



Farmer Status and Cropping Pattern of Pakistan: A Case Study of Tehsil Jehlum

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ABSTRACT

In this research paper, cropping pattern of tehsil Jehlum has been presented with respect to farmer status. The main objectives of present study are to show the present spatial distribution of crops in Tehsil Jehlum during Spring and Autumn season and to provide a detailed picture of tehsil Jehlum with respect to farmer status and cropping pattern in both seasons. The spatial distribution of crops was presented in the form of maps by the help of qualitative analysis in Arc GIS 10. For detailed cropping pattern 160 respondents consisting on small, medium and large category of farmers were interviewed to take information about cropping pattern of tehsil Jehlum in both seasons. The empirical results of study revealed that the total surveyed cultivated area is 2405.5 acres. During Spring season 83.14% area of total surveyed area, utilized by farmers. Wheat was 1st dominant crop of all sampled farmers in Spring season by occupying 64.91% of utilized area. Mustard was 2nd dominant crop, cultivated on 8.38% of utilized area during Spring season. During Autumn season 61.98% of total surveyed area was under cultivation. Millet was 1st dominant crop of Autumn season having 38.25% share of total utilized area while rice was 2nd dominant crop sharing 19.78% of total utilized area.

KEYWORDS: Cropping pattern, Spring season, Autumn season

1. INTRODUCTION

Cropping pattern can be defined as the proportion of area under different crop at a point of time, change in this distribution over a period of time [1]. The studies of Gulati, Levy, Lichtenberg, Rasul and Zandstra, show that the cropping patterns of an area are effect by historical, political, geo-climatic, and socio-economic factors [2,3,4,5,6]. It is dynamic idea that no cropping pattern can be said to be ideal for all times to a specific area. It will change in space and time with requirements and is ruled largely by the physical as well as technological and cultural factors. These changes are occupied by socioeconomic effect. Mostly the physical environment decreases the choice of certain crops [7].

The cropping pattern is influenced by the physical factors such as climate, soil, technological elements, availability of fertilizers, improved varieties of seeds, and plant protection chemicals; institutional factors like consolidation of holdings, land reform, price structure, procurement policies, and storage facilities. Climate plays a vital role in determining the existing cropping pattern. Any irregularities in the climate throughout the growing season, such as interval in the outbreak of rains, dry spells or access rains, too high or too low temperatures would very disturb the growth and final yield of the crops and plant. The cropping pattern varies from region to region due to the difference factor these factors are slope, temperature, amount and reliability of rainfall, soils, availability of water for irrigation, pesticides and mechanization.

Cropping pattern remained an important concern for Asian countries as Asia is the most densely populated continent of the world and requires food crops and cash crops as well. Different studies of cropping pattern related to Asian countries reveal the importance of this issue primarily to the study area. In 2016 Hassani's work on cropping pattern, Mandal work on cropping pattern of Assam plains and Singh's work in 2011 and 2012 are good examples [8,9,10,11].

Pakistan's economy is agrarian economy. Here even the industries are agro- based industries so agriculture is termed as the backbone of Pakistan economy. According to economic survey of Pakistan 2016-17 the agriculture sector's share in gross domestic product is 19.5 and it is employing 42.3 % of labor force [12]. So different scholars have worked on different agricultural areas of Pakistan like Sabri and Hassan studied the cropping pattern of Punjab province and Faisalabad division respectively [13,14]. The crop production in Pakistan has increased in comparison to previous financial year. The major crops, their area and production have been summarized in Table 1.

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Table 1: Cropping Pattern of Pakistan 2016-17

Crops	Area (000 hectares)	Production Thousand Tones	Growth percent
Cotton	2,489	10,671	7.6
Sugarcane	1,217	73,607	12.4
Rice	2,724	6,849	0.7
Maize	1,334	6,130	16.3
Wheat	9,052	27,750	0.5

Data Source: Pakistan Economic Survey 2016-17

Tehsil Jhelum, the one among the four tehsils of district Jhelum is located at the northern tip of Punjab province. It has been bounded by tehsil Dina and Tehsil Sohawa from western side. From the eastern side it shares its boundary with tehsil Sarai Almagir and Mandi bahuddin. To its southern side it has been locked by Tehsil Pind Dadan Khan and Choa Siadan Shah and from the northern side it has been bounded by Mirpur district.

