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Agriculture Diversification in the Low Hill Zone Agrarian Economy of Himachal Pradesh

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Abstract - **The new agricultural policy which provides status of agriculture as industry is expected to provide new avenues for exports of agricultural products, improving earnings by assured markets and establishment of agro-based industries. As such the diversification in agriculture is considered a desirable change to meet ever increasing demand of cereals, pulses, oilseeds, vegetables, fodder, fiber, fruits, spices and condiments, medicinal and commercial crops. India has endowed with diverse climate and soil types by the nature which facilitates diversification in agriculture and considered to be the major strength in meeting out the food requirements of ever increasing population. Diversification in agriculture is considered to have large potentialities of increasing income and employment and providing strength through reduced instabilities particularly under the situation of risk and capital constraints. These considerations make a strong case for diversification under Indian conditions.**
Keywords: **Agriculture, Diversification, Low Hill Zone, Economy, Himachal Pradesh**

I. INTRODUCTION

India is a country of about more than one billion people. About 70 per cent of India's population lives in rural areas where the main occupation is agriculture. Indian agriculture is characterized by small farm holding. Average size of farm is 1.57 hectares only. Around 93 per cent farmers have land holdings smaller than 4 hectares and they operate nearly 55 per cent of the arable land. On the other hand, only 1.6 per cent farmers have operational land holdings above 10 hectares they operate nearly 55 per cent of the total cultivated land. Due to diverse agro climatic conditions in the country, a large number of agricultural items are produced. Broadly, these can be classified into two groups' food grain crops and commercial crops. Due to challenge of feedings our vast population and the experience of food shortages in the pre independence era, self-reliance in food grains has been corner stone of our policies in the past 60 years, around 66 per cent of the total cultivated area is under food grain crops.

Population growth lay at the centre of the world food problem. Together with rising income, population has more than doubled world demand for food and agriculture during the agriculture. Limited access to material inputs and know how the demand included the small farmers to benefit from them only slowly. Also considerable in equality in the distribution of land and accordingly in incomes, steady loss of good agricultural land to non-agricultural uses, shifts in priorities etc. all seems to exhaust the potentialities of green revolution. Agricultural diversification has emerged as an alternative to agriculture. Limited access to material inputs and know how the demand included the small farmers to benefit from them only slowly. Also considerable in equality in the distribution of land and accordingly in incomes, steady loss of good agricultural land to non-agricultural uses, shifts in priorities etc. all seems to exhaust the potentialities of green revolution. Agricultural diversification has emerged as an alternative to attain the objectives of output growth, employment generation and natural resource sustainability in the developing countries. The recent experience in Asia particularly southeast Asia, Middle East and North Africa indicates that policy makers and planners are increasingly focusing on agricultural diversification to promote agricultural development. In the initial stage of development farmers generally grow only subsistence crops. But as the demand for food increases as a result of growth in population, the farmers try to produce more to maximize total farm output and farm business income by using more of better inputs like irrigation, high yielding variety of seeds, fertilizers etc. However, the farmers specialize in the production of few crops only. Therefore, they again diversify their agriculture to strengthen the existing level of development. Diversification in agriculture is considered to have large potentialities of increasing employment and income and providing strength through reduced instabilities particularly under the situation of risk and capital constraints as revealed by several studies. These considerations make a strong case for diversification of agricultural economy as well as for crop diversification in Indian economy.

A. Need of the Study

The possibility of and need for agricultural diversification arise from several reasons. The world is not static; opportunities and problems facing producers and economy and its various sectors keep on changing. This necessitates adjustments and reorientation of production and reallocation of resources among various alternatives to take advantage of emerging opportunities and to face new problems, threats and challenges. New opportunities that make agricultural diversification beneficial result from technological breakthrough, changes in demand pattern, changes in

government policy, development of irrigation and other infrastructure and new trade arrangements.

Diversification becomes necessary since growing of basic problems such as cereals can't alone support economic development notwithstanding the need to ensure food security to the people. In the context of state agricultural diversification has occurred across and within crop, horticulture and vegetable production. In Himachal Pradesh there are four major objectives of agricultural diversification. First, to increase the income of small households, second to attain the fuller employment in the farm households, third to stabilize the farm income over the seasons, and fourth conservation and enhancement of natural resources. Diversification is an integral part of structural transformation of an economy. The agricultural diversification is not possible without appropriate infrastructure and institutional reforms. Agricultural diversification needs appropriate credit facilities for purchasing of inputs, high yielding varieties of seeds and other inputs like chemical, insecticides etc. The irrigated and unirrigated land also affects it.

Agricultural diversification requires high investment of capital and labour inputs. There is a need for development of not only appropriate farm production technology, but also processing and marketing technology. It also depends on availability of infrastructural facilities, which would link the local farmers with national and global market. Crop diversification is certainly an important component of overall strategy for small farm development, other dimensions such as livestock, diversification and occupational diversification are also equally important. A broader conception of diversification not only makes it relevant even for those without land, but also permits the gainful exploitation of the potential synergy among different aspects of diversification especially in terms of employment and income linkages.

