



Major Crop Combination and Diversification Regions in Kashmir Valley

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Abstract : Agriculture is the main source of revenue in Kashmir Valley as the bulk of population survives or about 70% of the population survives on it. The Valley is geographically divided into three zones like flood plains, Kerewas and Mountains. Variations in altitude, soil and climate have closely influenced the agricultural practices among various districts of Kashmir valley. In the present paper an attempt has been made to study crop combination region, cropping pattern and crop diversification in Kashmir valley.

Keywords : crop combination; crop diversification; deviation; altitude etc.

I. Introduction

Agriculture is one of the most important human activity as it forms a major share of human and animal food as well as other materials to meet human needs, including the need for industrial raw materials. Agricultural activity not only involves cultivation of crops but also domestication of animals, forestry, irrigation and many other diversified activities. The economy of the state is deep rooted in agriculture and it is the pivot around which all the economic activities rotate. The economic prosperity of the state largely depends on the successful production of crops. The economy of the state is deep rooted in agriculture and it is the pivot around which all the economic activities rotate. The economic prosperity of the state largely depends on the successful production of crops. During 2010-11, the state produced 15.21 lakh quintals of food grains against 4.53 lakh quintal in 1950-51. The State comprises of three regions namely Jammu, Kashmir and Ladakh having distinct geographical outlook and agro climatic zones. Each zone having its own characteristics that largely determines the cropping pattern and productivity of crops. Paddy is the main crop of Kashmir, followed by maize, oilseeds, pulses, vegetables, fodder and wheat. In Jammu region, wheat is the predominant crop followed by maize, paddy, pulses, oilseeds, fodder, vegetables and other crops while in Ladakh, barley is the major cereal crop followed by wheat. The production of three major crops paddy, maize and wheat in J&K state is more than 90% of the total food grain production of all crops and rest is shared by other cereals and pulses.

1.1 Study Area - Location and Extent

The area selected for the study is Kashmir Valley- the extreme north western part of our country. The region is situated amidst the lofty ranges of the Himalayas and presents character of a semi-closed ecosystem. The region extends between 30° 25' N and 34° 45' N latitudes and between 73° 55' E and 75° 35' E longitude, covering an area of 15,948 square kilometers although the revenue records are available for just 5565.77 square kilometers which is just 34.90 per cent of the geographical area. The Jhelum and its tributaries enclosed the Valley of Kashmir in drainage system. The Valley receives sixty percent of the annual precipitation during the month of December and January in the form of rain and snow. The Valley of Kashmir depicts small areal extension is characterized by highly diversified

temperature and precipitation conditions at meso and micro level. In general the temperature decreases from the Valley floor towards the rim land.

On the basis of topographic features, the valley is divided in to three distinct zones. The first of the lower zones ranges from 1500-1800 meters above the sea level and second from 1880-2400 meters and third 2400-4500 meters. The Valley is bounded on the east, south and south west by Doda, Udhampur, Rajouri and Poonch district of Jammu provinces on the north west by Pakistan occupied Kashmir and towards north-east by Kargil district of Ladakh province. As per the 2011 census, the region supports a population of 6907623, persons constitutes about 55 percent of the total population of the state Jammu and Kashmir. About 71.33 percent of population lives in rural areas.

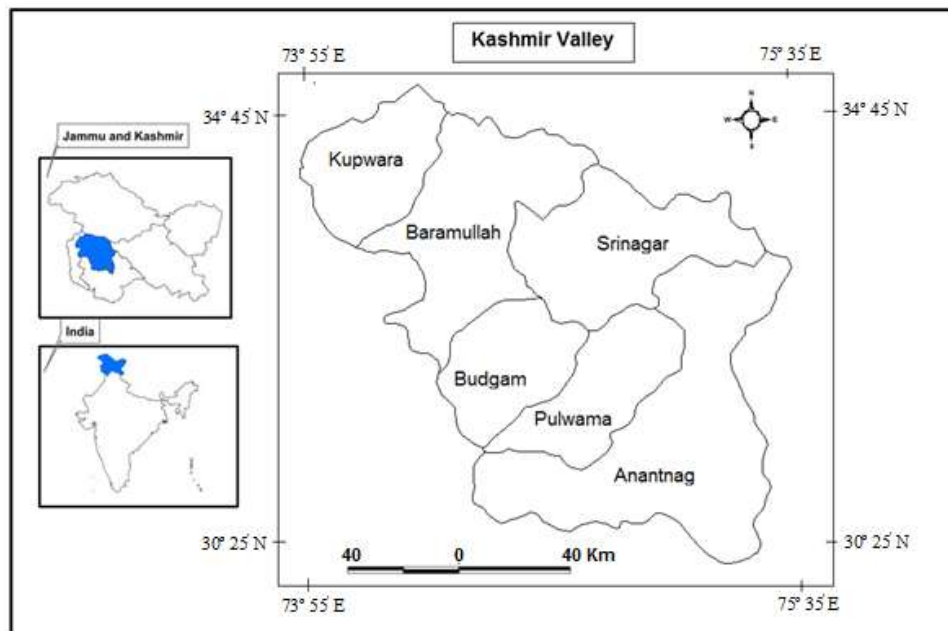


Fig 1.1

1.2 Aims and Obejctives

1. To find out the crop combination in Kashmir valley.
2. To find out the *crop diversification* in different districts of Kashmir valley