2. METHODOLOGY

One hundred and sixty farmers of all categories were interviewed by the help of questionnaire. As the farmers were uneducated so the questionnaires were not filled by the respondents the investigator asked questions to the respondents and filled the questionnaires according to their responses. To present the spatial distribution of crops the coordinates of 160 fields were also taken and kml (Keyhole Markup Language) file was converted into shape file. Qualitative maps were designed to portray the Spring season and Autumn season crops distribution. To show the detailed cropping pattern of tehsil Jhelum the collected data were entered into SPSS and descriptive statistics were applied to get the details about different variables like cropped area and categories of farmers, percentage share of each crop with respect to area.

3. RESULTS AND DISCUSSION

This section comprises over two sub sections according to the objectives of the study, one is spatial distribution of crops and second is cropping pattern adopted by different farmers. On the basis of cultivated crops we divided the year into two seasons. Spring season and Autumn season are two main agricultural season. In both season farmers grow a large variety crops.

3.1 Spatial Distribution of Crops in Tehsil Jhelum

3.1.1 Spatial Distribution of Crops in Spring Season

Spring season is a winter season, called as dry weather. In this season rainfall is low in month of January and February due to the western disturbances. The main crop of this season is wheat. The other crops of this season are like sugarcane, mustard, gram, maser, sarsoon, fodder and vegetable.

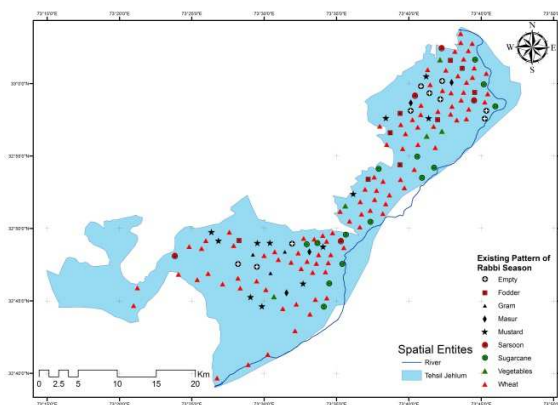


Figure 1: Spatial distribution of Spring Season Crops in Tehsil Jhelum

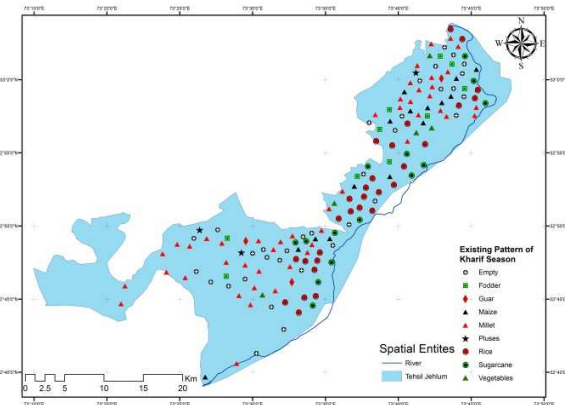


Figure 2: Spatial Distribution of Autumn Season Crops in Tehsil Jhelum

Figure1 is showing existing crops pattern of Spring season. For present study total selected agriculture fields were 160. In total selected field 98 fields (61.25%) were wheat crop fields. The sugarcane crop fields were 14 (8.75%),

the mustard crop fields were 12 (7.5%), the fodder crop fields were 9 (5.63%), the sarsoon crop fields were 5 (3.12%), the vegetable crop fields were 5 (3.12%), the maser crop field was 4 (2.5%), the gram crop field was 3 (1.88%), and the empty fields were 10 (6.25%).

