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AGRICULTURAL DEVELOPMENT IN HIMACHAL PRADESH: A DISTRICT LEVEL ANALYSIS

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Abstract

The present paper aims at examining the levels of agricultural development in Himachal Pradesh. It also attempts to bring out the spatial variations in the levels of agricultural development during four triennium periods i.e. 1972-75, 1982-85, 1993-96 and 2003-06. The study is entirely based on secondary data collected from various published and unpublished records of the Directorates of Land Records, Horticulture, Agriculture and Census Operations, Himachal Pradesh. In order to examine the level of agricultural development in Himachal Pradesh a set of 11 indicators have been selected. As these indicators are of different nature and character, "z" score has been used to standardise them. On the basis of composite mean scores, the districts have been categorised into three classes-low, medium and high, which clearly shows the spatial pattern and level of agricultural development in Himachal Pradesh. The study brings out that even after lapse of three and half decades, a slight improvement has been observed in level of agricultural development in the state. The study reveals that districts having better and assured irrigation facilities, high cropping intensity, large share of net sown area, high application of bio-chemical inputs, large size of operational land holdings and high level of agricultural yield enjoyed high levels of agricultural development.

Introduction

Food constitutes the first and one of the most fundamental needs of human beings. No nation can hope to flourish in the environment of political, economic or social stability without securing ample and nutritious food for its population either through domestic production or imports. Since agriculture fulfils this basic need of human existence, it naturally assumes a place of cardinal significance in the world economy (Virk, 1983). Agriculture a prime source of food is also a source of raw materials for various agro-based industries. Agricultural development increases the purchasing power of the rural poor and helps the growth of non-agricultural sector by providing a market for increased production of industries. In most of developing countries including India, agriculture constitutes the backbone of their national economies and occupies a place of topmost priority. Development of agriculture is the logical and necessary starting point for the general economic development for a country like India. India is predominantly agricultural and over-populated and suffers from an appalling

inequality in income level between its rural and urban sectors. Reduction in this disparity of income demands that high priority may be accorded to agriculture (Pandit, 1983).

The agrarian nature of Indian economy is evident from the fact that about two-thirds of the country's population is still dependent on agriculture. Although, the share of agriculture in the gross national product has declined from 60 per cent in 1951 to 20 per cent in 2006, it still forms the core of India's economy. Besides meeting the food necessities of India's huge population (1.2 billion), supplying raw materials to industrial sector, employing a large proportion of the labour force, agriculture still earns considerable amount of valuable foreign exchange (Singh and Singh, 2006). India has initiated the planned development right from the inception of first five year plan with a view to bring about a structural transformation in the economy to provide the material base for a self-reliant socialist economy. In agricultural sector, the nation has decided to follow the course of massive induction of technology i.e. farm implements, irrigation systems, improved varieties of seed, chemical fertilizers, insecticides and pesticides. The new technology began to bear the fruits as early as mid-fifties of 20th century, but an outstanding breakthrough in production could be achieved only in mid-sixties, when several package schemes and new strategies were adopted for the development of agriculture. This phenomenon was hailed world over as the Green Revolution of India (Mohammad, 1997). But Green Revolution has not been successful in all the states of India, as there are many factors which hinder the development of agriculture especially in mountainous states like Himachal Pradesh.

There are different variables which determine the development of agriculture of any region. Among them irrigation, size of operational holdings, application of bio-chemicals i.e. fertilizers, pesticides and HYV seeds are considered major indicators of agricultural development. Irrigation plays a decisive role in the cropping pattern, intensity of cropping, crop combination and extent of yield. Besides, the adoption and success of new and high yielding varieties of seeds, application of chemical fertilizers and pesticides is also closely associated with the provision of assured irrigational facilities (Annual Season and Crop Report, 2006). The size of operational land holdings often decides the financial status of the farmers which further determines the capacity of a farmer to invest in irrigation and other modern agricultural inputs i.e. fertilizers, pesticides and HYV seeds (Sharma, 1997). Moreover, the size of the farm decides the degree of risk that a farmer may bear, i.e. larger the size of operational holdings, greater the capacity of the farmer to take the risk and vice-versa. This, in turn, affects the extent of specialization and also the quantity of agricultural inputs to be used.

