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Characterization of various farming systems in Jammu region of J&K state

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Abstract

An investigation entitled “Economic Contribution of Farming System Components towards Livelihood Security in Jammu Region” was conducted in all the three agro-climatic zones namely temperate, intermediate and sub-tropical zones of Jammu region during the year 2011. Four blocks from each agro-climatic zone and two villages from each block were selected randomly for the present study. From each village, respondents were selected randomly using proportional allocation method, so as to constitute a total sample size of 80 in each climatic zone and overall total sample of 240. The total number of respondents following cereal based farming system was 52, 54 and 39 in temperate, intermediate and sub-tropical zones respectively, whereas it was 28, 25 and 41 respectively in livestock based farming systems. However, in intermediate zone one respondent was following fruit based farming system which accounted for 1.25 per cent of the total sample respondents.

Keywords: Characterization, various farming, Jammu region

Introduction

India accounts for some 2.4 per cent of the world's landmass but is home to about 17.52 per cent of the global population (Anonymous, 2011) ^[1]. The Indian economy is predominantly agrarian and agriculture is a primary source of livelihood providing employment directly or indirectly to 58 per cent of its population (Anonymous, 2012a) ^[2]. 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) ^[6]. The declining trend in size of average area operational holding from 2.28 hectares in 1970-71 to 1.33 hectares during 2000-01 and of 1.23 hectares in 2005-06 poses a serious challenge to the sustainability and profitability of farming (Anonymous, 2012b) ^[3]. In view of 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, it is imperative to develop strategies and agricultural technologies that enable adequate employment and income generation, especially for small and marginal farmers who constitute more than 80 per cent of the farming community (Jha, 2003) ^[4]. To meet the multiple objectives of poverty reduction, food security, competitiveness and sustainability, several researchers have recommended the farming system approach to research and development.

Methodology

The current study was undertaken in 12 blocks of the three agro-climatic zones of Jammu division namely subtropical zone, intermediate zone and temperate zone. Subtropical zone spreads between an altitude of 300 meters and 1000 meters above MSL and enshrines Jammu district as a whole and parts of Kathua, Udhampur and Rajouri districts. Intermediate zone is located between an altitude of 1000 meters and 1500 meter above MSL and consists of some parts of Udhampur and Reasi and large area of Rajouri, Doda, Ramban and Poonch within the said altitude. Temperate zone includes all other areas of Jammu Division which are located above 1500 meters altitude. The Blocks of Warwan, Marwah, Dachhan, Chhatru, Paddar, Kishtwar, Thathri, Bhaderwah, Banihal, Mendhar, Manjakot, Bani, Basohli and parts of Bhagwah, Assar, Gool-Gulabgarh, Mahore, Dudu-Basantgarh, Darhal, etc. fall in this zone. The primary data was collected by the personal interview method to respondents on

recall basis, by using well-designed and pretested schedule. Secondary data was collected from various published sources such as bulletins of the Ministry of Agriculture, Govt. of India, Directorate of Economics and Statistics, Govt. of India and Directorate of Economics and Statistics, Govt. of Jammu and Kashmir. The farmers were growing various enterprises on their farms, so it was necessary to identify the various farming systems prevalent in different zones. In order to differentiate various farming systems the gross returns concept was used. The gross returns from different enterprises viz. cereals, vegetables, fruits, livestock and poultry were calculated and the farmers were classified on the basis of maximum returns of different enterprises. Each farmer was classified into the farming system which yielded maximum returns.

Results

Identification of farming systems in temperate zone

The data presented in Table 1 revealed that 35 per cent farmers were following livestock based farming system while as 65 per cent farmers were following cereal based farming systems. The data revealed that the cereal based farming systems were predominant in the temperate zone of Jammu region. The main reason behind the farmers still practicing livestock and cereal based farming system is the low holding which does not allow the farmers to shift towards other enterprises as the farming in the region is still of subsistence nature and the farmers have to grow such crops which are needed for meeting their family requirements. Kumar *et al.* (2006) [5] also observed majority of the households belonged to wheat-mustard-based farming system group in water scarce region of Uttar Pradesh, hence confirming our results. Pawar *et al.* (1996) [7] also observed that the cereal based farming systems were still widely adopted. The livestock based farming systems were having 20.24 per cent of the total land holding indicating that the livestock based farming system were having less holding than the cereal based farming systems. The data indicated that the land holdings of the respondents directly influenced the type of farming system followed by the farmer. The more the land holding of the farmer, the more is the possibility of the respondent to follow the cereal based farming system, while as the less the land holding the more is its possibility of the respondent to follow the livestock based farming system. The main reason behind this is more income generation by the cereal crops when grown on more land as the classification of the farming system has been done on the gross returns from the various enterprises. The

results also indicated that the number of enterprises were more in the farming systems having more number of respondents. There was a lot of variation in the number of enterprises in the different farming systems with only two enterprises in FSC₃ to six in case of FSC₆. Similarly, Singh *et al.*, 2008 [9], observed a lot of variation in the number of enterprises in various identified farming systems in western Uttar Pradesh.

