

Reconciling the issues of subsistence and cash crops: a review on changing agriculture and livelihood security in the Uttarakhand Himalaya

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Abstract

This paper examines the issues of subsistence and cash crops in the Uttarakhand Himalaya. It discusses changing agriculture and livelihood security. Here, subsistence cereal farming is the main occupation of the people. This practice has recently got transformed as subsistence cereals have been replaced by the cash crops largely in the valley regions and mid-altitudes. In the highlands, traditionally cultivated cereals still dominate in the cropping pattern and they are quite suitable for conserving agro-biodiversity. Meanwhile, production and productivity of these crops is considerably less and normally they do not meet the food requirement of the increasing population. Cash crops, on the other hand, have the potential to attend the food security. There is a general consensus among the groups of people that the issue of subsistence and cash crops should be reconciled in view of changing agriculture and livelihood security. The study reveals that cultivation of subsistence cereals and cash crops together maintains agro-biodiversity and food security respectively. Data were mainly gathered from the primary and secondary sources.

Keywords: Subsistence, cash crop, livelihood security, agro-biodiversity, Uttarakhand Himalaya

Introduction

Agriculture is the main occupation of the inhabitants of Garhwal Himalaya. It is largely based upon the cultivation of subsistence cereal crops and carried out on the narrow patches of terraced fields. The main crops are nomenclature as '*Barahnaza*' (12-seeds) with giving low output but having high biodiversity. This system has been prevailing here for centuries. Recently, the changes in agricultural pattern can be noticed in the whole region. Although, subsistence cereals are still grown largely in the highlands yet, in the mid-slopes and valley regions, cereals are replaced by wheat and paddy crops. Besides, the trend of cultivating off-season vegetables, medicinal plants, and fruits is increasing. The changes in farming systems are largely due to the high growth in population, low yield of subsistence crops, changes in climatic conditions, and consequently the situation of food insecurity exists. To cope with food-scarcity, the farmers have transformed agricultural system on the one hand and the populaces have out-migrated to the plains, on the other. However, the agro-ecological conditions of the region are best suited for cultivating subsistence crops together with off-season vegetables, fruits, and medicinal plants. Subsistence crops maintain agro-biodiversity while cash crops supports sustainable livelihood. This paper examines the issues of subsistence and cash crops in the wake of global changes, high growth of population, and low output from the subsistence crops in the Uttarakhand Himalaya. The main question raised during the study was: what is the best option to adopt in the field of agriculture that could maintain agro-biodiversity and food security and could reconcile the issues whether subsistence, cash crops, or both to be adopted in the farming system?

Study area

The Uttarakhand Himalaya is located in the centre of the Himalayan Mountain System (HMS). It occupies an area of 51,125 sq km and a population of about 6.0 million (94.4 per sq km). This state lies between $28^{\circ} 53' 24''$ - $31^{\circ} 27' 50''$ N and $77^{\circ} 34' 27''$ - $81^{\circ} 02' 22''$ E (**Figure 1**). Of its total geographical area, about 47,325 sq km (92.6%) is covered by mountains, which is the mainland of Uttarakhand, while 3800 sq km (7.4%) is *Tarai* plains. The total snow covered area of its mountainous region is 7,632 sq km (16.1%), with an elevation of over 4000 m. The mid Himalayan region (at a height of 1000 to 3500 m) is found with many high mountain peaks, fertile lands, meadows, rivers and streams, and charming valleys. The *Tarai* plains are 150 km long and 40 km wide, and they are about 230 m above sea level. The entire region is geographically important and is comprised of the two distinct landscapes, i.e., the Garhwal and Kumaon Himalayas with thirteen districts. The mainland is characterized by the dominance of traditional cereal farming. The crops grown are millets, paddy, wheat, pulses, oilseeds, vegetables, and fruits. The livelihood of the populace depends largely upon the cereal farming, livestock production and forest-based non-timber products, while the availability of natural resources as forest, water, soil, and manpower is enormous as the forest (mostly temperate) covers about 59.9% land and the rivers are fed by the glaciers, which are perennial.