II. Methodology

The Present study mostly based on the secondary data collected through Agriculture Department and Financial Commissioner's Office, Srinagar. For the present investigation, District is selected as study unit. Weavers Crop combination technique has been used in present study. In order to assess the crop combination, the following formula has been adopted.

$$\Sigma = \frac{d^2}{n}$$

Where 'd' is the difference between the crop percentage in a given country (areal unit) and the appropriate percentage in the theoretical curve and 'n' is the number of crops in a given combination.

For Crop diversification Gibbs Martin (1962), methods has been used to calculate crop diversification in districts of kashmir valley.

$$\text{Crop diversification Index} = \frac{\sum x^2}{(\sum x)^2}$$

Where x is the percentage of total cropped area occupied by each crop.

2.1 Cropping pattern

The study of cropping pattern constitutes an important feature within the spatial dimensions of agricultural geography as it provides a good base for regional planning. Owing to its significance the problem has engaged the attention of geographers and agricultural land use planners. Cropping pattern may be referred to a particular location such as the country as a whole or the smaller units like the states, districts, villages or even to farms. It may likewise be related to a particular point of time. A change or shift in the cropping pattern implies a change in the proportion of area under different crops which depends to a large extent on the Geographical factors of the region. Moreover, the development of marketing infrastructure and the demand pattern of the people are also factor which affect cropping pattern (Shafi, 2006).

At any point of time an existing cropping pattern may be replaced by the other, if the physical and socio-economic factors of that area may favour the emerging one. For intensifying the cropping pattern and multiple cropping, the short duration fertilizers responsive, high yielding varieties are required. Any cropping sequence to be adopted by the cultivators should be flexible as to be based on the following (Hussain, 1979).

1. The crop should not accentuate certain diseases as a result of fixed continuous rotation.
2. The crop should not exhaust on some specific plant nutrients from a particular depth in the soil.
3. The crop should be fertility enhancing and soil improving; and
4. The crop should fetch handsome returns to the farmers and should provide the farmer employment and income all the year round. Moreover, the crop should ensure the optimum utilization of his resources, particularly, inputs like irrigation water, fertilizers, insecticides, equipments and power.

In India the cropping pattern is more elastic in plains than in the hilly areas. This is only because of the topography and agro-climatic conditions which are quite different from area to area. Characterized with mountainous and undulating terrain and variation in temperature, precipitation and soil, the Kashmir valley has highly diversified cropping pattern.

Table 1 : Area under food grain crops in Kashmir Valley (2008-2010)

Crop	Area in '000' hectare	Percentage
Rice	142.02	59.07
Maize	88.80	36.93
Wheat	0.61	0.26
Pulses	8.98	3.74
Total	240.41	100

Source: Financial Commissioner's Office, Srinagar.

The table 1.1 reveals that rice occupies large area having a percentage of 59.07 percent out of total cultivated area, which was followed by maize with 36.09 percent. The other crops like wheat and pulses constitute 0.26, and 3.74 percent respectively

Weaver 1954 was the first to applied statistical technique to establish the crop combination of the Middle West (USA). Weaver's method is popularly known as "Minimum Deviation Method" was calculated in terms of areal percentage for all the possible combination in the unit taken into the consideration against a theoretical of 100 % in case of a single crop, 50% in each of the two association, 33.3% in each of three crop association regions and so on. Weaver's formula is as such:

$$\Sigma = \frac{d^2}{n}$$

Where as

Σ = value of the crop combination.

d = difference between the actual crop percentage in a given unit and appropriate percentage in the theoretical curve.

n = number of crops in a given combination.

$$\text{Monoculture} = \frac{(100-59.07)^2}{1} = 1675.2$$

$$2 \text{ Crop Combination} = \frac{(50-59.07)^2 + (50-36.93)^2}{2} = 126.54$$

$$3 \text{ Crop Combination} = \frac{(33.33-59.07)^2 + (33.33-36.93)^2 + (33.33-3.74)^2}{3} = 517.02$$

It has been calculated according to Weaver's formula that minimum deviation from the normal curve is the two crop region and there fore the Kashmir valley is a two crop combination region (rice and maize). However, it is seen from table 3.6, in Kashmir valley high percentage share of area has been recorded by rice i.e., 56.07 percent of total cultivated area. While as 36.93 was contributed by maize, the second dominant crop in Kashmir Valley. The share of pulses is 3.74.

