27 man days from 0.65 man days in case of mustard, 206.40 man days from 6.62 man days in livestock and 19.80 man days from 6.04 man days in case of poultry. The increase in employment in vegetables and livestock could help in the decrease in the distressed employment particularly of females who utilise most of their time in these activities.

The optimum and the existing plans of cereal based farming systems in sub-tropical zone of Jammu region and the effect of optimal plan on the income and family employment is presented in table 7. Rice and fodder crops in *kharif* season, wheat, mustard and fodder in rabi were included in the plans, as these were the crops grown in the region. In addition to the crops, livestock and poultry enterprises were also included. The optimal plan suggested that land allocation should be 0.33 ha for rice during the kharif season, 0.33 ha for wheat during rabi season and 0.45 ha for fodder crops in both the seasons along with nine animals and 19 poultry birds. However in the existing plan the land allocation was 0.45 ha for rice, 0.57 ha for wheat, 0.05 ha for mustard with average of 3.12 animals and 6.93 poultry birds. Thus the optimal plan allocation resulted in the shifting of land from the cereal crops to fodder for the rearing of animals which are in accordance to the results of Vatta and Kumar (2000) [12] who aloso found that the dairy enterprise had significantly influenced the farming pattern of crops in the farms in Punjab and proposed shift of a large portion of the area under cereals towards fodder crops due to increased number of milch animals in the optimal plans. The income generated from the existing model was `41.59 thousand which increased to `97.27 thousand in the proposed model. The increase in income was mainly because of the livestock thus highlighting the importance of such enterprises in the farming system. The increase in the income of the family by the optimal plan allocation was also observed by Vatta and Kumar (2000) [12] hence confirming our results. It was observed that on an average the family labour can be increased from 198.42 man days to 516.29 man days, thus giving year round employment to the family members. The family labour requirement in the proposed model was maximum in case of livestock which can result in the increase in the female labour who do not generally work on the farms and thus female labour can be shifted towards the livestock while as, the men can work on the farms.

Table 1: Optimum plan for cereal based farming system in temperate zone of Jammu region and its effect on income and family employment

Enterprise	Area/No.		Income (` 000)		Family labour (Man days)	
	Proposed	Existing	Proposed	Existing	Proposed	Existing
Kharif						
Rice	0.31	0.13	5.11	2.06	18.97	7.65
Vegetable	0.62	0.01	23.94	0.40	54.65	0.91
Fodder	0.25	0.00	0.00	0.00	2.50	0.00
Maize	0.00	1.03	0.00	15.52	0.00	53.04
Rabi						
Wheat	0.09	0.98	1.43	15.54	3.69	40.13
Vegetable	0.84	0.02	32.48	0.74	74.13	1.68
Fodder	0.25	0.00	0.00	0.00	2.50	0.00
Livestock	5.00	0.65	54.60	7.14	233.75	30.57
Poultry	20.00	4.70	0.32	0.08	25.00	5.88
Total			117.88	41.47	415.20	139.86

Table 2: Optimum plan for livestock based farming system in temperate zone of Jammu region and its effect on income and family employment

Enterprise	Area/No.		Income (` 000)		Family labour (Man days)	
	Proposed	Existing	Proposed	Existing	Proposed	Existing
Kharif						
Rice	0.35	0.14	5.39	2.08	19.36	7.47
Maize	0.00	0.34	0.00	3.73	0.00	16.16
Vegetable	0.11	0.02	3.43	0.52	8.23	1.25
Fodder	0.10	0.00	0.00	0.00	0.90	0.00
Rabi						
Wheat	0.10	0.26	0.99	2.57	3.80	9.85
Vegetable	0.36	0.02	10.95	0.54	27.42	1.36
Fodder	0.10	0.00	0.00	0.00	0.90	0.00
Livestock	3.00	2.71	80.46	72.80	125.19	113.27
Poultry	20.00	7.04	0.26	0.09	20.00	7.04
Total			101.49	82.34	205.80	156.39