3.1.2 Spatial Distribution of Crops in Autumn Season

The Autumn season is called as rain fall season. In this season temperature is high with high rain fall and high humidity. Millet and rice were the major crops of this season. The other crops of this season were maize, pluses, guar, fodder, and vegetables. Figure 2 shows the percentage distribution of crops of Autumn season. The results show that the total 160 agriculture filed were selected of different places of the study area. It was observed that in total selected field 30% field were cultivated by millet crops. 18% fields were cultivated by rice. The sugarcane and maize crops were cultivated to 9% of total selected field. While the fodder crop was cultivated to 6% of the total selected area, the vegetable crop was cultivated to 3% of the total selected area, the pluses crop was cultivated to 2% of the total selected area, and the guar crop was found on 2% on cultivated field in total selected field in the study area.

Spring season and Autumn season are two main season. During Spring season rainfall is low in the month of January and February. The main crop of this season is wheat. The other crops of this season are like sugarcane, mustard, gram, maser, sarsoon, fodder and vegetables. The second season is the Autumn season, called as rainy season.

In this season temperature is high with heavy rain fall and high humidity. Millet and rice were the major crops of this season. The other crops of this season maize, pluses, guar, fodder, and vegetables .In both season farmers grow a large variety of food and nonfood crops.

Table 2: Cropping Pattern of Tehsil Jehlum in Spring Season

Farmer's category	Surveyed farmers	Total surveyed area (acre)	Area utilized in Spring season (acre)	Categories of crops	Major Spring crops			
					Crops name	Area	Rank	% of total area
Small farmers	36	144.5	144.5	Main crop	Wheat	103.75	1	71.80
					Mustard	14.5	2	10.03
					Sarsoon	6.75	3	4.67
					Masur (Split Red Lentil)	4.5	4	3.11
					Sugar cane	2.5	5	1.73
					Gram	1.5	6	1.04
				Intercrops	Fodder	8		5.54
					Vegetables	3		2.08
Semi-medium farmers	62	657.5	564.5	Main crops	Wheat	369.5	1	65.46
					Mustard	61	2	10.81
					Sarsoon	30.5	3	5.41
					Masur (Split Red Lentil)	27.75	4	4.91
					Sugar cane	19	5	3.36
					Gram	8	6	1.42
				Intercrops	Fodder	38		6.73
					Vegetables	10.75		1.90
Medium farmers	42	861.5	704.5	Main crop	Wheat	458.5	1	65.08
					Mustard	59.5	2	8.46
					Sarsoon	53	3	7.52
					Masur (Split Red Lentil)	43	4	6.10
					Sugar cane	18.25	5	2.59
					Gram	4.75	6	0.67
				Intercrops	Fodder	43.5		6.17
					Vegetables	24		3.41
Large farmers	20	742	586.5	Main crops	Wheat	366.5	1	62.49
					Mustard	66.5	2	11.34
					Sarsoon	39	3	6.65
					Masur (Split Red Lentil)	31.25	4	5.33
					Sugar cane	6.25	5	1.07
					Gram	4	6	0.68
				Intercrops	Fodder	42		7.16
					Vegetables	31		5.28

Data Source: Primary data through field survey 2016

Table 2 is presenting detailed information about the cropping pattern of tehsil Jhelum in Spring season. It is providing the descriptive statistics of total surveyed area, share of each crop with respect to area percentage and the categories of farmers along with cropping practices like intercropping, with respect to Spring season. The graphical representation has been placed in the form of Figure 3. The illustration of figure and table has been presented in section 3.2.

