

## Natural-Cultural Practices in Conservation of Traditional Crop Diversity in Mountain: A Study of Uttarakhand State, Indian Himalayas

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**ABSTRACT** Agrarian communities of the remote mountains, in Uttarakhand have developed several eco-friendly farming practices to conserve traditional crop diversity. Celebrating agro-diversity with religious and cultural fervour is an important instrument of conservation. This process has helped the hill peasants to comprehend the linkages between nature and culture and has taught the precious lesson to turn harsh agro-climatic adversities into fortune. The different cultural and ritual practices evolved in the process of conserving bio-diversity have saved many crops which otherwise would have been extinct. Seed festivals, seed fairs, seed banks, seed movement and farmers to farmers' seed exchange are important social and cultural instruments of conservation and promotion of traditional crop diversity in the mid-Himalayan region of Uttarakhand. The transformation of indigenous knowledge of farmers (especially women) and farming innovations are highly effective in promoting participatory and sustainable livelihoods options in the tough, ecological sensitive topography. The innovative farmers of survey villages produce *Baranaza*, a mix of twelve grains and pulses, simultaneously in one field. This practice exhibits a great deal of variability in crop diversity, crop composition and crop rotations to support ecological sustainability, food security and socio-cultural prosperity. This paper is a modest attempt to comprehend how the cultural practice of the region are intimately linked with the conservation of bio-diversity and are effective instruments of continuous sharpening of the farming and agricultural skills.

### INTRODUCTION

Uttarakhand State, a newly Himalayan State spread over between 28°-43' to 31°-27' North latitude to 77°-24' to 81°-02' East longitude is among the ninth Himalayan states of the Indian Republic. Situated on the southern slopes of the Himalayas, the northern part of the state is in greater Himalayan ranges and southern part is in the foothills. The state is administratively organized in 13 districts, among which 11 districts, accounting for about 93 percent of the total area of the state, are mountainous. As per the census of 2001, the state has a population of 8.4 million, of which 74.33 percent is rural inhabited in 15024 villages. About 66 percent is forest cover and only 13 percent is agriculture land. The availability of cultivable land declines with increase in altitude but human and cattle pressure on it tends to increase (Juyal 1985). In some areas of the state – like Bhatwari

and Joshimath Block, which are close to higher Himalayan ranges, arable land is around four percent of the total geographical area. Besides, one-third land resources in the state are in private ownership (Table 1) and rest of the land (around 67 percent) is owned by the state and large parts of it are reserve forest, in which farmers of the region have virtually no rights (Semwal 1993). The other important feature of the land ownership pattern is that more than 70 percent cultivators in the region are owners of less than one hectare of land, with an average holding of 0.19 hectares. The ownership of a typical peasant is scattered in 7 to 8 locations. Cultivation depends on rains as less than 10 percent arable land is irrigated (Swarup 1991). Because of these constraints of land ownership and other support structures like lack of assured irrigation, bio-chemical technology i.e. the green revolution has not made any inroad in the mountains of the state. The data of fertilizer and seed consumption validate this fact. As in none of the hill district the average consumption of chemical fertilizer has touched the figure of 10 kilogram per hectare and in some of the districts like Garhwal, Chamoli, Tehri Garhwal

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and Almora this figure is less than ten percent (Govt. of Uttaranchal 2005). Likewise is situation of seed utilization. Barring a few exceptions, more than 80 percent arable area of hill districts, is allotted to traditional crops (Table 2). These indicators are indeed indicating the backwardness of agriculture in the region in prevalent parlance of development but also indicate to the opportunities as reflected in the growing market for bio-food. Recently environmental sustainability, food security and biodiversity related issues have become important in the context of sustainable mountain development. Relevance of the bio-farming mountain agriculture is expected that in the future marginal mountains farmers will get more livelihood and income opportunities (Pokhriyal 2001). The challenge is how to utilize this opportunity and turn the adversity into good fortune.