The cropping pattern of the different farming systems in temperate zone as presented in Table 2 indicated that maize was the predominant crop in the region. The predominance of maize in the area was mainly because of the agro-climatic conditions and the hilly nature of the region which was best suited for the crop. Vegetables were also grown in all the farming systems except one, but the vegetable growing was mainly limited for the family consumption. Rice and wheat were the other crops grown in the region but were not followed by all the respondents. The reason behind this was rain fed nature of some study which was not suitable for growing either wheat or rice in the area. The maize was mainly grown on the rain-fed land whereas rice and wheat was grown on the irrigated land. Maximum land holding was in case of maize followed by wheat and rice and least in case of vegetables. The cropping intensity was more than 100 per cent in all the farming systems, however there is more scope for increasing the cropping intensity of the farming systems, which is indicated by the optimization of resources available to the farmer by the linear programming. Seven out of thirteen cereal based farming systems were not rearing animals on their farms while as two livestock based farming systems and six cereal based farming systems were not rearing poultry birds on their homes. The number of animals was more in case of livestock based farming systems as compared to the cereal based farming systems although the land holding was higher in case of cereal based farming systems, thereby indicating the higher intensity of animals on the less land holdings farms. The number of poultry birds per farming system were also more in case of livestock based farming system as compared to cereal based farming systems. The higher intensity of the animals and poultry on the less land was due to the more availability of the family labour which can be utilized for rearing the animals and also the need of the families to earn more for sustaining the family needs due to low land availability, which could be done only by rearing more animals. Tiwari, 1993 also observed that the animal density as well as the number of poultry birds was higher on small farms.

Table 1: Identification of farming systems in temperate zone of Jammu region

No.	Farming System Pattern	Number of farmers		Area	
		No.	%	ha	%
Livestock Based					
FSL1	Livestock + Maize + Rice + Vegetables+ Poultry	3	3.75	0.90	1.15
FSL2	Livestock + Maize + Vegetables	2	2.50	1.00	2.56
FSL3	Livestock + Maize + Wheat + Rice + Vegetables	1	1.25	0.55	0.70
FSL4	Livestock + Maize + Wheat + Vegetables+ Poultry	6	7.50	3.45	3.14
FSL5	Livestock + Rice + Maize + Vegetables	8	10.00	5.10	6.53
FSL6	Livestock + Wheat + Maize + Vegetables+ Poultry	8	10.00	4.80	6.15
FSL	Subtotal	28	35.00	15.80	20.24
Cereal Based					
FSC1	Maize + Rice + Livestock + Vegetables+ Poultry	2	2.50	2.00	2.56
FSC2	Maize + Rice + Vegetables	2	2.50	1.05	1.35
FSC3	Maize + Vegetables	1	1.25	0.50	0.64
FSC4	Maize + Wheat+ Poultry	1	1.25	1.05	1.35

FSC5	Maize + Wheat + Livestock + Vegetables+ Poultry	9	11.25	9.30	11.92
FSC6	Maize + Wheat + Rice + Livestock + Vegetables+ Poultry	9	11.25	17.00	21.78
FSC7	Maize + Wheat + Rice + Vegetables	2	2.50	2.55	3.27
FSC8	Maize + Wheat + Vegetables+ Poultry	13	16.25	10.00	12.81
FSC9	Rice + Maize + Livestock + Vegetables+ Poultry	4	5.00	3.95	5.06
FSC10	Wheat + Maize + Livestock + Vegetables	3	3.75	6.25	8.01
FSC11	Wheat + Maize + Rice + Livestock + Vegetables	1	1.25	5.00	6.41
FSC12	Wheat + Maize + Rice + Vegetables	1	1.25	1.50	1.92
FSC13	Wheat + Maize + Vegetables+ Poultry	4	5.00	2.10	2.69
FSC	Subtotal	52	65.00	62.25	79.76
FS	Total	80	100.00	78.05	100.00