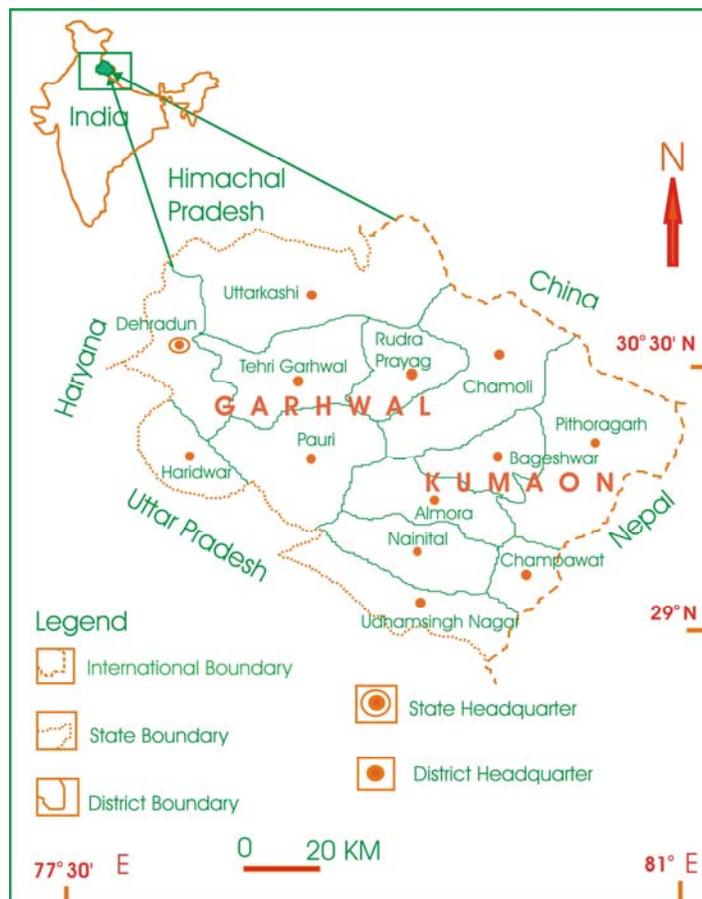


Figure 1: Location map of the Uttarakhand Himalaya

Methods

The study is mainly based upon the collection of primary data. A case study of fourteen villages of Khanda Gad sub-watershed of the Alaknanda River was conducted. Structured questionnaire was framed to get data on subsistence and cash crops. Extension workers, villagers, and officials of agriculture and horticulture department were interviewed. Participatory observation through rapid field visit of the case study villages in particular and whole area in general in all cropping seasons was made to discuss the present situation and future prospects of farming system.

Cultivating subsistence crops

The advanced nature of traditional farming in the region is illustrated by the practice of *Barahnaja*. This is the name of a sophisticated intercropping system of rain fed hill farming. *Mandua* (finger millet), *ramdana/chua* (amaranthus), *rajma* (common kidney beans), *ogal* (buckwheat), *urad* (black gram), *moong* (green gram), *naurangi* (mix of pulses), *gahath* (horse gram), *bhat* (soybean), *lobiya* (French beans) *kheera* (cucumber), *bhanga* (cannabis) and other crops, are grown together in a mixture which is finely balanced to optimize productivity, maintenance of soil fertility, conserving crop-diversity, and is geared towards meeting diverse household requirements. Zardhari¹ described it as a traditional mixed farming system in which central Himalayan farmers grow about 100 varieties of paddy, 170 varieties of kidney beans, eight varieties of wheat, four varieties of barley and about a dozen varieties of pulses and oil seeds each year. In such traditional cultivation, farmers had to spend almost nothing on inputs, since seeds, organic fertilizer, and pest control were virtually free. Whenever they realized that conditions were suitable, they would start planting. **Table 1** shows ecological sub-regions and agro-biodiversity in the Garhwal region. Crops are grown between 300 m to 3, 200 m. It is noticed that wheat, rice, *mandua*, and *jhangora* are the common crops in three ecological zones, while wheat is grown in almost all the four ecological zones with highest productivity in comparison to the other crops. Various pulses (e.g., "*masur*" — *Ervum lens*; "*kulat*" — *Dolichos biflorus*) are grown in intercropping system during the two harvest seasons— early winter after the rainy season (millet) and midsummer before the hot dry season (barley-wheat). Dry and wet rice, taro, pumpkins, beans, corn, ginger, chili, cucumbers, leafy vegetables, and tobacco are also grown. Potatoes have become an important cash crop, growing in areas unsuitable for other plants. In the upland areas, above 1500 m, the practice of cultivating '*Barahnaja*' is common. The mid-slopes and the low-lying river valleys got tremendous changes in cropping pattern as cultivation of paddy, wheat, and cash crops are the recent trends. It reduces agro-biodiversity in these areas.