B. Objectives of the Study

The specific objectives of the present study are

1. To study the impact of diversification on the income and employment of the selected households.
2. To analyze the factor which are responsible for agriculture diversification in the state.
3. To list the problems and explore the possibilities of Agricultural diversification in Himachal Pradesh.

C. Research Methodology

In order to achieve the above mentioned objectives, low hill zone has been purposively selected for the present empirical investigation on account of similar agro climatic conditions, cropping patterns, having good production potential, fertile soil, good road and communicational network, etc. Besides, all the major foodgrain crops viz., maize, paddy and wheat all are grown here. There are nine districts in low hill zone. Out of nine districts, one district i.e., Una was selected purposively which represents about 11 per cent sample of the zone at level and it was selected due to the reason that all major foodgrain crops grown there. There are 5 blocks in district Una. Out of the 5 blocks, 2 blocks were selected i.e., Una and Gagret, with the help of multistage random sampling which constitute nearly 40 per cent sample at the block level. At the second stage, 3 Panchayats in each selected block were selected. At the third stage, 4 Villages in each selected Panchayat were selected.

In addition to this, the selected categories of farms have further been divided into three size-classes viz., marginal farmers (below 1.0 hectare), small farmers (1-2 hectares), and medium farmers having more than (2 hectares). The data pertaining to the year 2013-14 were collected by survey method with the help of well-structured schedule from 200 farms consisting of 90 marginal,70 small and 40 medium selected randomly on the basis of probability proportional to the number of farms in each size class. In order to examine the nature and extent of agriculture diversification Herfindhal-Index is commonly used in the study area. The index has been computed by using the following method.

$$\text{Herfindhal Index} = \sum_{i=1}^{n} P_i^2$$

$$P_i = \frac{Ai}{\sum_{i=1}^{n} A_i}$$

in which A_i=Actual area under the ith crop (Hectare)
P_i= the proportion of area under ith crop (Hectare)

$\sum_{i=1}^{n} Ai$ = Total cropped area (hectare)

i=1, 2, 3,.....n (Number of crops)
N=Total number of crops

The index is defined as sum of the squares of all 'n' proportions and is a measure of concentration. For increasing diversification, H is decreasing and vice-versa. It is bounded by '0' means (complete diversification) and '1' means (complete specialization).

II. LITERATURE REVIEW

A general review of the literature of the period shows that the researchers were very much interested the changes in agriculture diversification in low hill zone of Himachal Pradesh over the years. The study conducted by Singh (1985) shows that the diversification of farm and nonfarm activities as a result of introduction of various rural development programmes has resulted in raising the level of income and employment of the rural poor to some extent. There is much scope to raise their standard of living by further diversification of agriculture on the one hand and development of cottage and small scale industries in the rural area on the other, so that they may be brought above

the poverty line. Madaliya (1985) also observed from the study that the success of the farms belonging to progressive area has been attributed to factors like favourable soil conditions, better irrigational facilities, larger area of remunerative cash crops, higher rates of use of farm input and larger herd size. The study showing the changes in agriculture diversification Ravi and Deenadayalu (1985), arrived at the conclusion that major drawback in the diversification process has been the lack of supporting infrastructure including fiancé etc. However, there is no dearth of literature relating to agriculture diversification.

The studies made by Azad (1985), Gill and Patel (1985), Pal and Pal (1985), Balishter (1985), Yadav (1985), Chawla and Chahl (1985), Sethi and Kanwar (1986), Bhatia and Tiwari (1990) etc., on the basis of various explanations favours agriculture diversification for income and employment purposes. Haque (1996), highlighted the problems and prospects of diversification of small farms in India. The study resulted that there is a need of vertical diversification in agricultural sectors. Moreover, if we want to promote the small farm diversification in various agro-climatic regions of the country then existing policies may have to be partly modified.

Pandey and Sharma (1996), Jha (1996), Singh (1996), Maji and Rahim (1996), in their studies revealed the significant quadratic response between crop diversification and income suggests that substitution away from the dominant crops particularly paddy does result in lost income. Crop diversification does not appear to have reached a level that result in reduced income. Chand and Chauhan (2002) explained that the agriculture diversification has emerged as an important alternative to attain the objectives of output growth, employment generation and natural resources substantially in the developing countries.

Jha (2008), Roy (2008), Shaw and Dave (2010), Satyasai and Premi (2015) in their studies they conclude that problem of food crisis can be eradicated when the area under food grains crops are increased. With this Government will be able to provide sufficient food to the people on responsible price through effective public distribution by using buffer stocks facilities. Wani (2011), revealed in his study that the hilly states have a lot of potential to accelerate agricultural growth through diversification from low to high value crops. Hill Eco-system offer tremendous scope to enhancing the farm income and creating job opportunities to the farmers. Hill agriculture has several niche areas having comparative advantage for better exploitation of resources and for better trade. Even though we have several constraints in hill agriculture, but we have opportunities to harness the production potential of surface water and agro climatic diversities that favours cultivation of fruits, vegetables and crops of industrial importance. It was observed that hill agriculture is gradually diversifying in favour of fruits and vegetables. Hill states have potential for production of vegetables in off-season that has higher demand in neighboring plains there is scarcity of supply.