Table 2: Cropping Pattern of different farming systems in temperate zone of Jammu region

Farming System	Total Area under different crops (ha)					No. of animals	No. of poultry birds
	Wheat	Rice	Maize	Vegetables	Total		
Livestock Based							
FSL ₁	-	0.33	0.58	0.05	0.96	10	30
FSL ₂	-	-	1.40	0.08	1.48	4	0
FSL ₃	0.50	0.05	0.50	0.04	1.09	2	0
FSL ₄	2.45	-	2.09	0.30	4.84	14	27
FSL ₅	-	3.40	1.70	0.27	5.37	26	81
FSL ₆	4.30	-	3.15	0.25	7.70	20	59
FSL	7.25	3.78	9.42	0.99	21.44	76	197
Cereal Based							
FSC ₁	-	0.65	1.35	0.05	2.05	4	20
FSC ₂	-	0.25	0.80	0.06	1.11	0	0
FSC ₃	-	-	0.50	0.02	0.52	0	0
FSC ₄	0.90	-	0.90	-	1.80	0	4
FSC ₅	8.40	-	8.40	0.31	17.11	10	43
FSC ₆	15.15	1.85	15.15	0.25	32.4	11	54
FSC ₇	2.35	0.20	2.35	0.07	4.97	0	0
FSC ₈	10.00	-	10.00	0.38	20.38	0	72
FSC ₉	-	2.75	1.20	0.10	4.05	2	32
FSC ₁₀	6.25	-	6.20	0.07	12.52	5	0
FSC ₁₁	4.50	0.50	4.50	0.04	9.54	2	0
FSC ₁₂	1.20	0.30	1.20	0.01	2.71	0	0
FSC ₁₃	2.10	-	1.25	0.14	3.49	0	20
FSC	50.85	6.50	53.80	1.52	112.67	34	245
FS	58.10	10.28	63.22	2.51	134.10	110	442

Identification of farming systems in intermediate zone

The data presented in Table 3 revealed that 31.25 per cent farmers were following livestock based farming system, 67.55 per cent farmers were following cereal based farming systems and only 1.25 per cent farmers were following fruit based farming systems. The data revealed that the cereal based farming systems were predominant in the intermediate zone of Jammu region. The main reason behind the farmers still practicing livestock and cereal based farming system is the low holding which does not allow the farmers to shift towards other enterprises as the farming in the region is still of subsistence nature and the farmers have to grow such crops which are needed for meeting their family requirements. Only one respondent was having large holding of land which was following fruit based farming system, thus showing that the farmers could shift towards other cash crops, if their land holdings are more in order to generate more income. Singh *et al.* (2010)^[8] also observed that cereal based farming systems were predominant in mid western plains of western Uttar Pradesh. Kumar *et al.* (2006)^[5] also observed majority of the households belonged to wheat-mustard-based farming system group in water scarce region of Uttar Pradesh. The livestock based farming systems were having 23.92 per cent of the total land holding indicating that the livestock based farming system were having less holding than the cereal based farming systems.

The data indicated that the land holdings of the respondents directly influenced the type of farming system followed by the farmer. The more the land holding of the farmer, the more the possibility of the respondent to follow the cereal based farming system, while as, the less the land holding, the more will be the possibility of the respondent to follow the livestock based farming system. The main reason behind this is more income generation by the cereal crops when grown on more land as the classification of the farming system has been done on the gross returns from the various enterprises. However, land holding per household was found to be maximum in case of fruit based farming system with 10.35 per cent of total land holding, thus indicating that fruit based farming systems were being practiced by large farmers only, who have enough land available with them after meeting their family requirements. There was a lot of variation in the number of enterprises in the different farming systems ranging between three and five in different farming systems. Such results are in close confirmation to that of Singh *et al.*, 2008^[9], who also observed a lot of variation in the number of enterprises in various identified farming systems in western Uttar Pradesh.

