

diversity, changed into the cultivation of paddy and wheat which dominated the valley regions and mid-slopes. Subsistence crops still grow in the highland areas. Fruits are abundantly cultivated in the temperate belt between 1,200 m and 2,200 m. The main fruits grown are apples, citrus, stone and nut fruits. Cultivation of off-season vegetables is a recent trend. While potato is largely grown in the highlands, onions, tomatoes, beans and other vegetables are grown in the valley regions and mid-slopes. These practices of cultivating various crops have been based on trial and error for centuries, as there is no stable farming system prevalent in the region. The present study discusses the changing cropping pattern in the Garhwal Himalaya.

Major trends in changing cropping pattern

- *Cultivating subsistence crops (barahnaza)*: Subsistence cereal farming is a centuries old practice in the Garhwal Himalaya, characterised by the dominance of barahnazas (twelve grains). Among them, the major grains are mandua (finger millet), cholai (amaranthus), urd (black gram), moong (green gram), chana (red gram), masoor (lentils), jau (barley), rajama (beans) and bhatt (soyabean). The method of cultivating these crops is traditional, carried out mainly on the narrow patches of terraced fields. These crops are ecologically strong and can be grown in adverse climatic conditions such as drought, high rainfall etc. and can feed a sizeable proportion of the population. Cereal crops are grown in the highland regions.
- *Cultivating wheat and paddy*: Along with the increase in population, the grain needed has increased in the entire Garhwal Himalaya region and subsistence cereal crops cannot meet this need. Keeping scarcity of grains in view, farmers initiated the cultivation of wheat and paddy in lieu of the traditionally cultivated subsistence crops, applying chemical fertilisers and improved seeds. This trend of cultivating paddy and wheat transformed the lifestyle of the farmers in a positive way and they became self-reliant in food grains. In the vast terraced fields of valley regions and mid-slopes, paddy and wheat are grown extensively in two seasons, kharif and rabi respectively.
- *Fruit cultivation*: During the 1970s, the Government of Uttar Pradesh launched a scheme of establishing fruit belts. The first step in 1976, was to demarcate the land otherwise not fit for cultivation of cereals as 'fruit belts' (Sati, 2002). The land used for this purpose was either unmeasured or measured forestland or community land. This scheme as a whole was not successful and many of the demarcated 'fruit belts' could not be established, while some 'fruit belts' still exist. However, it was widely followed by cultivators as they transformed their agricultural land from subsistence into cultivation of fruit crops. This practice was higher in the highlands than in the valley regions. Over the decades, these enthusiastic cultivators have changed and have started cultivating off-season vegetables, prominently potatoes in the highland areas.
- *Cultivation of off-season vegetables*: During the 1980s and 90s, large-scale cultivation of off-season vegetables was carried out. The production of potatoes in the highlands and onions in the valley regions gained a tremendous momentum. Currently, the trend of cultivating off-season vegetables: potato, onion, tomato, beans, capsicum, spinach, ginger, turmeric, garlic, chili, egg-plant, carrot etc. - dominates the cropping pattern both in the highlands and lowlands. Mainly Nepali immigrants are engaged in cultivating cash generating crops in the valley regions of the entire Garhwal Himalaya. The proportion of native

From Subsistence to Cash Generating Crops: A Case Study of Changing Cropping Pattern in the Garhwal Himalaya, India

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Introduction

The changes in the cropping pattern from subsistence to paddy and wheat crops gained momentum in the 1970s when the green revolution first took place in India. A vast area of agricultural land was devoted to wheat, paddy, pulses and oilseeds crops with excessive use of chemical fertilisers and experimental seeds. This national trend of intensive cultivation was also adopted in the Garhwal Himalaya, though not to the same degree. The farming community largely transformed their cropping land mainly in the valley regions and mid-slopes. The cropping pattern, which was characterised by the dominance of millets with high crop



Figure 1 [A] Cultivation of barahnazas (twelve grains) in Kandi Khal area, Tehri district, [B] paddy is grown largely in the Laster Gad sub - watershed of the Mandakini river in Rudrapur district, [C] apple cultivation on the wheat crop fields in Janglechatti village, Chamoli district, [D] cultivation of off-season vegetables in the Khanda Gad sub watershed of the Alaknanda river in Pauri district. Photos: Dr. Vishwambhar Prasad Sati.

people involved is considerably less, although local people initiated potato cultivation in the highland areas.