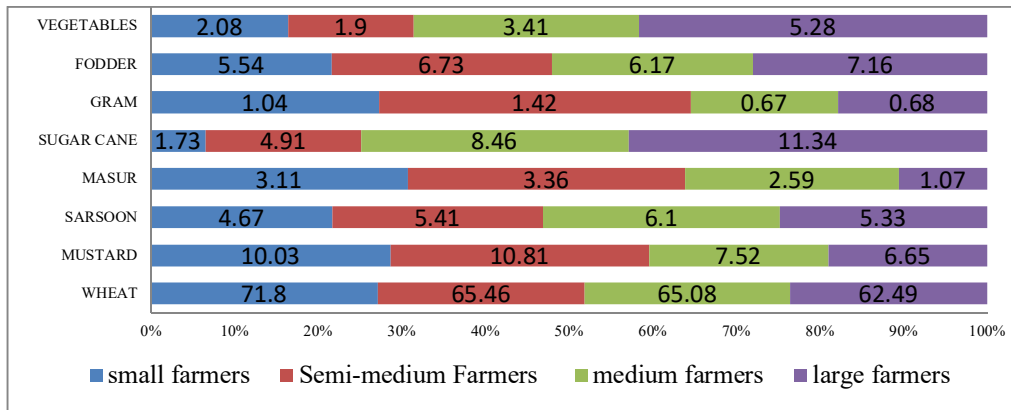


Figure 3: Cropping Pattern adopted by farmers of Spring Season Data Source: Table 2

Figure 3 is showing the cropping pattern of Spring season. Crop types are placed along y-axis whereas the percentages are shown on x-axis. Different colors are indicating the categories of farmers and the relative percentages of each of the categories have been placed on bars.

Table 3: Cropping Pattern of Tehsil Jehlum in Autumn Season in 2016

Farmer's category	Surveyed farmers	Total surveyed area (acre)	Area utilized in Autumn season (acre)	Categories Of crops	Major Autumn crops			
					Crops name	Area	Rank	% of total area
Small farmers	36	145	128.5	Main crop	Millet	71.25	1	55.44
					Rice	19.5	2	15.17
					Maize	14.75	3	11.47
					Pulses	11.75	4	9.14
					Guar	1.5	5	1.16
				Intercrops	Fodder	6.75		5.25
					Vegetables	3		2.33
Semi-medium farmers	62	657.5	421.5	Main crops	Millet	191.25	1	45.37
					Rice	58.5	2	13.87
					Maize	54.5	3	12.93
					Pulses	41	4	9.72
					Guar	11	5	2.60
				Intercrops	Fodder	52.75		12.51
					Vegetables	12.5		2.965
Medium farmers	42	861.5	503.5	Main crops	Millet	192	1	38.13
					Rice	87	2	17.27
					Maize	58.75	3	11.66
					Pulses	37.75	4	7.49
					Guar	12	5	2.383
				Intercrops	Fodder	90.75		18.02
					Vegetables	25.25		5.014
Large farmers	20	742	438	Main crops	Millet	116	1	26.48
					Rice	130	2	29.68
					Maize	59	3	13.47
					Pulses	22.5	4	5.136
					Guar	17	5	3.881
				Intercrops	Fodder	62.5		14.26
					Vegetables	31		7.07

Data Source: Primary data through field survey 2016

Table 3 is providing the descriptive statistics of surveyed farmers, total surveyed area in acres, share of each crop with respect to area percentage and the categories of farmers along with cropping practices like intercropping, with respect to Autumn season. The graphical representation has been placed in the form of Figure 3. The illustration of figure and table has been presented in section 3.2.