Table 1: Ecological sub-regions and agro-biodiversity

Ecological region	sub-	Altitude (m)	Agro-biodiversity
Lower Dun, Terai		300-600	Wheat, rice, and sugarcane
Upper Dun, Bhabar, Lower Shivaliks		600-1,200	Wheat, rice, mandua, jhangora, chaulai, and maize
Middle Kumaon	Garhwal-	1,200-1,800	Wheat, rice mandua, jhangora "cheena" (<i>Panicum miliaceum</i>), potato, and barley
Upper Kumaon	Garhwal-	1,800-2,400	Wheat, barley, potato, chaulai, cheena, phaphra" (<i>Fagopyum tataricum</i>)

Cold Zone	2,400-3,200	SUMMER- wheat, barley, potato, phaphra, chaulai, "kauni", "ogal", kodo" (Fagopyum esculentum), "uva" (Hoycleum himalayanse)
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Source: Adopted from Sati (2005)

Why cash crops?

The Uttarakhand Himalaya provides a great scope for production of cash crops- off-season vegetables, fruits, and medicinal plants. It varies from the valley regions to the mid-slopes and the highlands according to terrain, slope, soil contents, and availability of water. On the mid-slopes and the highlands, potatoes, medicinal plants, and temperate fruits are grown extensively, while on the terraces of valley regions, onions, tomatoes, and other seasonal vegetables cultivated. Besides, almost all variety of vegetables is grown in the entire region with extremely high economic value. In the highlands potatoes, medicinal plants, and temperate fruits are the main cash crops. These crops are grown between 1500 m and 2200 m. It is mostly grown on the gentle slope of the mid-altitudes and highlands (10-15°). During the eighties, farmers of the region started intensive cultivation of potatoes and temperate fruits. They produced large quantity of vegetables and fruits and were able to export them to the regional markets. Besides, the other vegetables and spices such as beans, ginger, garlic, cucumber, pumpkin, turmeric, and chilly are also grown in this zone. These vegetables are locally consumed. Recently, cultivating medicinal plants in the highlands are also being popularized here. The State Government initiated establishment of Poly Houses with the involvement of community people. Onions are grown in the valley regions and mid-altitudes, where availability of irrigated water is tremendously high. It is grown during the summer season in different localities along the river terraces between 800 m and 1200 m.

Cost-benefit analysis of subsistence and cash crops

A cost-benefit analysis of traditional and cash crops was carried out. A case study was conducted in Khanda Gad sub-watershed of the Alaknanda River with total fourteen villages were selected. **Table 2** shows area and annual income of off-season vegetables and cereals in 2007-2008. The total area under off-season vegetables is 51.5 ha and annual income is Rs. 133, 8100 (Rs. 25, 982 per ha) while under cereal crops, it is 330.4 ha land and Rs. 502, 1600 annual income, which is Rs. 15, 198 per ha. Similarly, the numbers of households working for producing off-season vegetables are 65 while, 368 households are involving with cultivation of cereal crops.