Gautam *et al.,* (2014), Pathania (2015) have examined the changes in hill agriculture. The changes in land use pattern revealed that most of the geographical area of the state is under snow, river and in hospitable terrains. The limited availability of cultivable land was the basic feature of hill geography. It was noticed that the rate of growth of major cereals in the state was not significant to match the rate of growth of population. In order to meet the increasing demand for foodgrains, there was a need to increase the production of these crops through intensive introduction of improved agricultural technology.

III. RESULTS AND DISCUSSION

A. Socio Economic Characteristics Sample Households

The study of socio economic profile of the sampled farmers is of utmost importance in the organization and management of farms. The nature of ownership of land, family size, educational level of the farmers, household's income etc., play a vital role to provide some valuable feedback regarding the existing set-up of the farmers and the likely changes under the prevailing conditions. The demographical profile of the sample households are studied herewith reference to their size of holdings. The size distribution of holding is taken up as a proxy of economic status of the households.

For the purpose of the present study a sample of 200 households has been selected, which constitute 90 marginal, 70 small, and 40 medium holding groups. However, the distribution of sample population (i.e., male and females of different age groups falls among these holding groups) is presented in Table I. It is clear from the table that out of total population 1226 persons of the sample farms 643 males and 583 are females. The sample population contains 431 persons in marginal holdings, 410 persons in small holdings and 285 persons in medium holdings. There is only 26.17 per cent of population under this category. The persons above the age of 59 years are considered as "old persons".

There is only 13.67 per cent population belonging to this category. It can also be inferred from the above data that there is 40.04 per cent population is partially or wholly dependent population. Size-wise analysis reveals that total workforce in the age group of 15-59 years is the highest on small farms (60.82 per cent) as compared to marginal farmers (62.20 per cent) and medium farms (55.08 per cent). The less proportion of workforce on medium holdings is attributed mainly due to joint family. The proportion of overall working population (15-59 years) is about 59.94 per cent. The children are put under the category "below 15 years" system under which same workforce has also to support more children and old age persons.

TABLE I AGE AND SEX-WISE FAMILY COMPOSITION OF THE SAMPLE HOUSEHOLDS

Sl. No.	Age Group (in years)	Sex	Size Class Holdings (in Hectares)			
			Marginal Holdings (<1 hec.)	Small Holdings (1-2 hec.)	Medium Holdings (Above 2 hec.)	Overall Holdings
1	0-9	M	38 (7.15)	28 (6.83)	22 (7.72)	88 (7.18)
		F	42 (7.90)	32 (7.80)	19 (6.67)	93 (7.58)
2	9-15	M	35 (6.59)	22 (5.36)	15 (5.26)	72 (5.87)
		F	39 (7.34)	13 (3.17)	16 (5.61)	68 (5.54)
3	15-59	M	168 (31.64)	135 (32.93)	85 (29.82)	388 (31.64)
		F	155 (29.19)	120 (29.27)	72 (25.26)	347 (28.30)
4	59-65	M	19 (3.58)	19 (4.63)	15 (5.26)	53 (4.32)
		F	16 (3.01)	18 (4.39)	14 (4.91)	48 (3.92)
5	65 & Above	M	10 (1.8)	15 (3.65)	17 (5.96)	42 (3.43)
		F	9 (1.69)	8 (1.95)	10 (3.51)	27 (2.20)
6	Total Population	M	270 (50.84)	219 (53.41)	154 (54.03)	643 (52.45)
		F	261 (49.15)	191 (46.58)	131 (45.96)	583 (47.55)
		T	531 (100)	410 (100)	285 (100)	1226 (100)

Note: Figures in Parentheses denote percentage to column total, *M= Male; F= Female; T=Total

It is also clear from the table that percentage of population under this category 'old person' is (19.64 per cent) per cent which is highest on medium holdings group as compared to small farms (14.62 per cent) and marginal (10.08 per cent) respectively. The percentage of children is more on marginal farms i.e., (28.98 per cent) which are the highest on marginal holding group as compared to medium (25.26 per cent) and small farms (28.98 per cent).

TABLE II FAMILY COMPOSITION, AVERAGE FAMILY SIZE, PERCENTAGE OF WORKFORCE, PERCENTAGE OF DEPENDENTS, NUMBER OF STANDARD MANDAYS, SEX –RATIO AND LITERACY PERCENTAGE AMONG THE SAMPLE HOUSEHOLDS

Sl. No.	Particulars	Size Class of Holdings (in Hectares)			
		Marginal Holdings	Small Holdings	Medium Holdings	Overall Holdings
1	Total Number of Households	90	70	40	200
	S.C	26	12	2	40
	S.T	-	-	-	-
	O.B.C	34	21	14	69
	Others*	30	37	24	91
2	Total sample population	531	410	285	1226
3	Average size of the farm family	5.90	5.86	7.13	6.13
4	Percentage of family workforce	60.82	62.20	55.08	59.95
5	Percentage of dependents	39.17	37.80	44.91	40.04
6	Total standard man days	366	245.2	189.2	800.4
7	Per households man days	3.81	3.95	4.28	3.96
8	Total available man days (annum)	1395	968	811	3174
9	Sex -Ratio per Hundred male	97	87	85	91
10	Literacy percentage	74.20	62.93	81.40	72.10
	(a) Male	85.53	71.23	83.45	80.05
	(b) Female	62.87	54.63	79.45	65.82

