

Land Use Pattern of Production of Temperate Fruits in Himachal Pradesh : A Study of District Shimla

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Abstract

Farm production is the resultant of allocation of resources into different ends and when these are combined in proper proportion, it can help to achieve a higher level of efficiency in a farm business. Use of any resource beyond its capacity can result in its rapid depletion and deterioration, which may cause severe damage to the sustainability of farming. Therefore, the study revealed the land use pattern of different farm sizes in production of temperate fruits, which not only determines resource efficiency, but also farm diversification. It was observed that 92% of the land was cultivated, of which 77% was under apple production and rest under other temperate fruits production. However, different farm size allocation picture revealed that more than 70% of the land was devoted to apple cultivation followed by pears, almonds cultivation by all farm sizes. As far as farm ownership is concerned, it was found to be 100% self-owned with no leasing in and leasing out across all farm sizes.

Keywords : cultivation, farm holdings, farm diversification, land use pattern, resource allocation

JEL Classification Codes : Q12, Q15, Q24

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Land is the most predominant input of an agricultural economy, and a proper study of land use profile helps the planners in evolving a suitable and scientific policy for crop production. The total geographical area of the state of Himachal Pradesh, as furnished by the Directorate of Land Records (according to village papers, that is, the papers prepared by the village accountants or *patwaris*), is 45,75,566 hectares of which area under forests was 11,26,124 hectares, which constituted 24.61% of the reporting area. Barren and unculturable lands such as mountains, deserts, etc. land, which cannot be brought under cultivation or such land that lies within cultivated holdings was 7,77,484 hectares and accounted for 16.99% of the reporting area. All land put to use other than agriculture (buildings, roads, etc.) is classified as land put to non-agriculture use and accounted for 7.64% of the total reporting area. Permanent pastures and other grazing lands form a large chunk of the reporting area, that is, 33%. In absolute terms, the area under this category was 15,10,434 hectares. Land which is not included in net area sown was 1.39% of the reporting area. However, cultural wastelands accounted for 2.65% of the total reporting area. Fallow lands comprise of all lands which were once taken up for cultivation but are temporarily out of cultivation for not less than one year, and this land accounted for 0.48% of the total reporting area. The current fallow denotes such areas which are in fallow during both the seasons of the same agricultural year. Such an area constituted 1.18% of the reporting area. Net area sown under crops and orchards counts area sown more than only once in the same year, and this constituted 12.01% of the reporting area. Area sown more

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than once represents the area on which crops are raised more than once during an agricultural year. It is obtained by deducting the net area sown from the total cropped area. Such type of area accounted for 8.34% of the reporting area. Total cropped area represents the sum-total of all areas sown to crops, treating “area-sown more than once” separately for each crop. The total cropped area during the year accounted for 9,31,862 hectares or 20.36% of the total reporting area.

With respect to District Shimla, as per information from the village papers regarding land utilization patterns, the data revealed that the geographical area of Shimla District is 5,25,326 hectares, of which 28.56% is under forest cover in the district. Interestingly, net area sown was 13.25% and area sown more than once was 3.48% of the total reporting area. Therefore, the total cropped area of the district was 16.74%. The land utilization pattern of the study area from the village papers revealed that the geographical area of the block Jubbal & Kotkhai is 54,076 hectares, of which 41.64% was under forest cover, and the net area sown was 26.00% and area sown more than once was 0.15% of the total reporting area. The total cropped area of the block was 26.15%. The land under permanent pastures and other grazing land was almost 19.78%. The land under barren & unculturable lands and land put to non-agricultural use was 1.79% and 3.98% of the total reported area, respectively. Culturable waste, current fallows, and other fallows land constituted 1.60%, 2.33%, and 0.74% of the total block reported area, respectively (Department of Revenue, Government of Himachal Pradesh, 2012, 2017).

The cropping pattern deals with the nature of crop and percentage of area under each crop. It is also an indicator of the level of development as well as the economic prosperity of the State. The data regarding the cropping pattern picture of 2018 – 19 revealed that out of 60.98% of the total cropped area under temperate fruits, 48.74% constituted apple crop. The total output of temperate fruits in the state was 4,05,749 metric tonnes, of which apple constituted 81.59% and other temperate fruit crops constituted 8.22%. Nuts and dry fruits contributed 4.39% of the cropped area and 0.80% of the total output. A look at the citrus fruits reveals that the area under these crops was 10.71% of the total cropped area, with a share of 6.49% in total production. The other sub-tropical fruits accounted for 23.92% of the total cropped area, with a contribution of 2.90% in total output.