Table 1.2 : District wise area under food grain crops in Kashmir valley 2008-2010

District	Rice (Hectares)	%	Maize (Hectares)	%	Wheat (Hectares)	%	Pulses (Hectares)	%	Total
Anantnag	42880	69.24	16583	26.78	4	0.006	2460	3.97	61927
Pulwama	17010	69.56	6566	26.85	333	1.36	543	2.22	24452
Srinagar	9616	67.75	4300	30.29	3	0.02	273	1.92	14192
Budgam	25300	70.14	9020	25	236	0.65	1513	4.19	36069
Baramullah	27136	46.85	27080	46.75	40	0.07	3670	6.33	57926
Kupwara	20083	43.8	25256	55.09	0	0	510	1.11	45849
total	142025		88805		616		8969		240415

Source: Financial Commissioner's Office, Srinagar 2010.

The table 1.2 while denoting the district wise cropping pattern in Valley having marked fluctuation among the different districts. The different crops in Anantnag district have varied areal structure. The rice is dominant crop occupying about 69.24 percent, which was followed by other crops like maize, pulses and wheat constituting 26.78, 3.97 and 0.006 percent respectively. In the Pulwama district, the area occupied by rice, maize, pulses and wheat is 69.56, 26.85, 2.22, and 1.36 percent respectively. Among these crops major portion of cultivated area is under occupation of rice. The trend is not different Srinagar where the major portion of land is occupied by rice with 67.75 percent, followed by maize. On the other hand district Budgam recorded 70.14 percent under the cultivation of rice, 25 percent under maize and 4.19 percent under pulses and 0.65 percent under wheat. However the districts Baramullah recorded 46.85 percent area under rice, followed by maize, pulses and wheat by 46.75, 6.33 and 0.07 percent respectively. While in case district Kupwara the maize is dominant crop with 55.08 percent followed by rice and pulses with 43.80 and 1.11 percent respectively. All these regions except Kupwara district rice is a dominant crop followed by maize. The district Kupwara has major portion of cultivated area under maize with 55.08 percent and rice with 43.80 percent.

According to Weaver's formula that minimum deviation from the normal curve is the two crop region and there fore the Kashmir valley is a two crop combination region (rice and maize). The main goal of agricultural land utilization as revealed by the composition and distribution pattern of crop combination regions is the maximum production of rice particulars for local consumption. The crop combination region based on statistical technique is an important device to access dominating position of crops in different districts of Valley.

2.2 Crop Diversification in Kashmir Valley

Diversification in structural forms of agriculture such as cropping pattern and agricultural enterprises explains why it is necessary to raise a variety of these forms which

possesses nearly an even proportion. Basically, it is an indicator of multiplication of agricultural activities which obviously involve intense competition among various activities for space. The keener the competition, the higher the magnitude of diversification, and the lesser the competition, greater will be the trend towards crop specialization or monoculture farming, where emphasis is on one or two crops. Agriculture diversification is now almost a normal feature of stable agriculture and progressive farm management in most of the extensive agricultural parts of the world (Bhatia, 1965).

Crop diversification is a concept which is opposite to crop specialization. The farmers all over the world, especially in the developing countries try to grow several crops in their holdings in an agricultural year. The level of crop diversification largely depends on the geo-climatic/socio-economic conditions and technological development in a region. In general higher the level of agricultural technology, lesser the degree of diversification. Moreover, the rich farmers prefer to specialize in agricultural enterprise while the poor and subsistent farmers are generally more interested in the diversification of crops. Crop diversification denotes the number of crops grown in a region within a specific period of time. It is an indicator multiplication of agricultural activities which indicates intense competition between various crops for space. Stiffer the competition higher is the magnitude of diversification, and lower the competition, greater will be the trend towards specialization or monoculture. Agricultural diversification is now almost a normal feature of stable agriculture and progressive farm management in most of the extensive agricultural parts of the world. It has been made possible by modern irrigation, use of fertilizers, high yield variety seeds, pesticides and mechanization technologies. Besides, the vagaries of weather, subsistent and orthodox farming practices also compel farmers to sow a number of crops. Hence, the magnitude of agricultural diversification shows the compact of physical, socio-economic and techno-organizational factors on agriculture.

Gibbs Martin (1962), Bhatia (1965) and Jasbir Singh (1976) have suggested various methods to calculate crop diversification. A better method was proposed by Gibbs Martin.

$$\text{Crop diversification Index} = \frac{\sum x^2}{(\sum x)^2}$$

Where x is the percentage of total cropped area occupied by each crop.