Himachal Pradesh has emerged as one of the leading states in the country in social development, hill area development and horticulture. Agriculture is the main occupation of the people of Himachal Pradesh. It has an important place in the economy of the state. The state of Himachal Pradesh is the only state in country whose 89.96 per cent population lives in rural areas (Census of India, 2011). Therefore, dependence on agriculture and horticulture has assumed greater significance as it provides direct employment to the workers of the state. The state is major producer of apples and quality seed potatoes and is known as apple state of India. The pressure of population on agriculture is also heavier in Himachal Pradesh. It is, therefore, obvious that

the development of agriculture holds the key to the progress of the state. The economy of Himachal Pradesh is largely dependent on agriculture which still occupies a significant place in the state economy as 16 per cent of total state domestic product (2010) was generated by agriculture and allied sectors and any fluctuations in the production of food-grains affect the economy significantly (Economic Survey, 2011).

Agricultural development is a multi-dimensional process. It is a key element of rural development in Himachal Pradesh. Agricultural development enhances social and cultural advancement due to an increase in per capita income. As a result, there is an overall improvement in the way of life which gets expression in the level of education, health care, better housing and so cultivators are able to make use of technology and practice improved methods of farming. There is a legitimate aspiration of the people in rural areas to improve their standard of living and to share the fruits of development. The agricultural development is a pre-requisite of economic growth in hilly state of Himachal Pradesh. Therefore, in this study, an endeavour has been made to assess the agricultural potential and the levels of development at the district level in the state.

Geographical Personality of the Study Area

Himachal Pradesh is geographically located between 30°22'44" to 33°12'44" North latitudes and 75°45'44" to 79°04'20" East longitudes. It has a geographical area of 55,673 km², which covers about 1.69 per cent of total area of India and supports 68,64,602 persons, which embraces about 0.57 per cent population of the country (Census of India, 2011). The study area comprises of 12 administrative districts. Himachal Pradesh is a hilly and mountainous state, which is separated by Shiwalik hills from the monotonous plains of Punjab. Himachal Pradesh has unique landmass represented by mountainous ranges, hills and valleys. Prominent features include the snow-clad peaks, which are visible even from the Punjab plains. Generally, elevation of study area increases as one move from south towards north. The study area is traversed by Shiwalik, Dhauladhar, Pirpanjal, Zanskar and Great Himalayan ranges.

The Department of Agriculture, Himachal Pradesh has divided the soils of the state into five groups based on climate and altitude. These include; (i) Low hill soil zone which extends up to an elevation of 900 metres. The soils are shallow and embedded with stones. The areas under this zone are suitable for cultivation of wheat, maize, sugarcane, ginger, paddy and citrus fruits. (ii) Mid-hill soil zone extends between 900 and 1500 metres.The soils are loam to clay-loam in texture with greyish brown colour and are well drained. These areas are suitable for growing potatoes, maize and stone fruits. (iii) High hill soil zone extends between 1500 and 2100 metres and have developed on steep slopes with good drainage. The soil is good for seed potatoes and temperate fruits. (iv) Mountainous soil zone extends between 2100 and 3000 metres. The soils are shallower in depth than the high hill soils. These soils are not very much used for agricultural purpose sand (v) Cold arid soil zone are found in Lahaul and Spiti, Pangi and Kinnaur where monsoonal rainfall is small or negligible. These soils are well suited for dry fruit cultivation. The state is drained by a number of rivers and streams. Most important among them are Satluj, Chenab, Ravi and Beas rivers. The great diversity in surface configuration, variation in elevation and the geographical location together has resulted into

diverse climatic conditions of the state. These climatic conditions vary from hot and sub-humid tropical in the southwest to temperate, cold alpine and glacial in the northern parts.

Objectives of the Study

The present study has been undertaken with the following objectives:

- To study the pattern of agricultural development in Himachal Pradesh at district level.
- To study the processes of change in the levels of agricultural development in Himachal Pradesh.

Materials and Methods

The present study is based on secondary data collected from various published and unpublished records of Directorates of Land Records, Horticulture, Agriculture and Census Operations, Himachal Pradesh. In order to examine the levels of agricultural development in Himachal Pradesh following 11 indicators have been selected:

i) Irrigation intensity (%)
ii) Cropping intensity (%)
iii) Share of net irrigated area to net sown area (%)
iv) Share of net sown area to total geographical area (%)
v) Share of agricultural labourers to total workers (%)
vi) Average size of operational land holdings (ha)
vii) Consumption of fertilisers (kg/ha) of gross cropped area
viii) Consumption of pesticides (kg or lit/000 ha) of gross cropped area
ix) Share of area under high yielding variety seeds to gross cropped area (%)
x) Share of area under commercial crops to gross cropped area (%)
xi) Average yield of food grains (kg/ha)

As the selected variables are of different nature and volume, they have been converted into comparable units by standardizing them with the help of following formula:

$$Zi = X_i - \bar{x} / s.d.$$

where Z_i = standard score for ith observation,
X_i = original value of the observation,
$\bar{x}$ = mean for all the values of X,
s.d. = standard deviation of X.