Table 2: Area and annual income from off-season vegetables and cereal crops (2007-2008)

Off-season vegetables	Area (ha)	Annual income (Rs.)	Cereal crops	Area (ha)	Annual income (Rs.)
Cauliflower	15	5, 08900	Wheat	100	1472000
Cucumber	3	2, 17000	Rice	100	2520000
Tomato	20	1, 79000	Barley	50	760000
Capsicum	3	1, 18000	Millets	50	121600
Beans	3	1, 15200	Pulses	20	70000
Potato	7.5	2, 00000	Oilseed	10.4	78000
Total	51.5	13, 38100	Total	330.4	50, 21600

Source: Primary collection

Table 3 shows production and per ha yields from off-season vegetables and subsistence crops in 2007-08 in twelve villages of Khanda Gad sub watershed. Main off-season vegetables grown are cauliflower, cucumber, tomato, capsicum, beans and potato. Among cereals, the main crops are wheat, rice, barley, millets, pulses, and oilseeds. Land under off-season vegetables is 51.5 ha while under subsistence, it is 330.4 ha. Highest per ha production is of cucumber (103.3) followed by tomato (89.5) and potato (53.3). Under cereal crops, rice and barley (36.8 each) have highest productivity followed by oilseeds (35.4). Concisely, per ha yield of off-season vegetables is 67.7 in comparison to cereals (28.0). This reveals the high potentials of off-season vegetables. If a sizeable proportion of cultivable land is devoted for cultivating cash crops, food security can be obtained thoroughly.

Table 3: Production and per ha yield from off-season vegetables and subsistence crops (2007-08)

Off-season vegetables	Area (ha)*	Production (in quintal)	Per ha yield	Subsistence crops	Area (ha)*	Production (in quintal)	Per ha yield
Cauliflower	15	727	48.5	Wheat	100	1520	15.2
Cucumber	3	310	103.3	Rice	100	3680	36.8
Tomato	20	1790	89.5	Barley	50	1840	36.8
Capsicum	3	118	39.3	Millets	50	1472	29.4
Beans	3	144	48.0	Pulses	20	368	18.4
Potato	7.5	400	53.3	Oilseeds	10.4	368	35.4
Total	51.5	3489	67.7	Total	330.4	9248	28.0

Source: Primary collection * Patwari circles Srinagar and Pauri

Changing agriculture and food security

Diversification in crops has doe impacts-first it sustains soil fertility and restore ecosystem and secondly, it enhances livelihood options. Crop diversity is largely found in the study area particularly in the uplands. Consequently, the villages located in the highlands (above 1600 m) have the capacity to store food-grains and sustain their livelihood even under the adverse conditions such as droughts, flash-floods, and collapse of market. Recently, global changes can be noticed everywhere in mountain regions. Population increased manifolds. Apparently, the changes in the farming systems have been observed. The cereals were not enough to meet the increasing food demands resulted in changes in cultivation from millets to paddy and wheat. During the past, paddy and wheat crops were rarely sown but now it is very common food. Even today, a large proportion of sown area is devoted to paddy and wheat crops. During the 1980s and 90s, a large-scale cultivation of fruits and off-season vegetables was carried out. The production of potato and onion has tremendously got a momentum but it was reduced considerably and currently more land is devoted to paddy and wheat crops. The agro-ecological conditions in the regions are very suitable for the production of all kinds of subsistence crops, off-season vegetables, fruits, medicinal plants, tea cultivation, and rearing of high yield variety animals for milk production. Tea cultivation may be a promising sector and may play a significant role in sustainable development of the region. After creation of Uttarakhand as a new state, the government established tea gardens in the mid-slopes of the mountainous region. The main objectives of establishing of the tea gardens in the state are (i) to harness the favourable environmental conditions, (ii) to enhance the economy of the people who are involved in tea cultivation, and (iii) to ensure the people's involvement so that augmentation of employment may be taken place. Off-Season Vegetables have a great and wide scope in enhancing livelihood and attending

food security. In the highland areas, the marginal farmers have started cultivating potatoes and they got tremendous success. Similarly, onion and tomato are the main crops in the low-lying river valleys and mid-altitudes. Potential of fruit cultivation is tremendously high. Fruits of all varieties from sub-tropical to sub-temperate and temperate are grown here. The agro-ecological conditions are quite feasible for cultivating these fruits. Medicinal plants are extensively grown in all altitudinal zones. The alpine meadows, locally known as 'Bugyals', obtain abundant sloppy land that are very suitable for growing medicinal plants. Under these conditions, food security can be attended if cultivation of cash crops be adopted proportionally and rationally in the entire region. Cereal crops are failed to secure livelihood as population is increasing and production of cereals is remained constant or decreasing. Therefore, the farmers of the region have tried to squeeze out from food insecurity and they opted various farming systems and grown various crops during the past from subsistence cereals to cash crops i.e. fruit, herbs, and vegetables.