Note: Others* means general category, S.C= Scheduled Caste, S.T. = Scheduled Tribe, O.B.C=Other Backward Classes

Table II gives us information regarding the average size of family, percentage of workforce; percentage of dependents, number of standard man days, sex ratio and literacy percentage for the sample farms. It is obvious from the table that out of 200 farms selected in study area, 90 falls in marginal, and 70 in small and 40 in medium holdings. As, can be seen from these data that no farm family falls in Scheduled Tribe category. Average size of the family has a tenancy to increase with farm size. It is mainly due to the fact that as farm size increases, the man/land ratio tends to decline and work-load per worker tends to increase. Therefore, the farmers of the study area will have a love for increasing family size as holding size increase which they can use it as a source of labour for agricultural production. However, percentage of family workforce (15-59) does not vary with farm size. Total standard man days have been worked out 366, 245.2, 189.2 and 800.4 on marginal, small, medium and all holdings. Similarly, per household standard man days have been estimated 3.81, 3.95, 4.28 and 3.96 in on marginal, small, medium and all holdings respectively. Sex-ratio per hundred male has worked out to be 97, 87, 85 and 91 for marginal, small, medium and all holdings. Literacy percentage among the sample households is found to be 74.20, per cent for the marginal holdings, 62.93, per cent for small holdings, 81.40 per cent for medium holdings and 72.10 per cent for all holdings.

The maximum literacy percentage is 81.40 percent on medium holding group attributed to better financial position and willingness for higher education. Similarly, male and female literacy rate is worked out to be 80.05 per cent and 65.82 per cent in among all the holdings together respectively. It can also be noticed that female literacy is growing with the size of holdings. It may be due to the willingness of female for education, better financial position and approachable education facilities etc.

TABLE III OCCUPATIONAL DISTRIBUTION OF THE SAMPLE POPULATION

Sl. No.	Particulars	Size Class of holdings (in Hectares)			
		Marginal holdings	Small holdings	Medium holdings	Overall holdings
1	Family labour force as percentage to total population	60.82	62.20	55.08	59.95
2	Share of partly or wholly dependent population	39.17	37.80	44.91	40.04
3	Workers as per cent to total labour force in the main activities:				
	a. Agriculture	56.99	57.86	53.02	55.95
	b. Labour	20.0	13.02	7.12	13.38
	c. Services	16.95	21.03	29.10	28.54
	d. Rural Artisans	-	-	-	-
	e. Business	4.23	7.12	6.12	5.82
	f. Others*	9.12	5.02	8.10	9.98

Note: Others* includes religious work, barbering, tailoring etc.

Further light on the family labour force scenario is thrown by the data given in Table III. Here it can be seen that more than 55.95 per cent labour force is engaged in agricultural activities, followed by 28.54 per cent in services, 13.38 per cent in labour activities and 9.98 per cent in others. But it is found that no one is engaged in rural artisans occupation from the sample collected during the survey. It is also clear from the table that there is a declining tendency of the labour force in agricultural as well as laboring activities with the increase in farm size while there is an increasing tendency in service sector activities with the increase in farm size.

The percentage of family labour force engaged in business activities is more on small farms as compared to that marginal and medium size of holdings. In all type of farms, none of the farmers is found to be engaged in artisan's activities. The percentage of partly or wholly dependents population is more on medium holding as compared to marginal and small holdings.

It can be seen from the Table IV that the percentage of irrigated area under owned land is more on medium farms (i.e., 85.96 per cent) as compared to their counterparts in both of periods. Mean size of holding is worked-out for marginal, small and medium holdings i.e., 0.833, 1.490 and2.752 hectares respectively. Size of all holdings is 1.446 hectares out of which 1.436 hectares is owned land and 0.010 hectares is leased out land. It is found that there is zero hectares area under leased-in land.

Irrigation is the major factor to determine the level of production of different crops apart from having complimentarily with the use of other technical inputs such as improved seeds and fertilizers. The major source of irrigation for the sample farm of Una and Gagret blocks was tube wells operated by electronic motors, diesel engines. But it is found during the survey that the maximum land of Una block having irrigational facilities as comparison to Gagret block. It is due to the fact that there are a few differences in cultivated land in both of the blocks.