Further, the results of the standard score obtained for different indicators have been aggregated to obtain composite standard score so that the regional disparities in the levels of agricultural development of districts may be brought out on a common scale. The composite standard score may be algebraically expressed as:

$$C.S.S. = \frac{\Sigma Z_i J}{N}$$

where, $Z_i J$ indicate 'Z' score of an indicator J in district $_i$
N refers to the number of indicators.

All the data have been arranged in descending order. In order to classify the districts as per the magnitude of development, the composite mean z score values have been divided into three classes of high (> + 0.20), medium (-0.20 to + 0.20) and low (< - 0.20). The maps showing the spatial variations in the level of agricultural development have been prepared using Arc GIS 9.3 package.

Scope and Period of Study

The present study is based on district-wise analysis of agricultural data of the state. It covers a time period of about thirty four years confined to four triennium periods i.e. 1972-75, 1982-85, 1993-96 and 2003-06. The first triennium (1972-75) is the time period for which secondary data relating to different variables of agricultural development were available at district level. In order to bring out

the broad pattern of agricultural development an interval of about a decade has been considered for subsequent time periods. The last triennium is 2003-06, for which latest secondary data pertaining to different indicators of agricultural development are available at the district level.

Results and Discussion

Trends in Level of Agricultural Development

i) **Levels of Agricultural Development, 1972-75 :** It is evident from Table 1 and Fig. 1, three districts namely Kangra (+0.44), Sirmaur (+0.43) and Hamirpur (+0.21) enjoyed high levels of agricultural development (> +0.20) during 1972-75. High irrigation and cropping intensity, large share of net sown area, high percentage of agricultural labourers and high percentage of area under commercial crops were the factors which resulted into high levels of agricultural development in these districts during 1972-75. Six districts namely Lahaul and Spiti, Una, Shimla, Solan, Bilaspur and Mandi registered moderate levels of agricultural development with z-score ranging between -0.20 to +0.20. The level of agricultural development was very low i.e. (< -0.20) in remaining three districts namely Kullu (-0.70), Chamba (-0.39) and Kinnaur (-0.30). Low cropping and irrigation intensity, small share of net sown area, low percentage of agricultural labourers, low percentage of area under commercial crops, low yield level of food grains and mountainous topography resulting into steep slope, small size of operational land holdings and infertile soils were responsible for low levels of agricultural development in these districts during 1972-75.

ii) **Levels of Agricultural Development, 1982-85 :** Table 2 reveals that Hamirpur district witnessing high level of agricultural development during 1972-75 recorded moderate level of development during 1982-85. The downfall of Hamirpur district from high to moderate level of development could be attributed to massive decline in irrigation intensity (Table 2), slight decline in net sown area and fragmentation of operational holdings due to increasing population pressure during first half of 1980s.While the phenomenal rise of Bilaspur district happened due to the improvement in irrigation intensity, cropping intensity and growing consumption of pesticides during early 1980s (Table 2). It shows that three districts namely Sirmaur (+0.48), Kangra (+0.30) and Bilaspur (+0.25) enjoyed high level of agricultural development during 1982-85. Six districts namely Una, Lahaul and Spiti, Solan, Mandi, Shimla and Hamirpur witnessed moderate level of agricultural development, while Kullu (-0.29), Kinnaur (-0.25) and Chamba (-0.25) remained less developed districts during early 1980s.

iii) **Levels of Agricultural Development, 1993-96 :** Table 3 shows that four districts namely Lahaul and Spiti (+0.59) along with Una (+0.50), Sirmaur (+0.36), and Solan (+0.22) emerged as agriculturally highly developed districts during 1993-96. However, two districts namely Bilaspur and Kangra declined to moderate level

Table 1
Himachal Pradesh: Distribution of Standard (Z) Scores of Indicators of Agricultural Development (1972-75)