Studies have been conducted by various authors like Kumar, Barik, and Prashar (2012) ; Singh, Hazrana, and Nazrana (2016) ; Vaidya, Bhardwaj, and Sood (2018) ; and Pandey and Ranganathan (2018) regarding land use and cropping pattern in agriculture production, which tries to reveal the crop diversification picture which reduces the risk of crops and provides economic benefits to farms and is helpful in alleviating rural poverty.

The study conducted by Kumar et al. (2012) dealt with the issues like land use and cropping pattern of District Solan of Himachal Pradesh. The results obtained in this study indicated that area under pulses showed decreased pattern ; whereas, in the case of vegetables, a significant increase was observed. The study by Singh et al. (2016) observed that the groundwater sources of Punjab have been principal factors for achieving food security in the country through the success of green revolution and shifting of cropping pattern in favour of water-intensive crops. It generated out of sample forecasts till 2025 to highlight the drastic and unsustainable consequences of current usage pattern.

Vaidya, Bhardwaj, and Sood (2018) observed the land allocation picture of the Kullu area of Himachal Pradesh. The study examined the spatio-temporal land use land cover changes of Kullu valley of Himachal Pradesh using LANDSAT imageries of 1989 and 2016. The study was carried out for major land-use type, that is, agriculture, orchard, forest, and built up in the valley over 27 years. The results indicated that during the last 27 years, the built-up area increased to the extent of 90.81% followed by orchards (12.39%) and forest (6.26%) ; whereas, area under agriculture decreased by 56.88%. The primary data revealed that farmers had abandoned wheat, paddy, maize, and barley crops and were pursuing cultivation of vegetable and fruit crops. Increased economic returns and climate change emerged as the probable drivers for the changes in the valley.

A study conducted by Pandey and Ranganathan (2018) examined the dynamics of land-use pattern in India with a focus on fallow lands. The authors found significant changes in the land-use pattern and a continuous expansion of fallow lands despite increasing demand for land for agricultural and non-agricultural purposes. The

fallow lands are distributed across the country but have a greater concentration in the states of Bihar, Andhra Pradesh, Rajasthan, and Karnataka. These changes in the temporal and spatial distribution of fallow lands are due to increasing variability in the precipitation and irrigation water, and low level of mechanization. If these lands can be brought under cultivation, it would enhance agricultural production and food security of the poor and marginal farmers.

Therefore, cropping and land use pattern deals with the nature of crop and percentage of area under each crop. It is also an indicator of the level of development as well as the economic prosperity of the state. The study of cropping pattern is of paramount importance for planning a rational and balanced programme of crop rising in such a manner that the people of the country get adequate fruit and raw material for agro-based industries. The cropping pattern changes in response to change in economic, technological, and institutional factors. Therefore, the objective of the current paper is to understand the land use pattern of the study area and to reveal the tenancy, resource allocation, and cropping pattern condition of different farm sizes, which therefore, will indicate the crop diversification picture of the area.

Materials and Methods

To find the answers of the framed objective, the present study was conducted in Jubbal & Kotkhai block of District Shimla, which was divided into 10 different panchayats, and thereafter, two villages from every panchayat with 10 farming households of different categories (marginal, small, & medium) from each village were randomly selected. However, the study is primarily based on primary data ; hence, personal interviews, face-to-face association with farmer respondents, and observation method have been adopted to collect the relevant information and analysis has been conducted with the help of simple tabular analysis based on means, percentage, and frequency etc.

Analysis and Results

Extent of Tenancy

As is the practice, it was assumed that each operational holding is a single farm. However, as is well known, an operational holding may comprise of several plots of land at varying distance from each other. Table 1 provides the details regarding the extent of tenancy.

Table 1. Extent of Tenancy – Number of Farms

Sr. No.	Particulars	Size Class of Holdings (in Hectares)			
		Marginal Farmers	Small Farmers	Medium Farmers	Overall Farmers
1.	Purely owner cultivator	40 (100.00)	60 (100.00)	100 (100.00)	200 (100.00)
2.	Farmer leasing in land	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
3.	Farmer leasing out land	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
4.	Total sample farmers	40 (100.00)	60 (100.00)	100 (100.00)	200 (100.00)

Note. Figures in the table are percentage analysis of respective column total.

It is clear from Table 1 that out of 200 farming households, 100.00% were purely owner cultivators across all farm sizes with no farms with leased in and leased out land and reason for the same is better infrastructure facility in the area, and also, 75% of the entire population was engaged in horticulture activity, which makes it their main source of income.