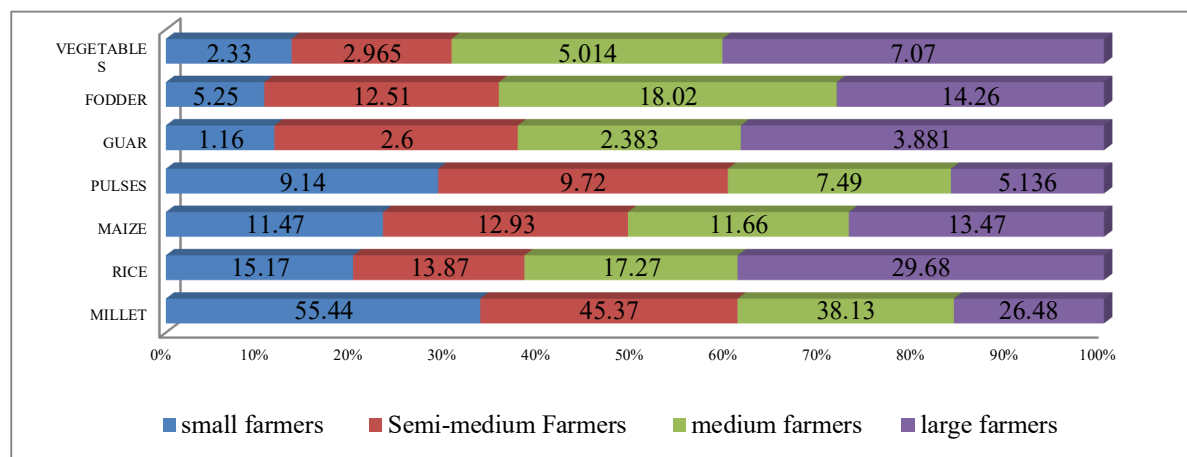


Figure 4: Cropping Pattern adopted by farmers of Autumn Season Data Source: Table 3

Figure 4 is showing the cropping pattern of Autumn season. Crop types have been positioned along y-axis whereas the percentages are shown on x-axis. Different colors are indicating the categories of farmers and the relative percentages of each of the categories have been placed on bars.

3.2 Cropping Pattern Adopt by the Sampled Farmers

Our field survey data showed that there is small variance in the cropping pattern implemented by the sample farmers in this study area. The farmers of all categories try to make best use of their land according to their own ability. But most of the farmers are uneducated. They do not know modern method and technique. In this study area the size of the field is so small. It is a rare chance to see the landholding size more than 2 acre.

3.2.1 Small Farmers

In small farmers category total thirty six farmers that landholding areas was less than six Acres. The total cultivated area of small survey farmers was 144.5 acres. The whole land was under cultivation in Spring season, which is about 100% of total cultivated area as in figure 3. The main crops wheat with 71.80% was the dominant crops in Spring season. Second main crop was mustard with 10.03%. While the sarsoon with 4.67%, masur with 3.11%, sugarcane with 1.73% and gram with 1.04% stood as 3rd, 4th, 5th and 6th ranked crops of Spring season. Fodder with 5.54% and vegetables with 2.08% stood as 1st and 2nd dominant intercrops of the Spring season. During in the Autumn season 88.92% of the total area was under cultivated. The results revealed that in Autumn season millet was 71.25% and rice was 19.5%. Other crops share was maize 14.75%, pluses 11.75% and guar 1.5%. Fodder's share was 5.25% and vegetables' share was 2.33%. Both were the intercrops crops in Autumn season. It was observed that small farmers grow largely food grains crop wheat and rice for their subsistence requirements. Most of the farmers attached with the animal husbandry. They cultivate fodder crops for their animals.

3.2.2 Semi Medium Farmers

In semi medium farmers category there were 62 farmers and their holding area was (6-15) acres. A total cultivated area of these farmers was 657.5 acres. In total cultivated area, mostly area (85.85%) was under cultivation during Spring season. Wheat with 65.46% was the dominate crop. Mustard contributing 10.81% was the second main crop of semi medium farmers. While the other crops like sugarcane with 4.91%, sarsoon with 5.41%, masur with 3.36% and gram with 1.42% were contributing in te total share of cultivated area in Spring season. Fodder share was 6.73% and vegetables share was 1.90%. Both were the intercrops of Spring season. In Autumn season 64.10 % of the total land was under cultivated. Millet, having 45.37% share and rice having 13.87% share were the major crops of

Autumn season. While the other crops of Autumn season were maize 12.93%, pluses 9.72%, and guar 2.60%. Intercrops of Autumn season were fodder with 12.51% share and vegetables with 2.96% share.