Districts	Irrigation Intensity (%)	Cropping intensity (%)	NIA to NSA (%)	NSA to TGA (%)	Agricultural Labourers to Total Workers (%)	Average Size of Operational Land Holdings (ha)	Consumption of Fertilizers (kg/ha)	Consumption of Pesticides (kg or lit/000ha)	Area Under HYV Seeds to GCA (%)	Area Under Commercial Crops to GCA (%)	Average Yield of Food-grains (Kg/ha)	Composite Mean
Bilaspur	0.68	0.72	-0.58	0.95	-0.56	-0.36	DNA	DNA	DNA	-1.09	-0.07	**-0.04**
Chamba	1.09	-0.22	-0.48	-0.94	-1.02	-1.11	DNA	DNA	DNA	-0.51	0.09	**-0.39**
Hamirpur	0.93	1.18	-0.71	1.68	0.59	-0.12	DNA	DNA	DNA	-1.43	-0.44	**0.21**
Kangra	0.97	0.92	0.32	0.38	0.83	-0.01	DNA	DNA	DNA	0.30	-0.22	**0.44**
Kinnaur	-0.77	-0.86	0.74	-1.34	0.66	0.50	DNA	DNA	DNA	-0.09	-1.27	**-0.30**
Kullu	-1.21	-0.08	-0.51	-0.92	-0.58	-1.82	DNA	DNA	DNA	-0.41	-0.12	**-0.70**
Lahaul and Spiti	-1.91	-2.57	2.83	-1.43	-1.17	0.59	DNA	DNA	DNA	2.09	2.97	**0.17**
Mandi	1.13	0.42	-0.27	0.49	-1.04	-0.87	DNA	DNA	DNA	-0.57	-0.22	**-0.12**
Shimla	0.23	-0.15	-0.60	-0.28	-0.22	0.33	DNA	DNA	DNA	1.57	-0.23	**0.08**
Sirmaur	-0.12	0.77	0.18	-0.10	0.68	1.72	DNA	DNA	DNA	0.24	0.07	**0.43**
Solan	-0.49	0.00	-0.20	0.53	-0.34	1.36	DNA	DNA	DNA	0.08	-0.35	**0.07**
Una	-0.53	-0.15	-0.70	0.98	2.18	-0.21	DNA	DNA	DNA	-0.18	-0.22	**0.15**

Source: Computed by Authors
DNA stands for data not available, NIA: net irrigated area, NSA: net sown area, GCA: gross cropped area, TGA: total geographical area, Ha: hectares, HYV: high yielding variety

Table 2
Himachal Pradesh: Distribution of Standard (Z) Scores of Indicators of Agricultural Development (1982-85)

Districts	Irrigation Intensity (%)	Cropping intensity (%)	NIA to NSA (%)	NSA to TGA (%)	Agricultural Labourers to Total Workers (%)	Average Size of Operational Land Holdings (ha)	Consumption of Fertilizers (kg/ha)	Consumption of Pesticides (kg or lit/000ha)	Area Under HYV Seeds to GCA (%)	Area Under Commercial Crops to GCA (%)	Average Yield of Food-grains (Kg/ha)	Composite Mean
Bilaspur	1.04	1.15	-0.53	0.90	-0.75	-0.18	-0.21	1.83	DNA	-0.86	0.08	**0.25**
Chamba	0.95	-0.26	-0.56	-0.92	-1.17	-0.98	-0.70	1.14	DNA	-0.49	0.47	**-0.25**
Hamirpur	0.22	1.27	-0.68	1.60	-0.37	-0.40	-0.26	-0.35	DNA	-1.05	-0.31	**-0.03**
Kangra	1.06	0.73	0.09	0.39	1.29	-0.69	-0.16	DNA	DNA	-0.29	0.31	**0.30**
Kinnaur	-0.93	-1.08	1.13	-1.39	1.38	-0.07	-0.63	-0.09	DNA	0.47	-1.33	**-0.25**
Kullu	-1.68	-0.20	-0.64	-0.91	-0.57	-1.09	-0.52	1.38	DNA	0.01	1.28	**-0.29**
Lahaul and Spiti	-1.63	-2.22	2.71	-1.48	-0.22	0.20	3.07	DNA	DNA	2.69	-2.25	**0.10**
Mandi	0.96	0.38	-0.33	0.63	-1.04	-0.76	-0.27	0.77	DNA	-0.57	0.25	**0.00**
Shimla	0.09	-0.48	-0.63	-0.23	0.10	0.25	0.04	DNA	DNA	0.89	-0.05	**0.00**
Sirmaur	0.60	0.69	0.18	-0.11	-0.35	2.36	-0.43	DNA	DNA	-0.07	1.41	**0.48**
Solan	-0.28	-0.48	-0.11	0.54	-0.22	1.38	0.03	DNA	DNA	-0.29	0.17	**0.08**
Una	-0.39	0.49	-0.62	0.97	1.93	-0.04	0.03	-0.58	DNA	-0.44	-0.03	**0.13**

Source: Computed by Authors
DNA stands for data not available, NIA: net irrigated area, NSA: net sown area, GCA: gross cropped area, TGA: total geographical area, Ha: hectares, HYV: high yielding variety