TABLE IV EXTENT OF TENANCY- AREA UNDER FARM IN HECTARES

(Area in hectares)

Sl. No.	Items	Size Class of Holdings			
		Marginal Holdings	Small Holdings	Medium Holdings	Overall Holdings
1	Total owned land	0.825 (99.03)	1.478 (99.19)	2.738 (99.49)	1.436 (99.30)
	i. Irrigated	0.633 (75.99)	1.220 (81.87)	2.211 (85.96)	1.168 (80.77)
	ii. Un-irrigated	0.156 (18.72)	0.257 (17.25)	0.537 (20.87)	0.268 (18.53)
2	Leased-in Land	Nil (0.0)	Nil (0.0)	Nil (0.0)	Nil (0.0)
	i. Irrigated	Nil (0.0)	Nil (0.0)	Nil (0.0)	Nil (0.0)
	ii. Un-irrigated	Nil (0.0)	Nil (0.0)	Nil (0.0)	Nil (0.0)
3	Leased-Out land	0.007 (0.84)	0.012 (0.80)	0.014 (0.544)	0.010 (0.69)
	i. Irrigated	0.007 (0.84)	0.008 (0.53)	0.014 (0.544)	0.009 (0.62)
	ii. Un-irrigated	Nil (0.0)	0.003 (0.20)	Nil (0.0)	0.001 (.069)
4	Mean Size of Holding A+B+C	0.833 (100)	1.490 (100)	2.752 (100)	1.446 (100)

Note: Figures in Parentheses denote percentage to column total

In Una block maximum land is plain and farm size is quite suitable for modern agriculture whereas in Gagret block some part of land is plain and some of the part is hilly as like other district of Himachal Pradesh. Due to some different farm nature, there is less irrigational facilities in Gagret block as compared to block Una.

TABLE V SUMMARY OF SOCIO-ECONOMIC CHARACTERISTICS

Sl. No.	Indicators	Size Class of Holdings (in Hectares)			
		Marginal Holdings	Small Holdings	Medium Holdings	Overall Holdings
1	Average Family Size	5.90	5.86	7.13	6.13
2	Percentage of work force	60.82	62.20	55.08	59.95
3	Percentage of dependants	39.17	37.80	44.91	40.04
4	Literacy percentage	74.20	62.93	81.40	72.10
5	Sex Ratio (Per 100 males)	97	87	85	91
6	Size of Holding (Hect.)	0.833	1.490	2.752	1.446
7	Cropping Intensity	192.83	209.74	222.28	210.11
8	Value of Agricultural implements(Rs.)	19817	40990	42463	27817
9	Value of livestock (Rs.)	14277	16128	20784	17062
10	Household income per month (Rs./ Household)	10682.18	16904.41	22838.41	16808.33
11	Household Expenditure per month (Rs./ Household)	11218.09	10304.64	17858.75	13127.16
12	Average Propensity to Consume	1.05	0.78	0.78	0.78

The result of some of the important socio-economic characteristics have been summarized and presented in Table V. It is noted that average family size came out to be about 6.13. It is increasing with the holding size also. Overall percentage of workforce is estimated to 59.95 per cent of total sample population which is engaged in various economic-activities. The literacy level is found more on medium holding groups as compared to their counterparts due to their better financial position and willingness to education to get good opportunities in other occupations. Overall literacy rate is worked out to be 72.10 per cent. Similarly, sex-ratio is found to be 91 females per 100 males. The ratio is found less on small and medium holding groups. During the survey period it is found that educated unemployment have put pressure on the boys of age group between 20-30 year remain yet bachelor which slightly is not in the favours for sex-ratio on small and medium groups. On the other hand, a person who have 2 or 3

shareholders, after marriage get separation from the parental home and owns a title of marginal farmer which slightly favors sex-ratio in this holding group. Size of holding is worked out to be 1.446 hectares. It is also clear from the table that cropping intensity is increasing with the increase in farm size indicating more use of available land for agricultural purpose. Similarly, value of all minor and major agricultural implements per farmer is worked out to be Rs. 27817. The per household per month income and consumption expenditure is estimated about Rs. 16808 and Rs. 13127 respectively indicating a surplus of Rs. 44172 per annum which can be utilized to improve the land productivity. The overall value of livestock is worked out to be Rs. 17062 and is increasing with the increase in farm size. The average propensity to consume is less than one on small and medium farms indicating higher capacity to save whereas it is greater than one on marginal farms indicating lower capacity to save.

B. Agriculture Diversification in Low Hill Zone

Agricultural diversification in the study area for 2013 and 2014 is estimated by Herfindhal index and presented in Table VI and VII. The tables revealed the area under major crops commonly grown in the study area in 2013 and 2014. Wheat crop has accounted for maximum area and followed by maize, paddy and other crops in 2013 as well as in 2014 for marginal, small and medium holdings respectively.

The value of Herfindhal Index in 2013 and 2014 was less than zero which shows that there exists complete diversification in the study area. In 2013 the value of Herfindhal Index for marginal, small, medium and overall holdings was 0.3161, 0.3551, 0.3152 and 0.3192 on the other hand in 2014, the value of index are same holdings are 0.3182, 0.3404, 0.3338 and 0.3394 respectively.

