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## **Effect on Income and Employment of Diversification and Commercialization of Agriculture in Kullu District of Himachal Pradesh**

**Brij Bala and S.D. Sharma**

### **Abstract**

The study carried out in the Kullu district of Himachal Pradesh has examined the extent of changes in cropping pattern and their effect on income and employment over the period 1990-91 to 2002-03. Data collected through the three-stage stratified random sampling technique have been used to analyze the impact of diversification and commercialization over time. The average farm-size has reduced from 0.80 hectares to 0.59 hectares during this period. The cereal-dominated cropping pattern has been replaced by vegetable-based cropping pattern, the area under cereal crops being declined from 59 per cent to 5 per cent. The cropping intensity has increased from 197 to 225 per cent. Cauliflower, cabbage and tomato are the major crops occupying the total cropped area. As the vegetable crops are highly labour-intensive, the annual labour requirement has increased by about 49 per cent. The labour requirement during *khariif*, *rabi* and *zaid* seasons has increased from 98.9, 90.0 and 10.0 mandays in period-I (1990-91) to 115.5, 113.8 and 64.0 mandays, respectively in period-II (2002-03). The per farm annual income has increased more than three-times, from Rs 31,240 to Rs 1,35,160 over this period. The labour employment as well as the contribution to total income have been found highest in cauliflower, followed by cabbage and tomato, though pea is reported to be the most labour-intensive crop and tomato has turned out to be the most paying crop per unit of area. This hike in income level, which is due to agricultural diversification, has raised the living standards of the farmers of this area.

### **Introduction**

Diversification of agriculture is advocated as one of the important strategies to stabilize and enhance farm income, increase employment

opportunities and conserve natural resources. However, the returns from diversification depend on the availability of such infrastructural facilities as irrigation, electricity, transportation, storage, markets, etc.

The agricultural development in the state of Himachal Pradesh has made rapid strides as is evident from the increase in production and productivity of different foodgrain and non-foodgrain crops. The most important accompanying change in the state's agriculture has been its transformation from cereal-based subsistence agriculture to vegetable-dominated commercial agriculture, especially in the areas falling under temperate agro-climatic zones. The area under vegetable crops increased from 25,000 hectares in 1995-96 to 34,150 hectares in 2001-02, while the production increased from 4,25,000 tonnes to 6,27,445 tonnes during this period. The process of crop diversification towards fruits and off-season vegetable crops like peas, cabbage, cauliflower, tomato, etc. is more pronounced in the areas having suitable agro-climatic conditions, like districts of Kinnaur, Kullu, Lahaul & Spiti, Sirmaur and Solan.

Kullu, being a mountainous district has small landholdings among its farmers. More than 85 per cent of the total farmers belong to the category of marginal and small farmers. Further, these holdings are scattered and uneven. Only six per cent of the total cultivated area is irrigated. Despite all these factors, the district is endowed with rich agro-climatic and soil conditions. Its valley areas are quite wholesome for vegetable cultivation and of late, have proved to be niches for off-season vegetable cultivation, while the higher reaches are producing high-quality fruits and pulses. Although off-season vegetable cultivation in the valley started 10-15 years ago, it has gathered momentum only recently. Earlier, the farmers were growing cereals like maize, wheat, paddy; minor millets like *cheena*, *bathu*, *kauni*; and pulses like gram, mash, rajmash and soybean, but now these crops have been completely replaced by off-season vegetables, specially in the areas having adequate irrigation facilities. Therefore, it was felt worthwhile to assess the impact of these rapid temporal changes on agriculture, from cereal-based to vegetable-dominated agriculture. The specific objectives of the study were:

- To study the socio-economic structure of the selected farm households,
- To examine the changes in the cropping pattern over the period, and
- To assess the changes in income and employment levels as a result of change in the cropping pattern.

### **Methodology**

The study was conducted in the Kullu district of Himachal Pradesh. A three-stage stratified sampling technique was used for the selection of sample.

The Kullu block of the district was selected purposively because the commercialization of agriculture was more visible in this block as a result of the efforts of Hill Agricultural Research and Extension Centre, Bajaura (a Regional Centre of HPKV, Palampur). Ten villages within the radius of 30 kilometres of this Centre were selected as a secondary unit of the sample. A list of farmers having at least 170 per cent cropping intensity was obtained and 100 farmers were selected on the basis of proportional allocation among the selected villages. The primary data were collected through interview method using the specifically designed schedules. Group discussions with senior people of the village were held to have an insight into the general pace and pattern of transformation. The written records maintained by some of the farmers were also used for data collection. The data regarding cropping pattern, labour employment and farm income, etc. were collected for two periods, viz. pre-commercialization (1990-91) and post-commercialization (2002-03). The required secondary data were collected from the Panchayat offices and District Statistical office.