Table 3: Optimum plan for cereal based farming system in intermediate zone of Jammu region and its effect on income and family employment

Enterprise	Area/No.		Income (` 000)		Family labour (Man days)	
	Proposed	Existing	Proposed	Existing	Proposed	Existing
Kharif						
Wheat	0.42	2.08	1.19	5.83	24.17	118.64
Vegetable	1.39	0.06	25.65	1.07	102.53	4.26
Fodder	0.20	0.00	0.00	0.00	2.00	0.00
Rabi						
Maize	0.00	1.86	0.00	7.00	0.00	116.22
Vegetable	1.81	0.10	33.47	1.85	133.80	7.38
Fodder	0.20	0.00	0.00	0.00	2.00	0.00
Livestock	4.00	0.72	45.80	8.27	177.72	32.09
Poultry	20.00	4.85	3.80	0.92	10.00	2.43
Total			109.90	24.93	452.22	281.01

Table 4: Optimum plan for livestock based farming system in intermediate zone of Jammu region and its effect on income and family employment

Enterprise	Area/No.		Income (` 000)		Family labour (Man days)	
	Proposed	Existing	Proposed	Existing	Proposed	Existing
Kharif						
Wheat	0.41	0.91	1.24	2.77	21.84	48.69
Vegetable	0.02	0.03	0.43	0.55	1.73	2.20
Fodder	0.55	0.00	0.00	0.00	5.50	0.00
Rabi						
Maize	0.00	0.87	0.00	2.16	0.00	53.66
Vegetable	0.02	0.04	0.37	0.69	1.47	2.79
Fodder	0.55	0.00	0.00	0.00	5.50	0.00
Livestock	11.00	3.16	244.42	70.22	436.04	125.26
Poultry	18.00	6.29	3.06	1.07	9.00	3.15
Total			249.52	77.46	481.08	235.75

Table 5: Optimum plan for fruit based farming system in intermediate zone of Jammu region and its effect on income and family employment

Enterprise	Area/No.		Income (` 000)		Family labour (Man days)	
	Proposed	Existing	Proposed	Existing	Proposed	Existing
Kharif						
Maize	0.00	2.00	0.00	5.32	0.00	126.00
Vegetable	6.91	1.00	122.03	17.66	494.74	71.60
Fodder	0.20	0.00	0.00	0.00	2.00	0.00
Rabi						
Vegetable	6.91	1.00	122.03	17.66	494.74	71.60
Fodder	0.20	0.00	0.00	0.00	2.00	0.00
Fruit	10.89	15.00	382.57	526.95	1350.39	1860.00
Livestock	4.00	2.00	138.52	69.26	96.00	48.00
Poultry	0.00	0.00	0.00	0.00	0.00	0.00
Total			765.15	636.85	2439.87	2177.20

Table 6: Optimum plan for cereal based farming system in subtropical zone of Jammu region and its effect on income and family employment

Enterprise	Area/No.		Income (` 000)		Family labour (Man days)	
	Proposed	Existing	Proposed	Existing	Proposed	Existing
Kharif						
Rice	1.08	0.65	8.33	5.03	29.73	17.97
Fodder	0.20	0.00	0.00	0.00	3.00	0.00
Rabi						
Wheat	0.15	0.77	1.49	7.67	4.71	24.22
Mustard	0.93	0.03	9.69	0.35	18.27	0.65
Fodder	0.20	0.00	0.00	0.00	3.00	0.00
Livestock	4.00	0.13	16.36	0.52	206.40	6.62
Poultry	20.00	6.10	1.00	0.31	19.80	6.04
Total			36.87	13.88	284.90	55.49

Table 7: Optimum plan for livestock based farming system in subtropical zone of Jammu region and its effect on income and family employment