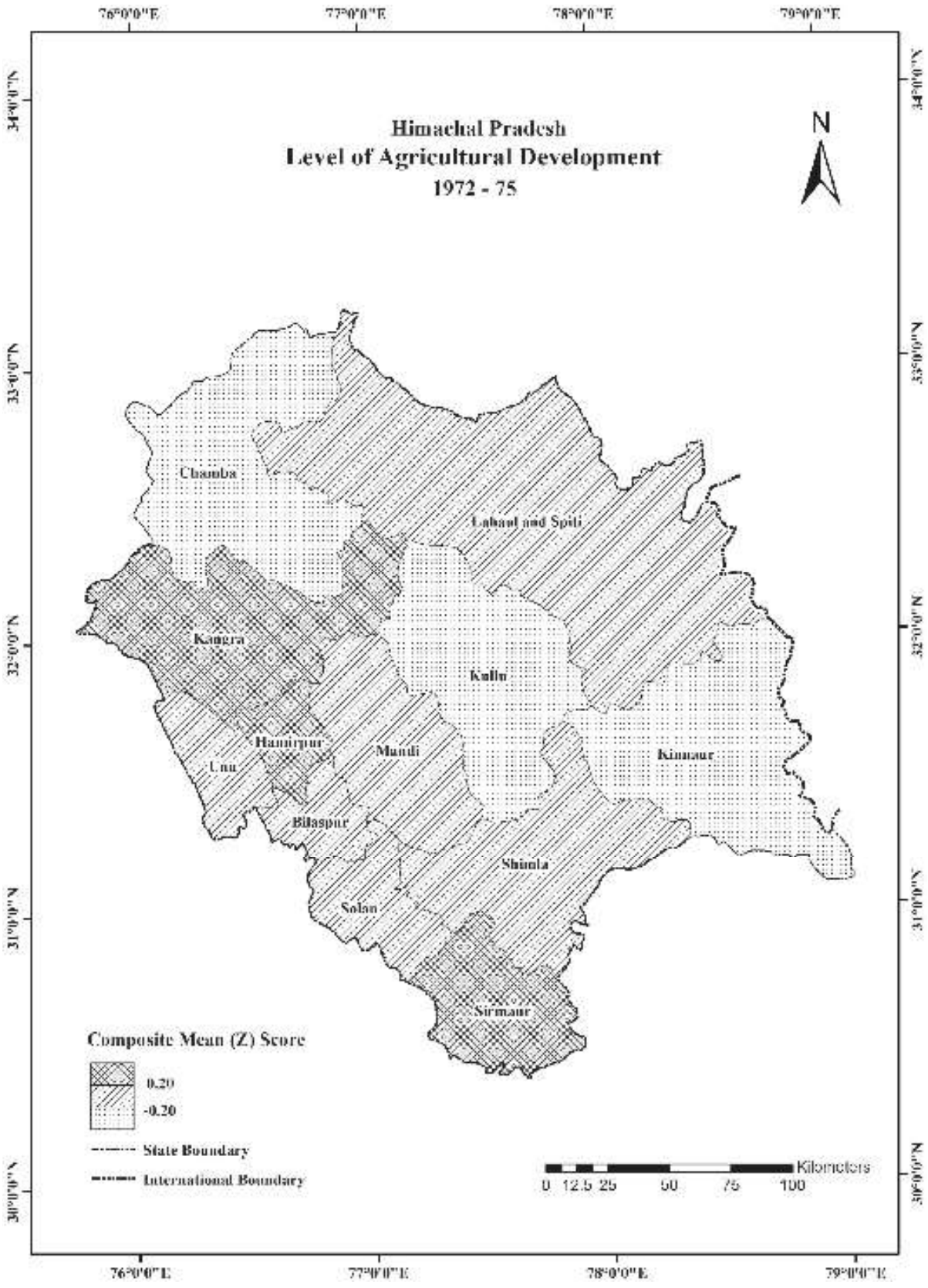
Himachal Pradesh
Level of Agricultural Development
1972 - 75
N
Chamba
Lahaul and Spiti
Kangra
Kullu
Hamirpur
Una
Mandi
Kinnaur
Bilaspur
Shimla
Solan
Sirmaur
Composite Mean (Z) Score
0.20
-0.20
State Boundary
International Boundary
Kilometers
0 12.5 25 50 75 100

Fig. 1

Table 3
Himachal Pradesh: Distribution of Standard (Z) Scores of Indicators of Agricultural Development (1993-96)