## **Results**

### **Socio-economic Structure of Sample Households**

The socio-economic features of the sample households, presented in Table 1, revealed that the average family size during two periods under study was about 5.5 and 5.0, with the number of adult members as 3.3 and 2.7, respectively. The number of adult females was less than of males during both the periods. The proportion of working force in the total population was found as 60 per cent and 54 per cent, whereas female workers constituted 42 per cent and 45 per cent of the total workforce during period-I and period-II, respectively. Of the total workers, only 31 per cent were literate during period-I and it almost doubled during period-II. The literacy rate was higher among male than female workers.

### **Cropping Pattern**

The cropping pattern before and after the introduction of vegetables has been given in Table 2. A complete commercialization of the cropping pattern can be seen from this table. A perusal of Table 2 indicated that maize, paddy, wheat and barley were the major cereals and mash, rajmash, and gram were the important pulse crops in the old cropping pattern. Some pseudo-cereals like *kodra* (*Paspalum* spp.) and oilseed crops like mustard and linseed also had their presence in the cropping pattern. The average farm size/ net cropped area reduced from 0.80 hectares to 0.59 hectares over the period due to factors like division of holdings and use of land for

**Table 1. Family composition, working force and educational status of households in the district Kullu : 1990-91 and 2002-03**

| Particulars                           | 1990-91 | 2002-03 |
|---------------------------------------|---------|---------|
| Average family size (No.)             | 5.50    | 4.98    |
| Adults                                | 3.30    | 2.68    |
| -Male                                 | 1.90    | 1.48    |
| -Female                               | 1.40    | 1.20    |
| Working force in total population (%) | 60      | 54      |
| Female workers to total workers (%)   | 42      | 45      |
| Literate workers, %                   | 31.5    | 59.7    |
| -Male                                 | 36.8    | 64.9    |
| -Female                               | 24.3    | 53.3    |

housing purpose. As a result of gradual transformation, the vegetable crops have totally overtaken the cereal crops. The cropping intensity has also increased from 197 per cent to 225 per cent because the vegetables are short-duration crops and some of them could be grown throughout the year.

Cauliflower, cabbage and tomato were the major crops, occupying about 33.8, 15.4 and 8.3 per cent of the total cropped area, respectively in the present cropping pattern. Frenchbean, spinach, brinjal and coriander were some other important crops of the area. The area under cereals had a sharp decline from 59 per cent in the previous cropping pattern to 5 per cent in the new pattern. It was pertinent to find that fodder crops were almost eliminated from the cropping pattern because the farmers have started feeding the livestock with vegetable leaves. The pulses and oilseed crops had also disappeared from the cropping pattern.

A study conducted by Agarwal (2004) in the Coimbatore district of Tamil Nadu has also reported reduction in the area under cereals and increase in the area under commercial crops as a sequel to diversification. However, the land under fodder crops was reported to have increased in that area owing to the increasing trend to feed the livestock with the own-farm fodder.

According to the estimates of area and production of major crops in India, (Ministry of Agriculture, Govt. of India, New Delhi), the share of vegetable crops in the gross cropped area has increased by about four-times, from 0.58 per cent during TE 1952-53 to 2.29 per cent during TE 1992-93.

### **Employment of Labour**

The average per farm labour employment for both the cropping patterns has been recorded in Table 2. It is evident from this table that though the