Major hurdles on the way in adopting cash crops

Lacking in infrastructural facilities: Lacking in infrastructural facilities such as cold storages and proper marketing system, the products do not receive full returns. Often they are unsold and consumed locally. Establishment of cold storages according to the production and distances between the producing areas will promote the production of cash crops and motivate the producers. Furthermore, it will ensure proper marketing of products. Similarly, small-scale industries and food processing centres should be established and local people involvement should be insured. *'We do not receive the return of the products we produce even often we are unable to have two times meal. We do not have work other than farming of food-grains and vegetables'*. A villager of Janglechatti village remarked.

Lacking in government initiatives holistically: Institution involvement, in terms of, encouraging farmers to cultivate certain cash generating crops such as herbs and providing them financial assistance, and insurance of their crops at the time of crop failure is lagging behind. High Altitude Plant Physiology Research Centre (HAPPRC) of HNB Garhwal University Srinagar Garhwal initiated such practice in a very high altitude village namely Ghais where number of farmers are increasing in cultivating medicinal plants and HAPPRC works as mediator between the villages and the company, which purchases products. Government initiatives for any development programmes have the multiple impacts on the area particularly at the time, when the government has to control over entire affairs of the state. The impacts may be negative or positive depending upon the degree of involvement and rationale of planning. Political instability (untimely change in government) and lacking in involvement towards development planning further deteriorates the aspect of livelihood. In the Uttarakhand Himalaya, it has a tremendous effect on the development. This part of the land was under the rule of Uttar Pradesh State until 2000. Due to its remoteness, very less impact of policies towards development could reach in the region and consequently, it remained untouched from the waves of modernization and industrialization.

Lacking in proper marketing: Lacking in proper marketing has been remaining a major hurdle for the growers of various cash generating crops in the region for centuries. The products of high quality and quantity do not get proper market for a long time and consequently the growers do not get their returns. Infrastructural facilities as transportation and cold storages are slackened. Many of the occasions, the crops after taking a year to get a form of product do not sell out. While discussing with the growers of medicinal plants, fruits, and vegetables regarding their products and economic viability, the growers do not find themselves easy to grow the cash crops instead of traditional cereal crops. The main cause which they strongly observed is market unavailability. The villages, where the agro-climatic conditions are suitable for growing cash crops and the farmers also intend to grow

them extensively, are very inaccessible from the transportation point of view. A good marketing system (from regional to national) will be the base for exporting these products.

Lacking in training programmes: Diversities in the government programmes for enhancing and diversifying livelihood options can be noticed in this region. Some of them are decades old. Although, State Government established training centres and appointed master trainers to impart training to the fruit and vegetable growers, the trainers remained failure to do so and consequently the production and productivity of these crops seemed declined in due course of time. Mostly, the farmers are unknown in cultivating cash crops and the situation becomes sternly serious.

Climate change: The reality of climate change, particularly in the mountain regions, is required an appraisal of climate data for a century or more. Currently, the perception of all groups of society towards the impact of climate change in mountain regions is Unanimous. The farmers have also the perceptions that the unproductiveness of fruits plants is due to climate change. Many farmers left their agricultural land abandoned. While discussing they said, *'due to tremendous changes in climate, cultivation of fruits has complete been destroyed'*. The areas where intensive cultivation of apple fruit was carried out during the past are no more for its cultivation. This belt has been sifted greatly in the higher elevation. This is also with the case of citrus and nut-stone fruits.