Districts	Irrigation Intensity (%)	Cropping intensity (%)	NIA to NSA (%)	NSA to TGA (%)	Agricultural Labourers to Total Workers (%)	Average Size of Operational Land Holdings (ha)	Consumption of Fertilizers (kg/ha)	Consumption of Pesticides (kg or lit/000ha)	Area Under HYV Seeds to GCA (%)	Area Under Commercial Crops to GCA (%)	Average Yield of Food-grains (Kg/ha)	Composite Mean
Bilaspur	0.95	1.03	-0.61	1.00	-0.85	-0.52	0.07	-0.28	0.05	-0.99	-0.60	**-0.07**
Chamba	-1.29	-0.28	-0.43	-0.91	-1.09	-0.97	-1.25	-0.26	-0.75	-0.60	1.54	**-0.57**
Hamirpur	0.46	1.19	-0.78	1.54	-0.68	-0.45	0.15	-0.28	-0.20	-1.19	-0.44	**-0.06**
Kangra	1.27	0.70	0.04	0.37	1.26	-0.84	0.05	DNA	-0.26	-0.40	-0.41	**0.18**
Kinnaur	-0.79	-1.34	1.16	-1.40	0.62	0.37	-1.61	DNA	DNA	1.37	-2.09	**-0.41**
Kullu	-1.49	-0.13	-0.74	-0.89	-0.50	-1.19	-0.57	-0.25	0.75	0.19	0.83	**-0.36**
Lahaul and Spiti	-1.36	-2.19	2.65	-1.49	0.92	0.69	2.10	3.17	-0.78	1.56	1.19	**0.59**
Mandi	0.94	0.38	-0.43	0.70	-0.88	-0.81	-0.30	-0.30	-0.56	-0.55	0.65	**-0.11**
Shimla	0.40	-0.59	-0.75	-0.19	-0.05	0.19	0.13	DNA	-0.66	1.73	-0.88	**-0.07**
Sirmaur	0.82	0.87	0.25	-0.13	-0.13	2.16	-0.44	DNA	-0.03	-0.22	0.41	**0.36**
Solan	0.35	0.11	-0.03	0.40	-0.69	1.20	0.39	-0.27	1.25	-0.36	0.03	**0.22**
Una	-0.24	0.24	-0.33	0.99	2.07	0.17	1.28	-0.28	2.35	-0.55	-0.24	**0.50**

Source: Computed by Authors
DNA stands for data not available, NIA: net irrigated area, NSA: net sown area, GCA: gross cropped area, TGA: total geographical area, Ha: hectares, HYV: high yielding variety

Table 4
Himachal Pradesh: Distribution of Standard (Z) Scores of Indicators of Agricultural Development (2003-2006)

Districts	Irrigation Intensity (%)	Cropping intensity (%)	NIA to NSA (%)	NSA to TGA (%)	Agricultural Labourers to Total Workers (%)	Average Size of Operational Land Holdings (ha)	Consumption of Fertilizers (kg/ha)	Consumption of Pesticides (kg or lit/000ha)	Area Under HYV Seeds to GCA (%)	Area Under Commercial Crops to GCA (%)	Average Yield of Food-grains (Kg/ha)	Composite Mean
Bilaspur	0.89	0.72	-0.63	1.01	-0.50	-0.63	-0.42	-0.34	1.10	-0.85	0.11	**0.04**
Chamba	-0.49	-0.32	-0.50	-0.89	-1.13	-0.94	-1.31	-0.30	-0.98	-0.57	0.28	**-0.65**
Hamirpur	0.80	1.02	-0.80	1.59	-0.61	-0.41	-0.44	-0.23	1.07	-0.92	0.12	**0.11**
Kangra	0.64	0.68	0.09	0.48	2.31	-0.70	-0.40	-0.42	0.76	-0.51	-0.56	**0.22**
Kinnaur	-1.20	-1.57	1.20	-1.42	-0.21	0.45	-1.25	0.31	DNA	0.73	-2.19	**-0.51**
Kullu	-1.74	0.42	-0.71	-0.87	-0.04	-1.32	0.05	-0.29	-0.07	0.01	1.09	**-0.32**
Lahaul and Spiti	-1.68	-2.01	2.60	-1.51	-0.61	0.86	1.53	3.11	-1.04	2.43	-1.46	**0.20**
Mandi	0.57	0.58	-0.42	0.63	-0.72	-0.77	-0.42	-0.33	0.72	-0.53	1.14	**0.04**
Shimla	0.75	-0.88	-0.86	-0.23	0.02	-0.12	1.70	-0.40	-1.31	1.29	-0.28	**-0.03**
Sirmaur	0.62	0.56	0.26	-0.10	-0.04	2.00	-0.35	-0.39	-0.09	-0.14	0.56	**0.26**
Solan	0.46	-0.07	-0.06	0.46	-0.15	1.31	0.02	-0.34	0.66	-0.40	0.42	**0.21**
Una	0.38	0.88	-0.17	0.84	1.68	0.26	1.29	-0.38	0.81	-0.55	0.77	**0.53**