TABLE VI CHANGES IN AGRICULTURE DIVERSIFICATION IN THE STUDY AREA-2013

(Area in hectare)

Sl. No.	Items	Farm Size							
		Marginal Farmers		Small Farmers		Medium Farmers		Overall Farmers	
		(Ai)	P_i^2	(Ai)	P_i^2	(Ai)	P_i^2	(Ai)	P_i^2
1	Rice	1218.6	0.046	1017.8	0.019	706.0	0.022	8700.0	0.023
2	Maize	1526.4	0.073	1786.4	0.063	1104.0	0.053	14008	0.058
3	Wheat	2531.7	0.194	3729.6	0.270	2285.6	0.230	27710	0.228
4	Vegetab-les	301.5	0.003	351.4	0.002	456.4	0.009	5874.0	0.010
5	Others	58.5	0.0001	241.5	0.0011	169.2	0.0012	1666.0	0.0007
		5636.7	$\sum_{i=1}^{n} P_i^2 =$ (0.3161)	7126.7	$\sum_{i=1}^{n} P_i^2 =$ (0.3551)	4721.2	$\sum_{i=1}^{n} P_i^2 =$ (0.3152)	57958	$\sum_{i=1}^{n} P_i^2 =$ (0.3192)

Note: (Ai) =Area under different crops in hectare,
(P_i^2)=Proportional area under i^{th} crops

TABLE VII CHANGES IN AGRICULTURE DIVERSIFICATION IN THE STUDY AREA-2014

(Area in hectare)

Sl. No.	Items	Farm Size							
		Marginal Farmers		Small Farmers		Medium Farmers		Overall Farmers	
		(Ai)	P_i^2	(Ai)	P_i^2	(Ai)	P_i^2	(Ai)	P_i^2
1	Rice	1250.1	0.036	1074.5	0.019	706.0	0.019	9378.0	0.024
2	Maize	1738.8	0.067	1866.9	0.057	1146.8	0.053	14932	0.061
3	Wheat	3004.2	0.212	3932.6	0.260	2469.2	0.255	30258	0.250
4	Vegetab-les	360.9	0.003	427.7	0.003	305.2	0.004	3550.0	0.003
5	Others	88.2	0.0002	294.7	0.0014	260.4	0.0028	2340.0	0.0014
		6442.2	$\sum_{i=1}^{n} P_i^2 =$ (0.3182)	7596.4	$\sum_{i=1}^{n} P_i^2 =$ (0.3404)	4887.6	$\sum_{i=1}^{n} p_i^2 =$ (0.3338)	60458	$\sum_{i=1}^{n} P_i^2 =$ (0.3394)

Note: (Ai) =Area under different crops in hectare
(P_i^2) = Proportional area under i^{th} crops

It is found that there exists diversification in agriculture of study area on the basis of holding individually as well as on the basis of overall holdings in 2013 and 2014. The study of agricultural diversification on the basis of primary as well as secondary data shows that the farmers of district Una rapidly adopt the new technology of farming for increase the productivity of crops as compared to other districts of Himachal Pradesh. It is due to the fact that there is a different geographical condition of Una district in comparison to other district of Himachal Pradesh.

Una district is about plain and a very little area of it lying under hilly area in comparison to other districts of the state. The new agricultural technology can be easily adopted in Una that is the reasons the farmers of Una district are growing high value cash crops rather than other subsistence crops. It is clear from the study that there is a vast scope of agricultural diversification in all of crops in the study area.

IV. CONCLUSION AND FUTURE POLICY IMPLICATIONS

The study of socio-economic conditions of the sampled households indicated Thus there was a tendency of increasing family size with the increase in holding size. It was mainly due to the fact that as farm size increases, the worker/land ratio tends to decline and work-load per worker tends to increase. Thus, it can be concluded that the farmers of the study area still have a love for increasing family size as holding size increase which they can use as a source of labour for agricultural production. The sex-wise literacy percentage for male and female was 80.05 per cent and 65.82 per cent respectively. The growing tendency for higher education was observed with the increase in size of holdings. It may be due to the willingness of the people for higher education, approachable education facilities provided by the state government and the better financial position of the sample households to get good opportunities for the selection of other occupations.

The overall sex-ratio at per hundred male was found to be 91. The study of occupational distribution revealed that about 56 per cent of the total family workforce is engaged in agricultural activities. The persons engaged in agricultural activities had a tendency to decrease with the increase in holding size. It may be due to their better financial position and willingness to get other occupations as the literacy rate is also high on medium holding group.

The percentage of family labour force engaged in other occupations was 28.54 for services, 5.82 for business activities, 9.98 for other occupations mentioned above. The willingness of sample households for Govt. services was found to be higher due to high literacy rate among the holding groups and economic security, social security and social status are the other factors which attract the people of the study area towards this sector. But the lack of employment opportunities in this sector forced them to remain engaged in agricultural activities. Hence, labour is being predominantly used in agricultural activities. The study of extent of tenancy revealed that 180 farmers were found to be purely-owner cultivator, 20 were found to be leasing-out land. The consumption expenditure has been increasing with the increase in holding size. On the basis of household income and consumption expenditure average propensity to consume has been worked out to be 0.78. Thus, a farmer was found to be able to save about Rs. 44174 per annum which can be utilized to improve the land productivity.