**Table 1: Ownership pattern of land resources in Uttarakhand (Excluding Haridwar District)**

Category	Area (sq.km.)	% age to total geographical area
A) State ownership	32031.00	62.65
i. Reserve forest	23819.65	46.58
ii. Civil forest	8013.63	15.69
iii. Cantonment forest	197.72	0.38
B) Community ownership	2368.00	4.63
C) Private ownership	16726.00	32.72
Total Uttarakhand (A+B+C)	51125.00	100.00

Source: Semwal 1993

**Table 2: Attributes of agriculture in mountain district of Uttarakhand (2003)**

District	%age of net irrigated area to net sown area	%age traditional crops to total cropped area	Per hectare fertiliser consumption to gross cropped area
Almora	8.14	93.10	2.8 kg
Rudraprayag	10.53	93.70	2.9 kg
Garhwal	8.64	92.90	2.6 kg
Bageshwar	22.22	94.30	6.9 kg
Tehri Garhwal	14.75	91.10	2.8 kg
Pithoragarh	9.43	90.50	4.8 kg
Champawat	10.34	86.15	3.9 kg
Chamoli	6.06	84.00	5.9 kg
Uttarkashi	18.50	77.60	9.8 kg

Source: Statistical Diary, 2004-5, Directorate of Economics and Statistics, Government of Uttaranchal.

Very high participation ratio of women is the other structural peculiarity of agriculture in the mountains. As a matter of fact they are

the custodian of agricultural bio-diversity (Sati and Juyal 2008). The heavy migration of young males for livelihood in different parts of the country has its telling impact on gender compositions of population in general and work force in particular. As out of thirteen districts of the state, in eight districts, which are mountainous, women outnumber men. Women participation ratio in workforce is more than fifty percent and more than three-fourth of the agriculture workforce is female (Table 3). The grip of patriarchal traditions are still quite strong as generally men own the land but in majority of family due to migration of the young males, women are the de-facto head of the household and take the decision regarding cultivation practices.

**Table 3: Sex Ratio and participation rate of women work force in Uttarakhand (2001)**

District	Sex ratio	% of female workers to total workers	% of rural female workers to total workers	% of female cultivators to total cultivators
Almora	1146	55.25	57.95	74.7
Rudraprayag	1115	52.67	53.35	75.9
Garhwal	1106	49.99	53.62	66.5
Bageshwar	1105	55.07	55.88	74.5
Tehri Garhwal	1049	49.76	53.62	70.0
Pithoragarh	1031	50.25	52.70	67.6
Champawat	1021	46.44	50.51	69.7
Chamoli	1016	50.94	53.96	69.6
Uttarkashi	941	45.94	47.53	74.8
Nainital	906	30.72	37.68	41.8
U S Nagar	902	19.90	24.07	30.3
Dehradun	887	18.46	24.92	18.8
Hardwar	865	13.26	14.84	22.8
Uttarakhand	964	35.98	42.17	50.1

Source: Census of India, Registrar General of India 2001

Even in these adverse conditions, farmers of the region, endowed with exceptional farming skills cultivate around 40 different species of traditional crops comprising cereals, pseudo cereals, millets, pulses and oilseeds. From time immemorial, farmers of the region cultivate and harvest *Baranaza* (a mix of twelve grain and pulses, sown and harvest simultaneously in one field) in monsoon crops. But despite this exceptional farm skill and bio-diversity, the mountain districts of the state are food deficient.

The region has diverse agro-climatic conditions ranging from the narrow flat strip of the south called *Tarai* and *Bhabar* to undulat-

ing mid mountains and the highlands nearing the snow line. These diverse climatic conditions have made the region a repository of agriculture bio-diversity. Some crops of the region like the *Basmati rice* grown in the Doon valley is unique to it. Other crops, like Buckwheat, (*Fagopyrum esculentum*, *F. tataricum*), Burnyard millet, (*Echinochloa frumentaces*), foxtail millet, (*Setaria italic*) hog millet (*Panicum miliaceum*), and variety of legumes like adjuki bean (*V. angularis*) hoesgram, (*Macrotyloma uniflorum*) are almost on the verge of extinction in similar agro-climatic conditions elsewhere in India but these crops are still grown by the subsistence farmers of the mountains of the Uttarakhand state and in some village these grains and pulses are still the staple diet of peasant households. The average grain yield of different traditional crops in the region has been reported at 10.25 quintals per hectare for wheat; 11.0 quintals per hectare for barley; 26.18 quintals per hectare for the mixed crop of paddy, barnyard millet and foxtail millet; 18.16 quintals per hectare for the mixed crop of finger millet and horse gram; 18.46 quintals per hectare amaranth, and total food grains to be at 18.84 quintals per hectare (Whittaker 1984 and Semwal et al. 2001). As per the tradition of the region, cereals, pseudo cereals, millets, and pulses or plant species grown by the cultivator in his own field are utilized in the religious, social and cultural rituals. However, little research is available and documented about these cultural practice instrumental in conserving agro bio-diversity.