The cropping pattern of the different farming systems in intermediate zone as presented in Table 4 indicated that wheat and maize was the predominant crops in the region and maize was grown in all the identified farming systems,

while as wheat was grown in all the farming systems except fruit based farming system. Vegetables were also grown in seven farming systems and fruits were grown only in fruit based farming systems. Maximum land holding was in case of wheat followed by maize. Wheat was grown on more area of land mainly because of the fact that it being the staple food next to rice in the region. Vegetables were grown on very less area, which was even lesser than the fruit area in the zone as they were grown only for meeting the family requirements. The cropping intensity was more than 100 per cent in all the farming systems, highest cropping intensity was found in case of cereal based farming system followed by livestock based farming system and least in fruit based farming systems. The reason behind the least cropping intensity in fruit based farming system was the low labour availability as well as the perennial nature of fruit trees. In case livestock based farming system more labour was utilized for rearing animals leaving less labour for crops resulting in low cropping intensity. Four cereal based

farming systems were not rearing animals on their farms while as the only fruit based farming system and one cereal based farming system viz. FSC₂ were not rearing poultry birds on their farms. The number of animals was more in case of livestock based farming systems as compared to the cereal based farming systems although the land holding was higher in case of cereal based farming systems, thereby indicating the higher intensity of animals on the less land holdings farms. The number of poultry birds per farming system were also more in case of cereal based farming system (6.8) as compared to livestock based farming systems (3.4). The higher intensity of the animals and poultry on the less land was due to the more availability of the family labour which can be utilized for rearing the animals and also the need of the families to earn more for sustaining the families due to low land availability, Tiwari, 1993 also observed that the animal density higher on small farms.

Table 3: Identification of farming systems in intermediate zone of Jammu region

S. No.	Farming System	Number of farmers		Area	
		No.	%	ha	%
Fruit Based					
FSF ₁	Fruits + Livestock + Maize + Vegetables	1	1.25	18.00	10.35
Livestock Based					
FSL ₁	Livestock + Maize + Wheat + Vegetables + Poultry	12	15.00	20.90	12.02
FSL ₂	Livestock + Maize + Wheat + Poultry	5	6.25	6.65	3.82
FSL ₃	Livestock + Wheat + Maize + Vegetables+ Poultry	7	8.75	10.45	6.01
FSL ₄	Livestock + Wheat + Maize+ Poultry	1	1.25	3.60	2.07
FSL	Subtotal	25	31.25	41.60	23.92
Cereal Based					
FSC ₁	Maize + Wheat + Vegetables+ Poultry	9	11.25	17.44	10.03
FSC ₂	Wheat + Maize + Vegetables	10	12.50	29.10	16.73
FSC ₃	Maize + Wheat+ Poultry	7	8.75	6.65	3.82
FSC ₄	Wheat + Maize+ Poultry	3	3.75	7.50	4.31
FSC ₅	Maize + Wheat + Livestock+ Poultry	6	7.50	9.10	5.23
FSC ₆	Wheat + Maize + Livestock+ Poultry	2	2.50	4.00	2.30
FSC ₇	Maize + Wheat + Livestock + Vegetables+ Poultry	10	12.50	14.26	8.20
FSC ₈	Wheat + Maize + Livestock + Vegetables+ Poultry	7	8.75	26.25	15.09
FSC	Subtotal	54	67.50	114.30	65.73
FS	Total	80	100.00	173.90	100.00

Table 4: Cropping Pattern of different farming systems in intermediate zone of Jammu region

Farming System	Total Area under different crops (ha)					No. of animals	No. of poultry birds
	Wheat	Maize	Vegetables	Fruit	Total		
Fruit Based							
FSF ₁	0.00	2.00	2.00	15.00	19.00	2	0
Livestock Based							
FSL ₁	10.85	10.85	1.09	0.00	22.79	37	24
FSL ₂	4.35	4.35	0.00	0.00	8.70	18	14
FSL ₃	6.15	5.75	0.62	0.00	12.52	21	39
FSL ₄	1.50	0.75	0.00	0.00	2.25	3	8
FSL	22.85	21.70	1.70	0.00	46.25	79	85
Cereal Based							
FSC ₁	16.40	15.40	1.64	0.00	33.44	0	54
FSC ₂	28.90	23.80	2.89	0.00	55.59	0	0
FSC ₃	6.65	6.65	0.00	0.00	13.30	0	49
FSC ₄	7.50	6.50	0.00	0.00	14.00	0	21
FSC ₅	9.10	9.10	0.00	0.00	18.20	7	36
FSC ₆	4.00	2.75	0.00	0.00	6.75	3	8
FSC ₇	13.60	13.60	1.36	0.00	28.56	20	50
FSC ₈	26.25	22.50	2.63	0.00	51.38	9	44
FSC	112.40	100.30	8.52	0.00	221.22	39	282
FS	135.25	124.00	12.22	15.00	286.47	120	367