The result of agriculture diversification is calculated with the help of Herfindhal Index on the basis of collected primary data for the year 2013 and 2014. For the calculation of diversification of agriculture only major crops grown in the study area is taking into consideration i.e., wheat, maize and paddy. The maximum area was accounted for wheat crop followed by maize and paddy. The value of Herfindhal Index in 2013 was 0.3161, 0.3551 and 0.3152 for marginal, small and medium holdings whereas in 2014, these values were 0.3182, 0.3404 and 0.3338 for marginal, small and medium holdings respectively. The value of overall index in 2013 was 0.3192 and in 2014 was 0.3394. In short, the value of Herfindhal Index in all type of holdings in 2013 and 2014 was equal to zero which shows that there exist agricultural diversification in the study area.

From the study it has been observed that there exist some problems/ constraints in the agricultural sector of Himachal Pradesh as well as in the study area. Himachal Pradesh is one of the states, which could not be much benefitted through new farm technology. This has mainly due to poor production base in terms of irrigation facilities, mountainous topography etc.

Some of the major constraints are

a. Farming on Tiny and Terraced Holdings,
b. Lack of irrigational facilities
c. Lack of road infrastructure, marketing and processing facilities and
d. Lack of adoption of new farm technology etc.

Hence after discussing the research problem in detail the following measures be suggested for the diversification of the agricultural economy of the state in general and for the low hill zone agrarian economy in particular.

1. Farmers of selected area have shown a preference for cereals crops. The policy makers should provide adequate incentives for the promotion of other crops categories like vegetables, oilseeds etc. Being cash crops, these will improve the financial position of the farmers.
2. Horticulture has almost been neglected in the study area, fruits like mangos, grapes; patharnakh, keno and lemon have got much production potentials as compared to other areas.
3. The study of farm size and productivity relationship indicated that there exists an inverse relationship

between the two. Again, land distribution in the study area is highly unequal and there are wide disparities of fragmentation of land holdings in spite of ceiling of Land Holding Act. So, with the application of Land Reforms will be helpful for improving the negative relationship between farm size and productivity.

4. Keeping in view the local conditions like environment, climatic and availability of fodder etc. the research and development organization in the state should concentrate on the development of more high yielding variety of seeds which must be stalk rot resistant and early maturing with high yield potential.
5. Although the district agricultural department has done a lot of work in distributing HYVs yet crop like paddy have not much increase in area devoted to it. Thus, paddy should also promote specially through provision of more irrigational facilities
6. In the study area the problem of stray - animals like cow, swine, fox, rabbit, and bird have passed a serious threat to agricultural sustainability. Huge bulk of crops are destroyed and eaten by these stray-animals before harvesting. Therefore, government should carry out a suitable programme in order to provide relief to the farmers of the study area. Labour under MANREGA programme should be utilized for the take care of crops in Himachal Pradesh as well as in the study area.
7. The role of institutional credit in the adoption of modern technology and improved agricultural practices cannot be overemphasized. However, our sample farmers are able to record a surplus income but the returns from the cultivation of these crops are not viable as indicated by the study of returns. As our sample farmers own only few assets related to modern technology, the government should provide adequate and timely supply of institutional credit at low interest rate and without third party guarantee to the farmers for the purchase of these critical inputs. There is also a need to encourage credit flow to agriculture sector to purchase these modern inputs.
8. To strengthen the process of agricultural diversification, the necessary steps should be taken by the agricultural department of the study area in providing basic infrastructure to the farmers for agricultural development.

In addition to above, the implementing authorities should implement strictly all the policies and programmes of the Centre and State governments in later and spirit for the benefit of the farming community and agriculture development of the state as well as of the study area. In spite of strenuous efforts made by the state government for the agriculture development and agricultural diversification in the study area, it also becomes, imperative on the part of the state to show seriousness on the suggestions and it is anticipated that these suggestions will ensure judicious and utilization of resources which in turn improve the level of production thereby lead to an improvement in well-being of farm families.

REFERENCES

[1] B. Gangwar, "Diversification in farming systems," *Agriculture Situation in India,* Vol. 600, 2004.

[2] J. Bhatia and S. K. Tiwari, "Diversification, Growth and Stability of Agricultural Economy in Uttar Pradesh," *Agriculture Situation in India,* 1990.

[3] C. R. Hazra, "Diversification in Indian agriculture," *Agriculture Situation in India,* pp. 409-421, 2001.

[4] J. Bhatia and S. K. Tiwari, "Diversification, Growth and Stability of Agricultural Economy in Uttar Pradesh," *Agriculture Situation in India,* 1990.

[5] R. Chand, "Agricultural Diversification in India," *Mittal Publication,* pp. 1-2, 1999.

[6] K. P. Chand, R. Singh and M. L. Sharma, "Diversification of Agriculture in Himachal Pradesh - A Spatio temporal analysis," *Agriculture Situation in India,* 1986.

[7] R. Chand and S. Chauhan, "Socio-Economic Factors in Agricultural Diversification in India," *Agriculture Situation in India,* Vol. 524, 2002.

[8] H. R. Sharma "Agricultural Development and Crop Diversification in Himachal Pradesh: Understanding the pattern, processes, Determinants and Lessons," *Indian Journal of Agricultural Economics,* pp. 71-74, 2005.