## STUDY AREA AND METHODOLOGY

To examine the role of culture and nature in

the conservation of traditional crop diversity, a sample of ten remote rural highland villages of district Chamoli, Garhwal Himalaya of Uttarakhand were selected for the study. Villages were located within altitudinal variation of 1800–3000 meters from mean sea level (Table 4). Villages were selected purposely keeping in view the cultural diversities, so that they were best representatives of other villages in the region. Information on utilizing crop diversity for the cultural purposes, indigenous knowledge of traditional crop farming and conservation methodologies were collected through interviewing the villagers using open-ended interviews and guided dialogue techniques. Participatory Rural Appraisal (PRA) exercises were also carried out in each of these villages. In these PRA exercises, 500 hundred farmers participated to share their expertise, views and opinions. The findings of the study revealed that although in the recent years the crop diversity of the survey region has declined to an alarming proportion but every farmer of survey villages is still cultivating all traditional crops for cultural and ritual purposes.

## RESULTS AND DISCUSSION

### a) Traditional Agriculture Practices: The Synthesis of Ecology and Human Needs

The peasants of survey villages, with their hard toil and struggle for food security have learnt that a simple two crops rotation in a year is not possible in the harsh climate of the region. Since winter is too harsh on seeds to germinate, spring (*Rabi*) crops are to be sown well before onset of the winter. The summer (*Kharif*) crops require more moisture to germi-

**Table 4: Population, forest and agriculture land use in survey villages**

Name of village	Total households	Total population	Total forest area (in hect.)	Total agriculture land (in hect.)	Irrigated land (in hect.)	Area under traditional crop (in hect.)
Gamsali	78	347	350	37	00	37(100)
Saloor Dungra	303	1466	365	151	00	151(100)
Mana	188	594	00	112	00	112(100)
Vaan	228	1286	300	325	00	300 (92)
Lata	75	342	951	193	00	180 (93)
Rains Chopta	125	589	00	55	00	50 (91)
Mandal	98	438	24	15	00	10 (67)
Aser	100	493	00	47	00	40 (85)
Deval	35	159	14	41	08	33 (81)
Nauti	185	735	107	77	16	60 (79)
Total	1415	6249	2111	1053	24	973 (92)

Source: Collected from survey villages, Note: Figures in brackets denote the percentage to area under traditional crop.

nate, more water to grow and hot and humid climate to ripe, therefore crops have to be sown well before the onset of the rainy season (monsoon). To cope with this complexity, peasants of the region have evolved a unique crop rotation pattern. The farmers of the cool-temperature zone (between 1800 to 2500 meters from mean sea level) divide the entire arable land of the village into two parts locally known as *Sari*. The crop rotation follows in such a way that paddy (*Oryza sativa*), burnyard millet (*Echinochloa frumentaces*) and other secondary crops stand in one part (*Sari*) and finger millet, (*Eleusine coracana*), amaranth (*Amaranthus oleracea*) and different pulses, are grown in other part. Paddy or barnyard millet is sown in April and after harvesting it in early October, wheat (*Triticum aestivum*) and oil seeds are sown subsequently. Immediately, after harvesting wheat and other accompanying crops, in early May, finger millet (*Eleusine coracana*) and other twelve grain crops and pulses are sown in the same fields (*sari*). After harvesting finger millet and other secondary crops in October, the land is left fallow for about 5 months and in month of April, paddy and other crops are sown in it. In this way every crop repeats itself in the same land after one and half year. In this unique pattern farmers get three crops in two years.

In the cool temperature zone (summer crop zone), villages are situated between 2500-3000 meters from mean sea level. Due to environmental constraints farmers cannot raise more than one crop in a year and all crops have to be sown in spring (April- May). The agro-climatic condition is highly favourable for cultivation of many traditional crops such as buckwheat (*Fagopyrum esculentum*, *F. tataricum*) locally known as *ogal* and *phaphra*, foxtail millet, burnyard millet pig-weed, naked barley, popy, kidney bean, rice bean and potato. Farmers of this area efficiently utilize this agro-climatic speciality from their fields.