Identification of farming systems in temperate zone

The data presented in Table 5 revealed that 51.25 per cent farmers were following livestock based farming system while as 48.75 per cent farmers were following cereal based farming systems. The data revealed that the livestock based farming systems were predominant in the subtropical zone of Jammu region. In this zone also the low land holding was preventing the farmers to switch over to cash crops resulting in the farmers following only cereal and livestock based farming systems. The livestock based farming systems were having 39.16 per cent of the total land holding indicating that the livestock based farming system were having less holding than the cereal based farming systems. The data indicated that the land holdings of the respondents directly influenced the type of farming system followed by the farmer. The more the land holding of the farmer, the more is the possibility of the respondent to follow the cereal based farming system, while as the less the land holding the more is its possibility of the respondent to follow the livestock based farming system. There was a lot of variation in the number of enterprises in the different farming systems ranging between three and five, thus are in close association to those of Singh *et al.*, 2008^[9], who also observed a lot of variation in the number of enterprises in various identified farming systems in western Uttar Pradesh.

The cropping pattern of the different farming systems in subtropical zone as presented in Table 6 indicated that

wheat and maize were the predominant crops in the zone. The predominance of rice and wheat in the area was mainly because of the agro-climatic conditions and irrigation facilities in the study area of the region. Mustard was grown in only five farming systems only limited for the family consumption. There was more scope for increasing the cropping intensity of the farming systems, which is indicated by the optimization of resources available to the farmer by the linear programming. Poultry birds were reared in all farming systems except one, while as animals were reared in only two farming systems of cereal based farming systems. The number of animals was very low (0.13) in the cereal based farming systems as compared to livestock based farming systems (3.12). The reason behind the less number of animals in the cereal based farming system was the readily availability of milk and milk products in the study area. The number of poultry birds per farming system were more in case of livestock based farming system (6.93) as compared to cereal based farming systems (6.10). The higher intensity of the animals and poultry on the less land was due to the more availability of the family labour which can be utilized for rearing the animals and also the need of the families to earn more for sustaining the families due to low land availability, which could be done only by rearing more animals. Tiwari, 1993 also observed that the animal density as well as the number of poultry birds was higher on small farms.

Table 5: Identification of farming systems in subtropical zone of Jammu region

No.	Farming System Pattern	Number of farmers		Land holding	
		No.	%	ha	%
Livestock based					
FSL1	Livestock + Rice + Wheat + Poultry	10	12.50	8.95	10.90
FSL2	Livestock + Rice + Wheat + Mustard + Poultry	8	10.00	5.45	6.64
FSL3	Livestock + Wheat + Poultry	3	3.75	2.10	2.56
FSL4	Livestock + Wheat + Rice + Poultry	14	17.50	10.85	13.22
FSL5	Livestock + Wheat + Rice + Mustard+ Poultry	6	7.50	4.80	5.85
FSL	Subtotal	41	51.25	32.15	39.16
Cereal based					
FSC1	Rice + Wheat + Poultry	12	15.00	13.35	16.26
FSC2	Rice + Wheat + Mustard + Poultry	4	5.00	3.65	4.45
FSC3	Rice + Wheat + Mustard + Livestock	1	1.25	2.50	3.05
FSC4	Wheat + Rice + Poultry	13	16.25	14.75	17.97
FSC5	Wheat + Rice + Livestock + Poultry	4	5.00	9.00	10.96
FSC6	Wheat + Rice + Mustard + Poultry	5	6.25	6.70	8.16
FSC	Subtotal	39	48.75	49.95	60.84
FS	Total	80	100.00	82.10	100.00

Table 6: Cropping Pattern of different farming systems in subtropical zone of Jammu region

Farming System	Total Area under different crops (ha)				No. of animals	No. of poultry birds
	Wheat	Rice	Mustard	Total		
Livestock based						
FSL1	4.50	8.65	-	13.15	30	43
FSL2	3.05	3.95	1.30	8.30	29	56
FSL3	2.00	-	-	2.00	10	17
FSL4	10.35	4.28	-	14.63	38	109
FSL5	3.60	1.45	0.80	5.85	21	60
Subtotal	23.50	18.33	2.10	43.93	128	284
Cereal based						
FSC1	4.90	9.35	-	14.25	0	84
FSC2	1.35	2.75	0.55	4.65	0	16
FSC3	1.05	1.50	0.15	2.70	1	0
FSC4	11.75	7.75	-	19.50	0	68
FSC5	7.00	1.75	-	8.75	4	32
FSC6	4.05	2.35	0.60	7.00	0	38
Subtotal	30.10	25.45	1.30	56.85	5	238
Total	53.60	43.78	3.40	100.78	133	522

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