[9] R. I. Singh, G. N. Singh and S. D. S. Senghar, "Impact of Diversification in Agriculture on level of Income and Employment of Rural Poor in district Kanpur U.P.," *Indian Journal of Agricultural Economics,* Vol. 11, No. 3, pp. 340, 1985.

[10] V. K. Madalia, "Diversification in Farming and Its Impact on Farm Income and Employment - A Study of Mehsana District in Gujarat State," *Indian Journal of Agricultural Economics,* Vol. 11, No. 3, pp. 336, 1985.

[11] Ravi and P. D. Deenadayalu, "Diversification of Rural Economy - A Case Study of Chickmanglur district Karnataka," *Indian Journal of Agricultural Economics,* Vol. 11, No. 3, pp. 339, 1985.

[12] M. P. Azad, R. N. Yadav and C. P. Singh, "Why Mixed Farming for Marginal and Small Farming? A Case Study," *Indian Journal of Agricultural Economics*, Vol. 11, No. 3, pp. 339, 1985.

[13] G. S. Gill and R. K. Patel, "Diversification of Farm Production Patterns in the Rural Economy of Cotton Belt of the Punjab," *Indian Journal of Agricultural Economics,* Vol. 11, No. 3, pp. 341, 1985.

[14] D. Pal and G. P. Pal, "Crop Diversification, Its Causes and Impact on the Farm Economy," *Indian Journal of Agricultural Economics,* Vol. 11, No. 3, pp. 342, 1985.

[15] R. K. Balishter Singh, and R. Singh, "A Study of Diversification of Agriculture in Agra District of Uttar Pradesh," *Indian Journal of Agricultural Economics,* Vol. 11, No. 3, pp. 343, 1985.

[16] S. R. Yadav, O. O. Rana, T. R. Singh and H. K. Nigam, "Pattern of Income and Its Disposal under Diversified Farming in District Kanpur," *Indian Journal of Agricultural Economics,* Vol. 11, No. 3, pp. 344, 1985.

[17] J. S. Chawla and T. S. Chahal, "Towards Diversification in Punjab Agriculture (A Case Study)," *Indian Journal of Agricultural Economics,* Vol. 11, No. 3, pp. 345, 1985.

[18] A. S. Sethi and R. S. Kanwar, "Diversification of Factors Affecting Sugarcane and Sugar Production in India," *Agricultural Situation in India,* pp. 1103-1106, 1986.

[19] J. Bhatiya and S. K. Tewari "Diversification, Growth and Stability of Agricultural Economy in UP," *Agricultural Situation in India,* pp. 397-403, 1990.

[20] T. Haque, "Diversification of Small Farms in India Problems and Prospects," *National Center for Agricultural Economics,* pp. 13-17, 1996.

[21] V. K. Pandey and K. C. Sharma "Crop Diversification and Self Sufficiency in Food Grains," *Indian Journal of Agricultural Economics,* Vol. 51, No. 4, pp. 644-651, 1996.

[22] D. Jha, "Rapporteor's Report on diversification of Agriculture and Food Security in the context of new economic policy," *Indian Journal of Agricultural Economics,* Vol. 51, No. 4, pp. 829-832, 1996.

[23] R. P. Singh, "Farm level Diversification in Dryland Region in India, Diversification of Small Farms in India: Problems and Prospects," *NCAER,* pp. 45-54, 1996.

[24] C. C. Majhi and M. B. Rahim, "An Investigation into Small Farm Diversification: Some Case Studies in West Bengal, Diversification of Small Farms in India, Problems and Prospects," *NCAER,* pp. 45-54, 1996.

[25] R. Chand and S. Chauhan, "Socio- Economic Factors in Agricultural Diversification in India," *Agriculture Situation in India,* pp. 523-529, 2002.

[26] B. Jha, "Was Crop Diversification responsible for the Recent food crisis in India," *Agriculture Situation in India,* Vol. 65, pp. 341-353, 2008.

[27] B. C. Roy, "Fruit and Vegetable Processing in India and its Role in Agricultural Development," *Indian Journal of Agricultural Economics,* Vol. 63, No. 3, pp. 380-381, 2008.

[28] J. Shah and D. Dave, " A shift from crop mix traditional dairying to market organised Dairy farming-plousible factors responsible for structural transformation in Indian dairy sector," *Indian Journal of Agricultural Economics,* Vol. 65, No. 2, pp. 298-306, 2010.

[29] M. H. Wani, "Hill Agriculture in India; Problems and Prospects of Mountain Agriculture," *Indian Journal of Agricultural Economics,* Vol. 66, No. 1, pp. 64-66, 2011.

[30] K. J. S. Satyasai and S. Premi, "Growth and Diversification Patterns in Indian Agriculture: District Level Analysis," *Agricultural Economics Research Review,* Vol. 28, pp. 1-10, 2015.

[31] M. Gautam, Bajpai and R. Singh, "Impact of Irrigation on Resource Use Efficiency in Crop Production of Himachal Pradesh," *Agricultural Situation in India,* pp. 5-10, 2014.

[32] M. S. Pathania, "Changes in Hill Agriculture: A Case Study of Himachal Pradesh," *Agricultural Situation in India,* pp. 16-21, 2015.