Besides evolving the unique crop rotation, peasants of the region have learnt that every field is unique and within the same field micro-climatic conditions and texture of soil also vary from part to part. Farmers take full advantage of this situation and use a mix cropping pattern, to raise variety of pulses and other millets with the principal crop. Farmers cultivate pulses in the lower and upper reaches of

the same field and middle portion of the field is occupied by principal crop. Monsoon crops season, especially in the (*sari*) land occupied by finger millet happens to be a rich mixed cropping season. Traditionally farmers harvest several types of crop species in addition to the principal crop. Some of these crops accompanying crops are amaranth (*Amaranthus oleracea*), buckwheat (*Fagopyrum esculentum*), naked barley (*Hordeum himalayens*), maize (*Zea mays*), kidney bean (*Phaseolus vulgaris*), horse-grams (*Macrotyloma uniflorum*), various types traditional soybean (*Glycine soja*, *Glycine max*, *Glycine*), adjuki bean (*V. angularis*), blackgram (*V. mungo*), cow peas (*V. unguiculata*), pigeon pea (*Cajanus cajan*), perilla (*Perilla frutescens*), sesame (*Sesamum indicum*), tickweed (*Cleome viscosa*) hemp (*Cannabis sativa*) roselle (*Roselle, hibiscus subdarifa*) and cucumber (*Cucumis sativus*). This tradition of mixed cropping provides protection against total crop failure and effective instrument of food security. This ecological suited agrarian system has more sustainable, viable and prosperous socio-economic life of farming communities (Guha 1991)

Dividing the entire arable land of the village in two parts, leaving each part (instead of isolated scattered fields) fallow by rotation, every peasant raises common crops. Following a common schedule of cultivation and harvesting has unique advantage in the mountains, where arable land is scarce and land holdings are scattered. This practice of leaving whole part of the arable land fallow, instead of individual, for about four to five months in winters, when scarcity of fodder is acute, provides grazing ground to animals. Animals graze on the stems (remnants' of harvest crop especially of finger millet rich in nutrient content) and subsequently manure the fields. The practice of raising multiple crops helps in retaining the balance of nutrient contents in soil, which deplete at fast rate in monoculture, hence require heavy doses of fertilisers that keep on increasing with subsequent crops. Thus, this unique pattern of crop rotation is an effective instrument of conserving soil, maintaining bio-diversity and ensuring food security. Peasants over centuries have learnt that conserving agro bio-diversity is an effective instrument to ensure food security and have helped to evolve these agronomic practices as an integral part of the culture of the region (Jardari 2007).

**Table 5: Fair and festivals of sample villages to conserve agro bio-diversity**

<i>Festivals</i>	<i>Month</i>	<i>Objectives</i>	<i>Activities</i>
<i>1. Seed Testing Festivals</i>			
Harela	Mid June to mid July (on the first day of <i>Aasar</i> month, as per the Vikram Samwat (VS) of Indian calendar)	Every house hold draws seeds from its seed bank to test their fertility. At least seven grains ( <i>Satajaj</i> ) viz. wheat, barley, finger millet, maize, and three types pulses are put to test.	For testing of seeds at least seven grains are sown in the premises of the house or temple on a bed of finest of the soil collected from fields. The germination is observed and on the 11th day, the sampling are harvested and offered to the deity of the temples, house and village. -do -
Navrati	Celebrated twice in a year, one in spring and other in autumn. In the month of Asooj of VS calendar. The <i>Asooj</i> month falls between mid September to mid October)	-do-	
<i>2. Testing the Saplings and Growth of Crop Related Festivals</i>			
1. Ghatwelda	Sankranti ( first date of Jeth month . The Jeth month of VS calendar fall between mid May to mid June)	Farmers examine the growth of monsoon Paddy (Kharif) Crop	For testing the growth of plants peasants collectively visits the fields and exchange note
2. Basant Panchami	Basant Panchmi festival. This festival is celebrated in middle or late <i>Magh</i> month (the <i>Magh</i> month of VS calendar, fall between mid January to mid February).	Farmers examine the growth of monsoon Paddy (Kharif) Crop	For testing the growth of plants peasants collectively visits the fields and exchange note. Peasants paste finest of the barely sapling at the entrance of their homes and temples.
3. Oniya Sankranti	<i>Oniya Sankranti festival is celebrated on the Sankranti Saravn (Sarvan month of VS calendar, which extends between mid July to Mid August).</i>	To examine the growth of the creepers of legumes and vegetables. The another aspect of this honour the individual rights of land.	Peasants install small logs in the fields of legumes and vegetables so that creepers could climb and branch out. Village community also visits fields and examine the status of lines or signs dividing different land holdings, and if finds any encroachment it insists on then and there correction
<i>3. Examining the Health of Live Stock Related Festivals</i>			
Bald Raj festivals	On the day of Diwali ,the Hindu festival of lights celebrated sometime between mid October to early November. As per the Hindu Lunar calendar on the Amavassya of Kartik month of VS calendar (the new moon night of <i>Kartik</i> month, which extends between mid Octobers to mid November)	To examine the health of animals especially of the bullocks and chalk plans to restore the health of animals during autumn and winter months, when they will not put to any hard work.	People decorate cattle with flowers and feed them with delicacies. It is a thanks-giving to the animals for their hard toil that brings prosperity to family . With the help of knowledge and expert of animal health people examine their cattle and chalk out their diet regimen and if necessary of treatment of wounds and ailments, to ensure well-being of the animals.
<i>4. Festivals Respecting Diversity and Adding Colour to Life</i>			
Shivratri	Mid February.	Preserving seeds of pumpkin	Festivities
Phool Sankranti	On first date of Chaitra month of VS calendar	Celebrating spring	Festivities
Vikhot	One first date of Vaisakh month of VS calendar ( this month is from mid April to mid May)	Adieu to spring and welcoming the harvesting season	Festivities and formal start of harvesting season.