Enterprise	Area/No.		Income (` 000)		Family labour (Man days)	
	Proposed	Existing	Proposed	Existing	Proposed	Existing
Kharif						
Rice	0.33	0.45	2.45	3.29	9.94	13.31
Fodder	0.45	0.00	0.00	0.00	6.75	0.00
Rabi						
Wheat	0.33	0.57	3.60	6.18	9.26	15.89
Mustard	0.00	0.05	0.00	0.47	0.00	1.13
Fodder	0.45	0.00	0.00	0.00	6.75	0.00
Livestock	9.00	3.12	90.45	31.38	464.40	161.09
Poultry	19.00	6.93	0.76	0.28	19.19	7.00
Total			97.27	41.59	516.29	198.42

Conclusion

Majority of the farmers were following cereal based farming systems in temperate and intermediate zone, however in the sub-tropical zone almost equal share of cereal and livestock based farming systems were observed. The optimum allocation of land resulted in the increase in the cropping intensity of the farmers along with the increase in the income and employment of the family. The highest percentage increase in the income of the family by the optimal plan allocation was observed in cereal based farming systems as compared to livestock based farming systems. The percentage increase in employment was also higher for cereal based farming systems than livestock based farming systems in temperate and sub-tropical zones. However, in intermediate zone livestock based farming systems resulted in more employment generation increase as compared to cereal based farming systems. In fruit based farming systems the percentage increase in the income and employment was lower as compared to other farming systems mainly due to the fact that the family labour availability was the limiting factor in fruit based farming systems. Thus it can be concluded that the optimal plan allocation could not only result in increase in income and employment but also reduce the distressed employment and provide food security to the farmers of the region.

References

1. Anonymous. Economic survey, Ministry of Finance, Government of India, 2012a, 357.
2. Anonymous. Census of India, 2011. Provisional population Totals. Paper 1 of 2011. India Sreies I. Registrar General and Census Commisioner India, Government of India, 2011a, 187.
3. Anonymous. Database Digest of Statistics, Directorate of Economics and Statistics, Govt. of Jammu and Kashmir, 2011b, 121.
4. Alagumani T, Anjugam M. Impact of dairy enterprises on income and employment in Madurai district, Tamil Nadu. Proceedings of the 7th Annual Conference Agric. Econ. Res. Assoc. on Livestock in Different Farming Systems, held at Tamil Nadu Veterinary and Animal Sciences University, Chennai, 2000, 30.
5. Fabusoron E, Agbonlahor M. Optimal production plan and resource allocation for small rice-based farmers in Ogun State, Nigeria. Agriculture and Environment. 2002; 2(2):37-42.
6. Goswami SN. Sectoral interdependency and block level planning in west Garo hills district of Meghalaya. Indian J Agric. Econ. 1994; 49(2):217-227.
7. Mahapatra IC. Farming system research-A key to sustainable agriculture. Fertilizer News. 1994; 39(11):13-25.
8. Neelakanta Sastry TV. Optimum enterprise system for farmers in Chittoor district, Andhra Pradesh. Ph.D. Thesis, University of Agricultural Sciences, Bangalore, 1993
9. Shalander Kumar, Jain DK, Rajvir Singh. Increasing income and employment through sustainable farming systems in water scarce region of Uttar Pradesh. Agric. Econ. Res. Review. 2006; 19(1):145-157.
10. Srinivasa G, Chengappa PG, Lalith Achoth, Keshava Reddy, Nagaraja GN. Optimum cropping for sericulture-dominant farms in southern dry zone of Karnataka. Agric. Econ. Res. Review. 2005; 18(1):17-132.
11. Thakur DS, Sharma KD, Saini AS. Optimum farming systems for quantum jump in farm production and income in post green revolution belt. Indian Journal of Agricultural Economics. 1991; 46(3):457-458.
12. Vatta Kamal, Kumar Sanjay. Potential of dairy enterprise on Punjab farms: A linear programming analysis. Agricultural situation in India. 2000; 55(12):501-505.