Land Use Pattern

It is a well-established fact that in the rural areas, the variations in the level of living is high due to uneven distribution of fixed factor that is land. Land being a gift of nature is the basic need of man, be it for agricultural uses or non-agricultural uses. The term 'land use' has a specific connotation – that it seeks to present the distribution of total land availability with a household into various uses. Being a major productive asset of rural households, land happens to be the main source of income and employment. Land available for cultivation out of

Table 2. Land Use Pattern Among the Sample Households

					(Area in Hectares)
Size of Holdings					
Sr. No.	Particulars	Marginal Farmers (≤ 1 Hectare)	Small Farmers (1–2 Hectares)	Medium Farmers (Above 2 Hectares)	Overall Farmers
A.	Area under apple cultivation	22.30 (76.37)	74.30 (80.24)	309.10 (76.83)	405.70 (77.41)
B.	Area under almond cultivation	1.70 (5.82)	3.80 (4.10)	13.60 (3.38)	19.10 (3.64)
C.	Area under cherry cultivation	1.60 (5.48)	3.30 (3.56)	7.40 (1.84)	12.30 (2.35)
D.	Area under pears cultivation	1.80 (6.16)	5.20 (5.62)	27.40 (6.81)	34.40 (6.56)
E.	Area under apricot cultivation	1.70 (5.82)	3.30 (3.56)	7.40 (1.84)	12.40 (2.37)
1.	Total Cultivated Land	29.10 (99.66)	89.90 (97.08)	365.00 (90.73)	484 (92.35)
A.	Barren land	0.10 (0.34)	2.30 (2.48)	21.40 (5.32)	24.00 (4.58)
B.	Land put to non-agriculture use	0 (0.00)	0 (0.00)	3.80 (0.94)	3.80 (0.73)
C.	Permanent pastures & grazing land	0 (0.00)	0.40 (0.43)	11.80 (2.93)	12.10 (2.31)
D.	Area under miscellaneous trees	0 (0.00)	0 (0.00)	0.07 (0.04)	0.04 (0.03)
2.	Total Uncultivated Land	0.10 (0.34)	2.70 (2.92)	37.30 (9.27)	40.10 (7.65)
3.	Total Area Owned (1+2)	29.20 (100.00)	92.60 (100.00)	402.30 (100.00)	524.10 (100.00)
4.	Average Size of Holding	0.73	1.54	4.02	2.62
5.	Total Number of Farmers	40	60	100	200

Note. Figures in the parentheses denote the percentage of column total.

total land holdings in Himachal Pradesh was 75.3% of the total area as against 85.9% at all India average. Net area sown was 11.9% of the total culturable area as against 45.8% at all India average. Irrigation facilities were 20% of the net cropped area as against 45% at all India average.

Table 2 illustrates the land use pattern among the sample households and the table reveals the following :

➤ **Uncultivated Land** : From the study, it is evident that out of the total 524.10 hectares owned land, 7.65% of the land was uncultivated. However, out of the overall uncultivated land, 4.58% was barren land followed by permanent pastures (2.31%), non-agriculture use (0.73%), and miscellaneous trees (0.03%). Different farm size analysis reveals that area under uncultivated land increased with an increase in farm size. The figures are 0.34%, 2.92%, and 9.27% for marginal, small, and medium farms, respectively. However, land use pattern of uncultivated land by different farm sizes reveals that across all farm sizes, maximum land came under barren land followed by permanent pastures ; whereas, land under non-agriculture use and miscellaneous trees was nil under marginal and small farmers. Therefore, comparing the same with the State, District, and Block levels, it has been observed that area under uncultivated land of the study area was 7.65% of the total land, which is comparatively less as compared to State (80%), District (83%), and Block levels (74%).