Table 2: Crop Diversification Index of Kashmir Valley

Index Range	Category	Name of district
< 0.50	Low	Kupwara
0.50 - 0.55	Moderate	Srinagar, Baramullah
> 0.55	High	Anantnag, Pulwama, Budgam

Source: Computed and compiled on the basis of data available in Financial Commissioner's Office, Srinagar (2010).

The Crop diversification regions of Kashmir valley have been shown in fig.1.2 it may be seen that Kupwara district has the low degree of crop diversification. The Srinagar, Baramullah districts have moderate level of diversification, while the Anantnag, Pulwama, Budgam districts have a high degree of crop diversification (Table 2). The main advantage of

a map showing the level of diversification lies in the fact that it helps in the future planning and development of agriculture. The districts which have a high degree of diversification are generally the areas of extreme moisture condition and /or areas of erratic rainfall. In such areas agriculture is largely subsistent in character. The areas of high degree of diversification of crops deserve special attention of planers for development of agriculture.

2.3 Crop Diversification in Kashmir Valley

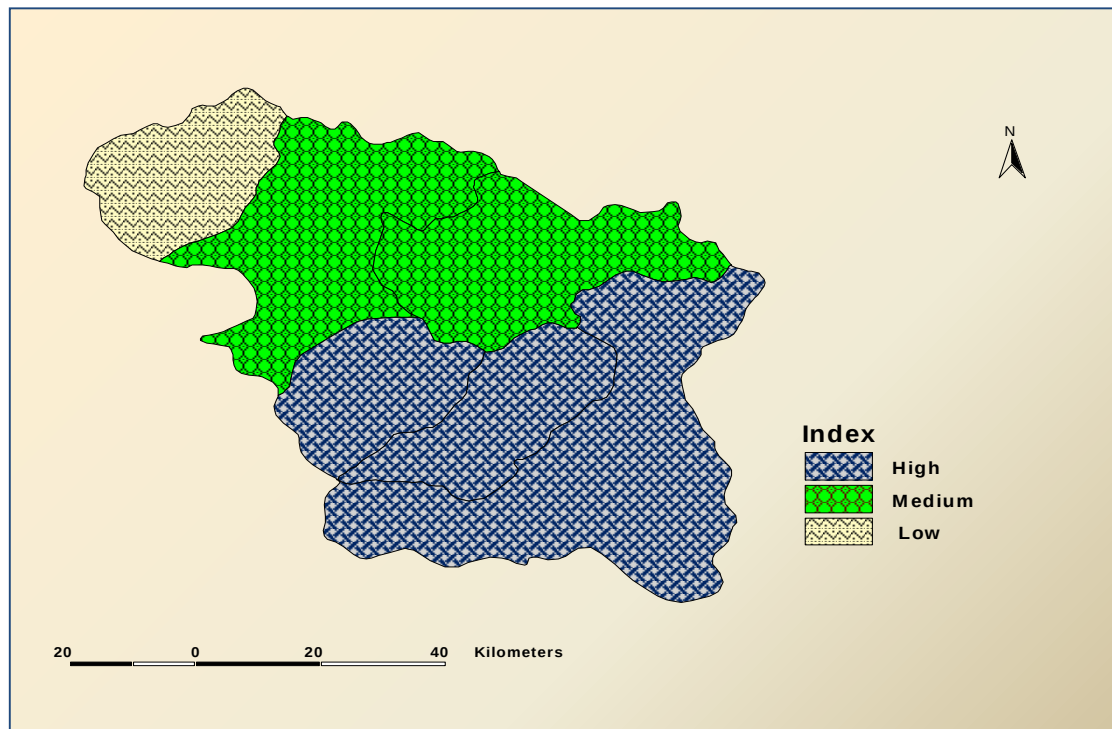


Fig 1.2

III. Conclusion

Agriculture is the main source of the economy of Jammu and Kashmir. Around 70% of population in the state gets livelihood directly or indirectly from agriculture and allied sectors. The cropping Patterns of a region are closely influenced by the geo climatic, socio-economic, historical and political factors. The physical environment (Physiography, climate, soil and water) imposes constraints on the growth and distribution of plants and animals. The role of farmers in the cultivation of certain crops in a region is also important. The physical environment limits the choice of crops, either by prohibiting the growth of certain plants or by reducing their yield per unit area. The crop combination of various districts of valley is closely influenced by the terrain, soil and extreme climatic conditions. It has been calculated according to Weaver's, method that about 96 percent of the total cultivated land under food grain crops is dominated by rice and maize. Hence, it can simply be called as two-crop combination region. Gibbs martin method has been used to find out the Crop diversification of Kashmir valley. It may be seen that Kupwara district has the lowest degree of crop diversification. The Srinagar and Baramullah districts have moderate level of diversification.

While the Anantnag, Pulwama and Budgam districts have a high degree of crop diversification.

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