### **b) Culture in the Conservation of Traditional Crop Diversity**

Cultivation activities in mountain, right from terracing the slope to diffusion of information, are arduous tasks. In the harsh topography and climatic conditions, over the experience of centuries, the peasants have internalized the fact that it is better to live in harmony than to struggle with nature and this could be possible with collective efforts. This very realization has evolved the above mentioned unique common crop rotation and combination pattern, without any formal regulations. Likewise for diffusion of information, peasants of the region have evolved communal methods of sharing information and experience at every stage of cultivation, ranging from periodic testing of the seeds, checking the growth of crops, assisting families to improve the productivity of the crop, examining the health of livestock, celebrating arrival of seasons and rejoicing the harvesting of crops.

Every celebration starts with worship or thanks giving to gods and goddess by offering the produce to the presiding deity of the village for preserving the seed, bestowing good growth of saplings, the harvest and ends with collective feast of the dishes of the harvested grains. After the celebrations, the peasant use the crops and preserve some portion of the produce as seeds. Seeds are always preserved from the field, best in terms of productivity. Thus every peasant his own seed store. The custom of (*customary law*) offering the produce to presiding deity of the village and preserving seed, before consuming and selling the produce by every peasant household at individual household as well as at community level, is an effective instrument of examining the crops produced. The detailed study of some festivals and conservation traditions of different crops in survey villages has been summarised in table 5. Most of the cultural practices of the region are observed as per the Vikram Samvat (VS) calendar therefore a *VS calendar months and their corresponding Gregorian calendar month are also detailed out in this table*.

The *village Panchayat* (the elected body of village representative for managing the affairs of the village) collects a specific quantity of recently harvested crops (generally 0.5 kg. to 1kg) from every household to offer it to the

presiding deity of the village. Another important practice is testing of seeds. Every household tests seeds of his seed bank at least thrice in every year. The first testing is done during the *Harela festival* (festival related to testing of different seeds), celebrated on the *Sankranti of Aassar month, of Vikram Samvat (VS) calendar of India*, to invoke gods to send rains (monsoon). The second and third tests of seed is done during the Navaratri festivals celebrated for nine days on two occasions, once on the onset of autumn and the other on set of spring. In Navaratri festival goddess Durga (*the matriarchal form of power, wisdom and prosperity*) is worshiped. During these festivals the testing of seeds, is done in a simple but effective manner. The peasant sows at least seven types of grains and pulses in the premises of the house or temple on a bed of finest of the soil collected from fields. The germination is observed on the ninth or tenth day, the saplings are harvested and offered to the deity of the house and village. If in this process a peasant finds that the seeds are not up to marks she/he borrows better seeds from others in the village.

Alike testing seeds, to check the growth of crop, testing of saplings is also done, at least on three occasions. The first occasion comes at *Basant Panchmi festival*. This festival is celebrated on the fifth day of the *Magh month of VS calendar*. This festival bids adieu to winters and welcomes springs. People examine the growth of the spring crops of wheat or barley and paste finest of saplings of barley at entrance of their home and temples. The second occasion, *Ghelda festival* is observed on *Sankranti of Jeth month of VS calendar*. Farmers examine the growth of sapling of Kharif crops of paddy and foxtail millet. The third occasion to examine the saplings is associated with celebration of *oniya Sankranti*. This festival celebrated on the *Sankranti of Shravan month of VS calendar*. In this festival the peasant examines only the creepers of legumes and vegetables and install small logs in the fields of legumes and vegetables to provide support to creepers to climb and branch out. Another aspect of this festival is to honour the rights of individuals on land. Peasants collectively visit the fields and inspect the dividing line drawn or sign marked to separate two holdings, is intact and if any encroachment upon the land of others is detected, the village community insists to correct it then and there.