- **Cultivating medicinal plants:** Recently the Government of Uttarakhand initiated cultivating medicinal plants in the highland areas. Training has been given to local farmers and poly houses were given to them to grow medicinal plants. About 25 farmers of Ghais village of Chamoli district have earned INR. 87,000 after growing kutki and kut. This was achieved by assistance given by scientists of the High Altitude Plant Physiology Centre, HNB Garhwal University, Srinagar Garhwal, Uttarakhand, India. Similarly, the high altitude areas of Mandakini, Nandakini and Pindar river basins are growing medicinal plants in poly houses. The state government has provided them with subsidies for this purpose.

Land abandonment

Land has been abandoned in many locations. This is generally found in villages which are located in the lower elevations or along the roads. One of the most important reasons for abandonment of land along the road is caused by commercial uses. The study area is best known for tourism, especially for highland sacred pilgrimage tourism. Farmland alongside roads is being developed to provide board and lodging. Along the valley of the Alaknanda River from Devedprayag to Karanprayag, around 80 percent of cultivable land is abandoned and

mushrooming hotels, motels, lodges and dhawas can be seen there. In the villages of higher elevations, land abandonment is due to a large-scale emigration of the populace to the urban centres of India. They are permanent emigrants. It was noticed that the households who are earning money through remittances, also leave their agriculture land abandoned in almost all the cases. There are the cases in the villages, where about 60 percent of the people have emigrated. There is a trend for households who are fully dependent on output from agricultural crops for their livelihood to cultivate cereals and they are even cultivating the farmlands of the emigrants which has reduced the growth of land abandonment.

Conclusion

Transformation of crops from subsistence to cultivation of paddy, wheat, fruits and off-season vegetables has been experienced for last three decades or so. Subsistence agriculture in a variety of crops that was the main occupation of most farmers did not continue for long because of low production and productivity. This resulted in a transformation of cereals particularly millets, into cultivating paddy and wheat, which sustained food security in the region. Earlier, marginal farmers struggled to get two meals a day, but are now able to have enough food grains for the whole year. Fruits, medicinal plants and off-season vegetables have the potential to enhance livelihoods as agro-ecological conditions are suitable for growing these crops in all altitudinal

zones. However, this practice requires a considerable level of infrastructure facilities e.g. sizeable cold storages and proper marketing network. The people's perception towards the cultivation of medicinal plants is quite different. Discussion with many farmers of the region showed a unanimous conclusion. The farmer questions: "Why do we grow medicinal plants? We have to wait for two years or so before getting returns from medicinal plants and sometimes the return is not sufficient, while from wheat and paddy crops, at least we have livelihood for a season." "We want to cultivate medicinal plants as the natural environment is favourable for their production, but due to a lack of market facilities, their cultivation is not feasible", a small shopkeeper of Janglechatti village stated. There is a similar case argued for the cultivation of fruits and off-season vegetables. In the highlands, where transportation facilities are poor and cold storage unavailable, farmers are facing acute problems for cultivating cash generating crops. There is an urgent need for the development of infrastructural facilities. The State Government's role in this regard is crucial. If a sizeable proportion of cultivable land is to be devoted to cultivating cash crops, proper marketing has to be provided, community participation and a strong government role has to be ensured. Then the entire Garhwal Himalaya can attain food security.

Sati, V P (2002) *Development of fruit Cultivation in Hills: A Case of the Alaknanda Basin*. Kohli, Kothari, and Choudhary (ed). Management of Environmental Pollution. Book Enclave, Jaipur, India

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