Source: Computed by Authors
DNA stands for data not available, NIA: net irrigated area, NSA: net sown area, GCA: gross cropped area, TGA: total geographical area, Ha: hectares, HYV: high yielding variety

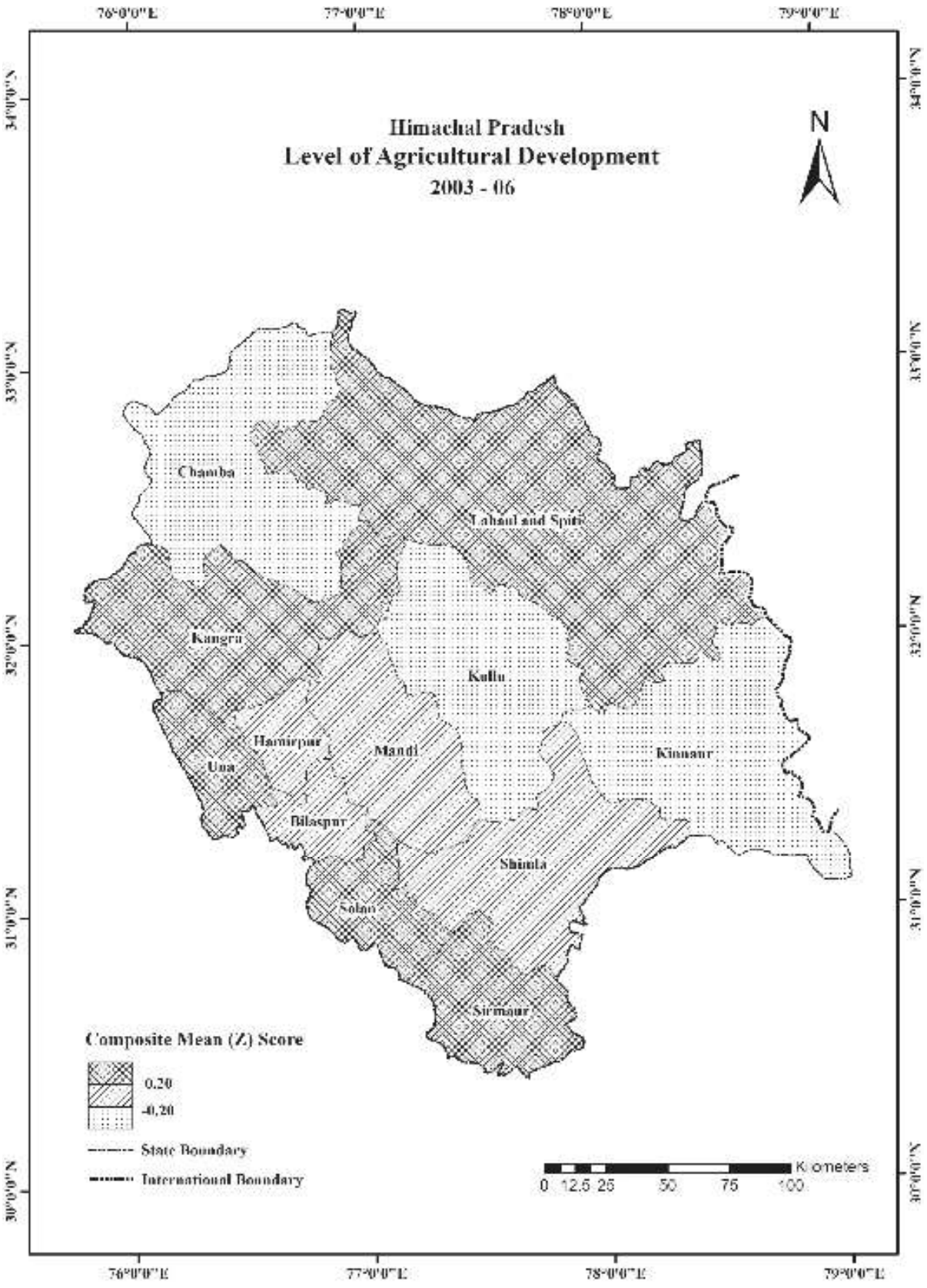
Himachal Pradesh
Level of Agricultural Development
2003 - 06
N
Chamba
Lahaul and Spiti
Kangra
Kullu
Hamirpur
Mandi
Una
Kinnaur
Bilaspur
Shimla
Solan
Sirmaur
Composite Mean (Z) Score
0.20
-0.20
State Boundary
International Boundary
Kilometers
0 12.5 25 50 75 100