During these festivals the peasants exchange their experience and knowledge about the growth of the crops and discuss ways and means to improve it further. The *Bald Raj festival (festivals related to health of live stock)* which is celebrated on the *Diwali* (the Hindu festival of lights celebrated sometime between mid October to early November). In this festival peasants pay their respect to animals, especially to bullocks, which have toiled hard during monsoon and brought rich harvest the family and examine their health with the help of traditional experts. They decorate cattle with flower and feed them delicacies food grains. To restore their health during autumn and winter months, they cattle are put on regimen of good diet and are not put to any hard work.

#### CONCLUSION AND POLICY IMPLECTION

The above festivals are organized and celebrated at household and village level across the mountain districts of the state. For wider sharing of experiences, fair and festivals are also organized at regional level. Some of the festivals organised are of national and international repute. One such festival is Nada Devi Raj Jat, celebrated at an interval of 12 years in the Nada Devi Bio-sphere reserve. This festival entails tracking for about 230 kilometres commencing from an altitude of 2000 meters from mean sea level at Nauti village of district Chamoli, and culminating at a glaciated lack-Rupkund, situated at the altitude of 4000 meters from mean sea level. This festival is great occasion to witness the bio and cultural diversities of this Himalayan state. Recently UNSECO has recognized the mask dance (*Mukota Nirtya*) of this festival as world heritage. The other festivals of regional importance were organized in sample village. Besides sharing experiences of cultivation practices, only traditional grains products and variety of delicacies were used in the worship and offered to the participants of the festivals. The traditions of using traditional and local food grains only in worship and rituals are pervasive across the mountain tracts of the state. To promote this belief system, recently temple committees of world renowned shrines of *Badrinath, Kedaranth, Yamuntori* and *Gangotri* which have more than three million pilgrims annually have reintroduced

*ogal* and *phaphar* in daily rituals of offerings (*prasad*) prepared by local self help groups (SHGs) of the region.

As the hill districts of the state are food deficient and import large quantities of food grains, the traditional crops meet only a fraction of the food requirement. The traditional crops would have vanished but thanks to the above mentioned cultural practices of the region, not only these crop variety are surviving but some of them are attracting attention of multinational companies for their nutritive values. These traditional crops are more resistant to environmental vagaries but in the euphoria of green revolution, very little research and extension work has been done to develop, conserve and popularise these crops. Despite the nutritive value, marketing potentials of these crops was not explored fully. The farmers used to exchange their traditional crops for commodities of daily needs like salt, jaggery, cooking wares and other things. Till recently the term of trade was very adverse to the farmers. For instance, one kg. of salt which could be bought for one-fourth of Rupee, in late eighties was exchanged for one kg. of amaranth, which was being sold in the markets of plains at the rate of Rs. 6 to 8 per kg. However, the situation is gradually changing, with improving transportation network and activities of non-government organizations. Some of the traditional grains of this region, for their being bio-product has attracted Multinational Corporations and are intending to use in preparation of baby foods. The Japanese multination company *Yoshifoomi Kihata* producing baby food has purchased finger millet in bulk from the region. Some of the bio-products of the state are now available on the retail outlets in the metro cities of India. The comparative advantage of these traditional crops is specifically for their being organic products better in nutrient content and taste.

A great effort has been made by institutional and voluntary organisations to conserve the traditional crop diversity. Jardhar village of *Henval valley* of Tehri Garhwal district of this mountain state can be cited as an example, in this context. Mr. Vijay Jardhari and his co-workers (volunteers) are involved in the collection of seeds of various traditional crops from different parts of the region under their '*Save the Seed Movement*'. They are also trying to revive the old traditional agriculture system in

the valley (Gupta 2008). Such efforts may go a long way in creating the mega diversity of crop plants thereby contributing towards the sustainable development of agriculture and livelihood of farmers in the region. However, much more efforts are still needed at Government level in the direction for patent of these rare crops and popularize these traditional crops by conserving their organic specialities and integrating them with market. Thus, the well preserved bio-diversity by the people has a great capacity to turn climatic adversities of mountain regions into opportunities and rescue people of the region from poverty and vulnerability.

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