**Table 2. Cropping pattern and labour requirement: 1990-91 (Period I) and 2002-03 (Period II)**

| Season/Crops         | Period-I     |                     | Season/Crops         | Period-II    |                     |
|----------------------|--------------|---------------------|----------------------|--------------|---------------------|
|                      | Area<br>(ha) | Labour<br>(mandays) |                      | Area<br>(ha) | Labour<br>(mandays) |
| <b><i>Kharif</i></b> |              |                     | <b><i>Kharif</i></b> |              |                     |
| Maize                | 0.224        | 22.4                | Tomato               | 0.110        | 27.6                |
| Paddy                | 0.144        | 27.0                | Cauliflower          | 0.101        | 20.3                |
| Mash                 | 0.096        | 12.5                | Cabbage              | 0.063        | 13.7                |
| Rajmash              | 0.064        | 12.0                | Brinjal              | 0.054        | 13.3                |
| Other pulses         | 0.064        | 8.0                 | Maize                | 0.041        | 6.7                 |
| Kodra                | 0.080        | 10.0                | Capsicum             | 0.024        | 5.3                 |
| Charri (fodder)      | 0.096        | 7.0                 | Cucumber             | 0.080        | 18.6                |
|                      |              |                     | Frenchbean           | 0.038        | 10.0                |
| <b><i>Rabi</i></b>   |              |                     | <b><i>Rabi</i></b>   |              |                     |
| Wheat                | 0.320        | 30.0                | Cauliflower          | 0.220        | 45.0                |
| Barley               | 0.160        | 18.0                | Cabbage              | 0.142        | 28.3                |
| Lentil               | 0.040        | 8.0                 | Spinach              | 0.066        | 17.8                |
| Gram                 | 0.064        | 15.0                | Turnip               | 0.032        | 6.0                 |
| Linseed              | 0.024        | 5.0                 | Wheat                | 0.026        | 3.5                 |
| Mustard              | 0.064        | 9.0                 | Radish               | 0.022        | 4.5                 |
| Oats                 | 0.016        | 5.0                 | Rye/mustard          | 0.022        | 5.2                 |
|                      |              |                     | Peas                 | 0.010        | 3.5                 |
| <b><i>Zaid</i></b>   |              |                     | <b><i>Zaid</i></b>   |              |                     |
| Toria                | 0.120        | 10.0                | Cauliflower          | 0.129        | 25.7                |
|                      |              |                     | Spinach              | 0.059        | 15.8                |
|                      |              |                     | Coriander            | 0.041        | 8.5                 |
|                      |              |                     | Frenchbean           | 0.032        | 8.0                 |
|                      |              |                     | Toria                | 0.022        | 6.0                 |
| Total cropped area   | 1.576        | 198.9               |                      | 1.333        | 293.3               |
| Net cropped area     | 0.800        |                     |                      | 0.592        |                     |
| Cropping intensity   | 197          |                     |                      | 225          |                     |

average farm size and total cropped area were both higher, the total labour requirement was comparatively less in the previous cropping pattern than the existing one. The introduction of advanced technology in agriculture, viz. use of tractors, line sowing, etc. had made various inter-cultural operations convenient and saved some labour too, but the vegetable crops were so labour-intensive that even for smaller cropped area, there was requirement of more labour per farm. The table also shows that in the old cropping pattern, the maximum labour was employed in paddy, followed by maize during the *kharif* and wheat, followed by barley during the *rabi* season. In

the vegetable-dominated cropping pattern, the maximum labour was employed in cauliflower (31% of the total), followed by cabbage (14.3%) and tomato (9.4%). It can be seen from Table 3 that in the existing cropping pattern, the total labour requirement during *kharif* was 115.5 mandays, during *rabi* 113.8 mandays and during *zaid* 64 mandays as against 99, 90 and 10 mandays during the respective seasons in the old cropping pattern.

A study conducted by Kumar and Singh (2003) in the district of Farukhabad (UP), has indicated that with increase in the cropping intensity and introduction of labour-intensive crops in the cropping pattern, the employment of labour increased on the farms where maize, potato, wheat and pumpkin were being grown and sunflower was introduced later. The study revealed that the employment for 176 mandays for production of crops ( average area 1.15 ha) during the year 1996-97 increased to 236 mandays in 2000-01. Another study by Pandey and Singh (2003) has compared the employment of labour in agriculture in the rural and urban villages and has found that as the cropping intensity in rural villages was more, the ratio of agricultural labour force was higher in rural than urban villages.

A perusal of Table 3 reveals that the total labour requirement increased by about 49 per cent over the period which has (i) enabled full utilization of family labour, and (ii) generated employment opportunity for landless labourers to earn Rs 50-80 per day. The migration of labour to other parts of the district or state had circumscribed over the period. Also, the existing cropping pattern had offered an opportunity to the agricultural labourers to utilize their time in a gainful manner.

A study conducted by Rajesh (1998) to evaluate the gains of technology adoption in terms of income and employment of labourers in the southern districts of Tamil Nadu had shown a positive correlation between crop income and technology adoption index. The study has further concluded that the technological change contributed not only to family labour employment *per se* but also to the additional employment of agricultural labourers.

**Table 3. Season-wise labour requirement in district Kullu : 1990-91 and 2002-2003**

| Crop-season   | Labour requirement (mandays) |           | Change over the period (%) |
|---------------|------------------------------|-----------|----------------------------|
|               | Period-I                     | Period-II |                            |
| <i>Kharif</i> | 98.9                         | 115.5     | 16.78                      |
| <i>Rabi</i>   | 90.0                         | 113.8     | 26.44                      |
| <i>Zaid</i>   | 10.0                         | 64.0      | 540.00                     |
| Total         | 198.9                        | 293.3     | 48.96                      |

### Income Levels

The study on changes in the income levels per farm, given in Table 4, shows that the total farm income increased from Rs 31,240 to Rs 1,35,160 over the period, registering an increase of more than 3.3-times. The table also reveals that wheat, maize, rajmash and mash were the major contributors towards the total income under the previous cropping pattern, while cauliflower (38%), cabbage (16.6%) and tomato (10.4%) were the main contributors to income under the existing pattern. The returns per unit area were highest for tomato. It can also be observed that the cereal crops constituted a negligible proportion (1%) in the total farm income. This overall increase in farm income has uplifted the living standard of the local people