Fig. 2

of agricultural development during 1993-96 from high level of development recorded in 1982-85.The downward trend (from 1982-85 to 1993-96) of Bilaspur and Kangra districts to moderate level of development could be attributed to slight decline in irrigation intensity, decrease in area under commercial crops, decline in yield of food grains, massive decrease in application of pesticides and fragmentation of operational holdings due to increasing population pressure. Chamba (-0.57), Kinnaur (-0.41) and Kullu (-0.36) districts, on the other hand, witnessed low level of agricultural development during this period. The five districts namely Kangra, Hamirpur, Bilaspur, Shimla and Mandi experienced moderate level of agricultural development during 1993-96.

iv) **Levels of Agricultural Development, 2003-06 :** Table 4 and Fig. 2 reveal that Una (+0.53) along with Sirmaur (+0.26), Kangra (+0.22), Solan (+0.21) and Lahaul and Spiti (+0.20) emerged as agriculturally highly developed districts during 2003-06. The improvement and rise in irrigational facilities, cropping intensity, share of net sown area, application of bio-chemical inputs, relatively large size of operational land holdings and level of agricultural yield could be associated with high development of agriculture in these areas. While three districts namely Chamba (-0.65), Kinnaur (-0.51) and Kullu (-0.32) continued to be agriculturally less developed districts during 2003-06. Low irrigation and cropping intensity, small share of net sown area, less application of bio-chemical inputs and very low level of agricultural yield have been the factors resulting into low levels of agricultural development of these districts. Remaining four districts namely Hamirpur, Bilaspur, Mandi and Shimla witnessed moderate level of agricultural development with composite z-score ranging between -0.20 to +0.20.

v) **Change in Levels of Agricultural Development 1972-75 to 2003-06** : The state witnessed a slight improvement in the levels of agricultural development in the state during last four decades i.e. 1972-75 to 2003-06. The study reveals that there were only three districts namely Kangra (+0.44), Sirmaur (+0.43) and Hamirpur (+0.21) with high levels of agricultural development during early 1980s.The number increased when Una (+0.53) along with Sirmaur (+0.26),Kangra (+0.22), Solan (+0.21) and Lahaul and Spiti (+0.20) emerged as agriculturally highly developed districts during next four decades. It may be attributed to interplay of a combination of factors which include improvement and rise in irrigational facilities, cropping intensity, share of net sown area, application of bio-chemical inputs and size of operational land holdings. However, Chamba (-0.65), Kinnaur (-0.51) and Kullu (-0.32) continued to be agriculturally less developed districts during the whole study period i.e. 1972-75 to 2003-06. Low irrigation and cropping intensity, small share of net sown area, less application of bio-chemical inputs and very low level of agricultural yield have been the major

determinants resulting into low levels of agricultural development in these districts.

Conclusions

The study highlights that there were only three districts namely Kangra, Sirmaur and Hamirpur with high levels of agricultural development during early 1980s. The high agricultural development in these districts could be attributed to high irrigation and cropping intensity, large share of net sown area, high proportion of agricultural labourers and high percentage of area under commercial crops. The study further reveals that four districts namely Lahaul and Spiti along with Una, Sirmaur and Solan emerged as highly developed districts during 1993-96. However, two districts namely Bilaspur and Kangra declined to moderate level of agricultural development during 1993-96 from high level of development in 1982-85. The downward trend of Bilaspur and Kangra districts from high to moderate level could be attributed to slight decline in irrigation intensity, shrinking acreage under commercial crops, decline in yield of food grains, massive decrease in application of pesticides and fragmentation of operational holdings.

The study further highlights that five districts, namely Una, Sirmaur, Kangra, Solan and Lahaul and Spiti emerged as agriculturally highly developed districts during 2003-06. It may be attributed to better and assured irrigational facilities, high cropping intensity, large share of net sown area, high application of bio-chemical inputs, large size of operational land holdings and high level of agricultural yield. The application and benefit of these agricultural inputs together strengthened the agriculture and increased the yield level in these areas. However, Chamba, Kinnaur and Kullu districts witnessed low levels of agricultural development. Low irrigation and cropping intensity, small share of net sown area, less application of bio-chemical inputs and very low level of agricultural yield have been the factors resulting into low levels of agricultural development in these districts. Small size of operational land holdings in Chamba and Kullu districts does not offer favourable environment for the introduction of modern agricultural inputs and risk bearing capacity among the farmers. The study on the whole reveals wide regional imbalances in level of agricultural development in Himachal Pradesh. Therefore, it is suggested that for better agricultural development, irrigation system should be improved and balanced application of bio-chemical inputs on scientific lines should be encouraged. The effect of topography i.e. small size of land holdings may be tapped while developing and introducing high income yielding crops suitable to local agro-ecological conditions.

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