During my extensive field visit of Gwaldom-Lolti apple fruit belts, it was noticed that the apple orchards are no more existed. This belt was producing large-scale apple even exporting it. Now, the orchards have been disappeared. It was also observed that pine forest invaded oak forest at a large-scale. Pine trees can be seen in and above oak forest. The invasion of pine forest over temperate or coniferous forest resulted in warming in the region. Not only this, it has also impacted on cropping pattern. The differences noticed in apple cultivation in different locations were due to the presence and absence of oak forest. Disappearance of oak forest was due to over exploitation because the oak trees have multiple uses from fodder to fuel and cooling environment. A large-scale oak forest depletion was noticed during the 1980s resulted in increase in temperature.

There is a story of failure of individual efforts towards diversifying and enhancing livelihood options. The agriculture land is largely fragmented. If innovative ideas are implemented by the farmers for changing in farming systems they are not able to cultivate these ideas. There are various regions such as crops damage by wildlife. Under such circumstances, what step is to be raised for enhancing and diversifying the options for better livelihood? There is a general consensus among the producers, researchers, and academicians about community participation. Like self help group, community participation in development activities should be ensured. Though, there are various schemes launched for assisting farmers and organizing community groups for the development purposes, still major thrust is required to assist the community groups as a whole not as an individual farmer. If a group of community people will participate together in any development activities, the entire scenario may be changed and development of the region may be insured.

Land abandonment can be observed in many locations. It is generally found in the villages, which are located in the lower elevation or along the roads. One of the most important factors of land abandonment along the road is commercial uses of land or for constructing settlements. The region is best known for tourism especially for pilgrimage tourism. The farmlands along the roads are converting into accommodation avenues; lodging and boarding. Along the Valley of Alaknanda River, from Devprayag to Karanprayag or in other river valleys, around 80% land is abandoned and mushrooming hotels, motels,

lodges, and *dhawas* can be seen. In the villages of lower elevation, land abandonment is due to large-scale emigration of the populace to the urban centres of India. They are permanent migrants and settled in the urban centres. Their cultivable land is abandoned. It is also noticed that the households, who are earning money through remittances, also leave their agriculture land uncultivated. There are the cases in the villages, where about 60% people have emigrated and their land is abandoned. A common trend was observed in the villages that only the households, who are fully dependent on the output from agricultural land for their livelihoods are cultivating cereals and they also cultivate the farmlands of the migrants.

The Farming Communities and their Perceptions: The farming households can be categorized into three groups according to their socio-economy, education, and sources of income. The first group has been emigrated largely to the urban areas of Himalayan foothills, Doon and Dwar valleys, and Ganges plain. They are moderate to highly educated accordingly serving for moderate and higher positions. The main source of their income is from service sector. Even they have agricultural land in their respective villages, which they have given to other family members for cultivation with no returns. In second group, farming households earning money from two sources; one is from remittances and from cultivation also. This category of households also enjoys farming because most part of their livelihood is met out from the money of remittance. At least a person or two is emigrated annually and biannually mostly in the army. The third group of farming households, who formed an important segment of the farming society, is living under critical stage. This group is marginal and more vulnerable in food security, struggling to secure substantial food grain from the crops and trying to establish a secure method of cultivation so that to able to coup with food scarcity. Cultivation of grains is the only option among them because they do not have any other sources of income. Transformation of crops from traditional cereals to cultivation of fruits and then off-season vegetables has been exercised by the farmers especially by the third group for last three decades or so. Cultivation of cereals at subsistence level, which was the main occupation and has diversity in crops no more existed for a long because of low production and productivity. This resulted in transformation of cereals particularly millets into cultivating wheat and paddy, which sustains the food security and largely cultivating until now. Meanwhile, fruits were largely grown but in due course of time, it could not receive an impressive position and the farmers left this practice. Off-season vegetables i.e. potato, onion, tomato, green leaves, beans, spices, and cultivating medicinal plants have the potentials to enhance livelihood but this practice requires a considerable infrastructural facilities e.g. sizeable cold storages and proper marketing network. The people's perception towards selection of crops and cultivating them is quite different. While discussing with many farmers of the region, a unanimous conclusion derived. The farmers questions, *why we grow off-season vegetables and medicinal plants? We have to wait for two years or so for getting returns from the medicinal plants and some time the return is not desirable, while from wheat and paddy crops at least we can run our livelihood for a season. Though the return from off-season vegetables and medicinal plants may be greater!* Unless the proper market and essential infrastructural facilities are provided, the cultivation of cash generating crops is not sustainable. *'We want to cultivate fruits and vegetables as the natural environment is favourable for the production of these crops but we are not able to do because of lack of infrastructural facilities'* said by a small shopkeeper of Janglechatti village.