➤ **Cultivated Land** : Land is a costly and scarce input in agriculture. The case for its efficient use is self-evident. Given the inherited and acquired or added qualities of land, the pattern of its use on farms can be a crucial factor in determining the overall returns realized in agriculture. It depends on the types of crops raised on farms, the proportion of farm area put under different crops, and the number of times a given unit of land is cultivated in a year. Area is an important dimension which ought to be considered in evaluating land use pattern prevailing on farms in different size classes. The cropping pattern indicates the extent of area grown to each crop as a percentage to the total cropped area. Therefore, the study reveals that out of the total 524.10 hectares owned land, 92.35% of the land was cultivated, with the percentage of area under apple crop being 77.41% followed by the area under pear crop (6.56%), almond (3.64%), apricot (2.37%), and cherry crop (2.35%). However, a farm size analysis reveals that out of the total area owned, land under cultivation was decreasing with an increase in farm size in percentage terms for marginal farms (99.66%), small (97.08%), and medium farms (90.73%). When one looks at it from the land use pattern by different farm sizes, it is revealed that across all farm sizes, the maximum area comes under apple cultivation with 76.37%, 80.24%, and 76.83% for marginal, small, and medium farms, respectively. As far as pear and almond crop cultivation is concerned, these are the second and third most cultivated crops after apples across all farm sizes with 6.16%, 5.62%, 6.81% and 5.82%, 4.10%, and 3.38% for marginal, small, and medium farms, respectively. With respect to apricot and cherry cultivation, it shows decreasing trend with increasing farm size and it is revealed that fewer hectares of land were allotted across all farm sizes in the cultivation of both the crops.

Table 3 depicts the picture of cropping pattern of the Jubbal & Kotkhai block for the year 2018, which explains that 89% of the land was devoted for apple cultivation followed by pears (5.52%), almonds (2.28%), cherry (0.84%), and 0.70% for apricots. It reveals the dominance of apple production in the region, and it shows consistency with the current study.

From the study, it is observed that 92.35% of the land was cultivated of the total area owned of the study area, which is very high in comparison to the State (20%), District (17%), and Block levels (26%). However, it is also revealed from the study that apple constitutes of the maximum area under cultivation in comparison to the other fruits (pears, apricot, cherry, and almond), showing consistency with the state's cropping pattern, where 48.74% of the area was under apple cultivation out of the 60.98% of the total cropped area under temperate fruits production. In the block Jubbal & Kotkhai, 89.26% of the area was under apple cultivation followed by pears and other fruits.

Table 3. Cropping Pattern of Jubbal & Kotkhai Block for the Year 2018

Sr. No.	Name of Fruits	(Area in Hectares)	
		Area in Hectares	Percentage of the Total Area
1.	Apple	7,976.11	89.26
2.	Plum	22.55	0.25
3.	Peach	30.93	0.35
4.	Apricot	62.92	0.70
5.	Pear	493.32	5.52
6.	Cherry	74.65	0.84
7.	Kiwi	7.69	0.09
8.	Pomegranate	21.03	0.24
9.	Persimmon	4.00	0.04
10.	Almond	203.79	2.28
11.	Walnut	16.02	0.18
12.	Pecan nut	0.02	0.00
13.	Hazelnut	0.33	0.00
14.	Kagzi Lime	13.91	0.16
15.	Galgol	8.17	0.09
	Total	8,935.44	100.00

Note. Department of Horticulture, Government of Himachal Pradesh (2019).

Conclusion and Policy Implications

From the research, one can conclude that more than 90% of the land was cultivated and was used for production of different temperate fruits. It is also discovered that 100% of farm ownership belonged to farmers with no leasing in and leasing out. As far as the area under different fruit cultivation is concerned, it was found that more than 70% of land across all farm sizes was devoted to apple production followed by pears, almond, apricot, and cherry. Hence, it reveals the dominance of apple cultivation, which leads us to the following suggestion. Crop diversification is recommended in the study area as it leads to less dependence on one crop, not only to reduce the level of risk, but it also leads to optimum resource allocation, which can bring increasing returns to scale in different farm sizes.

Limitations of the Study

The present empirical investigation suffers from the following limitations :

↪ The study is based on the data collected for one reference year, that is, 2018 – 2019, which may not necessarily hold for other periods as well.

↪ The data used here were collected by survey method through personal interviews, face to face association with the farm respondents, and observation method at a single point of time. Hence, there is every possibility of memory bias. Usually, the maintenance of records by farmers was not in evidence in the study area. Therefore, the data on the current crop season was not quite reliable. Yet, the present study reduces the margin of error by using personal investigation.

↪ The sample size in the present study is quite small and confined only to the high hill agro-climatic zone. Therefore, due to variations in topography, climatic conditions, cropping patterns, and infrastructural facilities in the state, the results of the study cannot be applied for the state as a whole.

Authors' Contribution

Dr. Sikander Kumar conceived the idea and developed qualitative and quantitative design to undertake the empirical study. Dr. Kumar verified the analytical methods and supervised the study. Vishal Chauhan extracted research papers of high repute, filtered these based on keywords, and generated concepts and codes relevant to the study design. The data collection were done through interviews and numerical computations using Excel by Vishal Chauhan in consultation with Dr. Sikander Kumar.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter, or materials discussed in this manuscript.

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