3.2.3 Medium Farmers

There were total 42 surveyed farmers and their land holding area was (16-25) acres. 861.5 acres was total cultivated area of these farmers. 81.77% of that area was under cultivation in Spring season. Wheat with 65.08% and sugarcane with 8.46% remained preferred crops in Spring season. While the mustard with 7.52%, sarsoo with 6.10%, and masur with 2.59% and gram with 0.67% also added to the total share during Spring season. Fodder 6.17% and vegetables 3.41% were intercrops of Spring season. During the Autumn season 58.44% of the total area was cultivated. Millet with 38.13% and rice with 17.27% were the preferred crops of Autumn season. While the other crops like maize with 11.66%, pluses with 7.49% and guar with 2.38% were also the minor contributors of total share in Autumn season. Intercrops of Autumn season were fodder with 18.02% and vegetables with 5.01%.

3.2.4 Large Farmers

There were 20 surveyed farmers in large farmer's category their land holding area was bigger than 25 acres. The total cultivated area was 742 acres. During the Spring season 79.04% of the total area was under cultivation. Wheat with 62.49% was the dominant crop in Spring season. Sugarcane with 11.34% was the second major crop in Spring season. While the mustard with 6.65%, sarsoo with 5.33%, masur with 1.07% and grams with 0.68% were also adding in total share. Fodder with 7.16% and vegetables with 5.28% were the intercrop of Spring season. During the Autumn season about 59.02 % area was under cultivation. Rice with 29.68% and millet with 26.48% were the most preferred crops of the large farmer in Autumn season. Other crops like maize with 13.47%, pulses with 5.13% and guar with 3.88% were the minor contributors of total share in Autumn season. Fodder and vegetable was the intercrops of Autumn season.

4. Conclusion

The results showed the overall cropping pattern of rabbi and Autumn season adopted by the sampled farmers. The study of 160 sampled farmers of all the categories and farm size showed that the total cultivated area was 2405.5 acres. During Spring season 83.14% of the total cultivated area was under cultivation. Wheat with 64.91% was the dominant crop of all sampled farmers in Spring season. While the mustard with 8.38%, sugarcane with 7.81%, sarsoo with 5.57%, masur with 2.40% and grams with 0.91% were other crops in Spring season. Fodder with 6.58% and vegetables with 3.44% were intercrops of all sampled farmer in Spring season. During Autumn season 61.98% of the total cultivated area was under cultivation. Millet with 38.25% and rice with 19.78% were dominant crops of all sampled farmers in Autumn season. While the other crops of Autumn season were maize with 12.54%, pluses with 7.58% and guar with 2.78%. Fodder with 14.26% and vegetables with 4.81% were intercrops of all sampled farmers.

Cropping pattern is highly influenced by the farmer status. In present study large scale farmers utilize intercropping system to increase their livelihood. Our findings revealed that from 20 large scale selected farmers 100 % of them utilized intercropping. From 42 medium scale surveyed farmers 97.6 % utilized intercropping and from 62 surveyed semi medium farmers 75.8% used intercropping while from 36 small scale farmers only 8% used intercropping. It reveals that the farmer status has impact on cropping patten which leads to increase in livelihood of farmers. Shi min and his fellows conducted a research in 2017 which was based on adoption of intercropping among smallholders rubber farmers and their findings declared intercropping as an important source of income for the household in the lower income category [15]. But in case of Pakistan it is vice versa here small scale farmers don't take risk of intercropping as they can't bear the burden of using fertilizers and heavy doses of pesticides. Being a resident of developing country it is difficult for them to bear the financial expense. A case study from a developing country shows similar results to the present study in which Clifton Makate and his fellows stated that "the crop diversification depends on the land size, farming experience, asset wealth, location, access to agricultural extension services, information on output prices, low transportation costs and general information access" [16]. And these indicators are mostly attributed to large scale farmers. In 2001 a book on farming systems written by Jhon. A. Dixon also stated that usage of diversification of production as one of strategies to reduce in poverty and hunger [17]. The present study also endorse the same strategy as the medium and semi medium farmers inclination towards using intercropping is high which shows that the diversification of crop plays an important role in improving household income.

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