Conclusions

The issues of subsistence and cash generating agriculture got a momentum in the 1970s when the concept of green revolution first ever launched in India. A vast land of agriculture was devoted under the crops of wheat, paddy, pulses, and oilseeds with excessive use of chemical fertilizers and experimental seeds. This national trend of intensive cultivation was also adopted in the Uttarakhand Himalaya though not in the same scale or degree. In this regard, the first step was raised to demarcate the land, which was otherwise not fit for the cultivation of cereals, as 'fruit belts' in 1972². The land undertaken 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 get into the final shape while some 'fruit belts' still exist. This scheme was widely followed by the cultivators as they transformed their agricultural land for cultivation of fruit crops but the proportion of land was very less. However, it was high in the highland than to the valley regions. Over the decades, the enthusiastic cultivators withdrawn their steps and they started cultivating off-season vegetables prominently in the highland areas. Meanwhile, cultivating wheat and paddy crops replaced the traditional cereal crops e.g. millets to a great extent. This trend of cultivating paddy and wheat transformed the lifestyle of the farmers in an optimistic way and they became self reliant in food grains. Cultivating fruits and off-season vegetables could enhance the livelihood as they are more cash generating crops but due to lack of infrastructural and market facilities, the farmers could not earn sufficient price even equal to their investment. As a result of this, the experts and extension workers mostly academicians were divided into two groups about their expertise in cultivating traditional cereal crops and cash generating crops. They are separately advocating what crops should be cultivated or what not. Even many studies were conducted separately showing the viability of either traditional crops or cash generating crops. Rao and Saxena³ concluded that the change in food habits from millets to paddy and wheat resulted in food insecurity. This was supported by many social scientists and ecologists who believe that traditional crops are more sustainable for livelihood and ecological restoration. But the scenario is different. Cultivating paddy and wheat, largely on the terraced fields, brought self-reliant among the farmers as earlier the marginal farmers struggled for getting two times meal now able to have enough food grains for the whole year⁴. Another study reveals the cash crops have greater potential to enhance livelihood as agro-ecological conditions are suitable for growing these crops in all altitudinal zones.

Developmental intervention through government agencies needs a considerable policy framework. Crops diversity needs conserved but at the same time a considerable proportion of cultivable land to be devoted for cash crops. For the centuries, the local people are practicing different systems of cultivation in this hilly region as trial and error. The government has also initiated people's supportive programmes for speedy development and for the welfare of local people. Earlier, all segments of the society had the perceptions that due to the uniqueness of the region, the development formulas could not be fitted to the region and then struggle was started for a separate state and finally in 2000 a part of the hilly region named Uttarakhand State was carved out. Eight years have been gone and third government is working after its statehood, no tremendous changes noticed so far. No doubt, sustainability in livelihood is achieved to a certain extent but this could not reduce hardship, especially in the highlands where development of infrastructural facilities is a mirage. The populace is still struggling for the basic needs of food, cloth, and shelter.

Cultivating subsistence and cash crops are interrelated and interlinked in the Uttarakhand Himalaya. Diversity in agriculture crops including cultivation of subsistence crops restores soil fertility and ecology and enhances the livelihood options. It is a practice, which supports livelihood even at adverse situation e.g. crop failure, adverse climatic conditions, etc.

Meanwhile, it can not fulfill the growing need of the cultivators in a wake of increasing population and global changes, which seems more effective in the region recently. As the study reveals that enhancing and diversifying livelihood options including cultivation of off-season vegetables, fruits, medicinal plants, tea cultivation, use of non-timber forest products, rearing of animals; draught and high yield variety, harnessing water resource through construction of micro-hydroelectric power plants, and promoting eco-tourism, all in sustainable manner, together with cultivating cereals according to agro-climate and providing market facilities will serve the regional economy in a better way.

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