**Table 4. Cropping pattern and income level of households in the district Kullu: 1990-91 and 2002-03**

| Season/Crops         | Period-I     |                | Season/Crops         | Period-II    |                |
|----------------------|--------------|----------------|----------------------|--------------|----------------|
|                      | Area<br>(ha) | Income<br>(Rs) |                      | Area<br>(ha) | Income<br>(Rs) |
| <b><i>Kharif</i></b> |              |                | <b><i>Kharif</i></b> |              |                |
| Maize                | 0.224        | 3,050          | Tomato               | 0.110        | 14,058         |
| Paddy                | 0.144        | 1,280          | Cauliflower          | 0.101        | 12,328         |
| Mash                 | 0.096        | 2,680          | Cabbage              | 0.063        | 6,926          |
| Rajmash              | 0.064        | 2,950          | Brinjal              | 0.054        | 4,522          |
| Other pulses         | 0.064        | 2,250          | Maize                | 0.041        | 800            |
| Kodra                | 0.080        | 550            | Capsicum             | 0.024        | 2,900          |
| Charri(fodder)       | 0.096        | 8,000          | Cucumber             | 0.080        | 8,048          |
|                      |              |                | Frenchbean           | 0.038        | 2,960          |
| <b><i>Rabi</i></b>   |              |                | <b><i>Rabi</i></b>   |              |                |
| Wheat                | 0.320        | 4,750          | Cauliflower          | 0.220        | 24,566         |
| Barley               | 0.160        | 1,850          | Cabbage              | 0.142        | 15,518         |
| Lentil               | 0.040        | 1,850          | Spinach              | 0.066        | 5,918          |
| Gram                 | 0.064        | 1,650          | Turnip               | 0.032        | 3,620          |
| Linseed              | 0.024        | 950            | Wheat                | 0.026        | 672            |
| Mustard              | 0.064        | 1,380          | Radish               | 0.022        | 2,376          |
| Oats                 | 0.016        | 2,050          | Rye/mustard          | 0.022        | 1,550          |
|                      |              |                | Peas                 | 0.010        | 1,040          |
| <b><i>Zaid</i></b>   |              |                | <b><i>Zaid</i></b>   |              |                |
| Toria                | 0.120        | 1,500          | Cauliflower          | 0.129        | 14,382         |
|                      |              |                | Spinach              | 0.059        | 5,276          |
|                      |              |                | Coriander            | 0.041        | 2,624          |
|                      |              |                | Radish               | 0.032        | 3,520          |
|                      |              |                | Toria                | 0.022        | 1,550          |
| Total farm income    |              | 31,240         |                      |              | 1,35,160       |



**Table 5. A comparison of the assets possessed by the sample households in district Kullu: 1990-91 (Period I) and 2002-03 (Period II)**

(Per cent households)

| Assets              | Period-I | Period-II |
|---------------------|----------|-----------|
| Tractors            | 0        | 6         |
| Tube-well           | 0        | 30        |
| Vans/ cars          | 0        | 5         |
| Telephones          | 3        | 70        |
| Mobiles             | 0        | 20        |
| Televisions         | 10       | 95        |
| <i>Pucca</i> houses | 8        | 60        |

which is clearly evident from the assets possessed by them during the two periods under study (Table 5).

A perusal of Table 5 reveals that during period-II, about 6 per cent farmers had tractors, 30 per cent had their own tubewells, 5 per cent had cars/ vans and 20 per cent were using mobile phones, whereas no such assets were available during the previous period. Earlier, only 10 per cent farmers possessed TV sets, 8 per cent had *pucca* houses and 3 per cent had telephone facility of their own as compared to 95, 60 and 70 per cent, respectively at present. A village study conducted in Andhra Pradesh by Murty (1998), to examine the impact of farm diversification on income, found that the values of income varied only in a narrow range for largely diversified farms (with diversification index between 0.01 and 0.40), and largely specialized farms (with diversification index between 0.61 and 1.00), inferring that diversification minimized risk by stabilizing income.

### Conclusions

The study has reported a spectacular shift in the cropping pattern over the period 1990-91 to 2002-03 in the Kullu district. The traditional cereal crops have been almost completely replaced by the vegetable crops. The dominance of relatively short-duration vegetable crops in the cropping pattern has raised the cropping intensity. The vegetable crops being highly labour-intensive, have generated more employment opportunities in the villages. The overall labour employment has increased by about 49 per cent. The agricultural income per farm has increased by 332 per cent over the period. Consequently, the general standard of living of the farming community has been perceived to be uplifted.

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