



A finger millet plant conserved for seed in the study area. Photo: M. C. Sati.

Women in the Forefront: Conservation of Traditional Crop Biodiversity: A Study of Uttarakhand State in Indian Himalaya

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The Uttarakhand State spreading over 53,485 km² accommodates 8.48 million people, accounting for about 0.83 percent of the population of India and 21.4 percent of the Indian Himalayas region respectively. The region is primarily an agrarian economy, operating at a very low level of production, unable to provide income and employment round the year to the dependent population and consequently pushes large numbers of young males to go outside the region in search of a livelihood. This trend is reflected in the sex ratio of the region. As per the census of 2001 among the thirteen districts of the state, in the eight exclusively mountainous districts, there are more than one thousand women

per thousand men. This was first visible in the last decade of nineteenth century and continues. Agriculture coupled with animal husbandry is the mainstay of the people here but because of the heavy migration of males, these districts have very high participation rate of women in the work force. Except to plough, which is symbolic of male domination, all other activities in agriculture are the exclusive domain of women. Thus their contribution to total work in agriculture is more than 85 percent.

To examine the gender role in conservation of traditional crop biodiversity, a sample of twelve villages located within an altitudinal variation of 1,400-2,200 metres, in the Nagaun and Purota block of Uttarkashi district and Pokhari and Joshimath block of Chamoli in Uttarakhand State were selected. Approximately 200 women respondents associated in different self-help groups (SHG) participated in the study by sharing their perceptions. Traditional crop diversity of survey villages is as high as about forty crop species comprising cereals, pseudo cereals, millets, pulses and oilseeds of various varieties. The best agricultural practices of the region involve turning environmental constraints into resources to preserve bio-diversity and making it a basis of food security. The farmers have learnt that a simple two crop rotation is not possible in the region, because winters are too harsh for seeds to germinate. Therefore the crops to be harvested in spring have to be sown well before the onset of winter. Moreover to ensure food security, fullest utilisation of rainwater is also necessary. Paddy locally known as sati (*Oryza sativa*) and finger millet, locally known as mandua or koda (*Eleusine coracana*), which have better yields in the region vis-à-vis other crops and require more water and a hot humid climate are cultivated simultaneously during the monsoon. These factors necessitated the evolution of a unique pattern of rotating crops. Farmers divide the entire arable land of the village in two segments locally known as sari. Habitation or any other prominent geographical feature like a rivulet separates these two segments. The crop rotation is followed in such a way that paddy occupies one sari, and koda is cultivated on another half. Paddy is sown in one sari in April and after harvesting it in September-October, wheat locally known as gehun (*Triticum aestivum*) is sown on the same land. Reaping wheat by mid May, the sari is used to cultivate koda. After harvesting the crop in October, the land is left fallow for about four months till April, when paddy is sown in it.

The other half or sari occupied by koda is left fallow and after the crop is over in October till April when paddy is sown and reaped the following October. Subsequently wheat is sown which is harvested in April when the land goes under cultivation of koda. In this way every crop is repeated on the same plot after one and a half years; cultivators get three crops in two years.

This division of land into two parts where a block of land is left fallow instead of where there are scattered fields has its advantage when cattle are turned loose to graze on the remnants of straw and grass that can be found on the terrace walls. Animal husbandry provides support as the principal source of manure and power to mountain agriculture. Many crops are produced in addition to those mentioned above, like potato, amaranth, kidney beans, millets and pseudo cereals. The richness of crop diversity in the region is apparent from the fact that women traditionally harvest more than twelve grains and pulses (locally known as Bara naza) in the monsoon and have evolved a very effective mechanism to avert total crop failure to ensure food security.

The recent experiences

Since the reorganisation of the 13 northern districts of the state of Uttar Pradesh into Uttarakhand State, state patronage has extended to agriculture bio-diversity and women are in the forefront to manage diversity through indigenous knowledge, linking this with marketing channels. To tap the market potentials of organic produce, women farmers have formed voluntary organisations to cultivate and market traditional organic crops. Himalayan Action Research Centre (HARC) has played a seminal role by providing institutional support through the creation of Self Help Groups (SHGs), in the formation of a women farmers' cooperative federation, the Rawain Women Cooperative Federation (RWCF), organising training programmes for the SHGs and federation members and arranging visits of women farmers to interact with other mountain states. In the surveyed villages, women farmers and SHGs are cultivating many traditional crops viz. buckwheat, horse gram, amaranths, foxtail millet etc. on a commercial scale, which were earlier on the verge of extinction.

These women farmers have realised that their crops have unique selling properties (USP) of bio-products and they have created a marketing network through HARC. HARC arranges stalls for the women's cooperative federation's products at national level fairs and exhibitions such as Agriculture Expo, International Trade fair Delhi, and National Women Farmers' Fair in Ahmedabad, Uttarakhand and Mahotsav in Dehradun. It is estimated the ex-farm value of traditional crops is about IRs.30 million along with an annual turnover of IRs.45 million per annum. The average annual return of each SHG is estimated at IRs. 1.0-1.5 million. A typical SHG has 10-12 members, thus the average turnover per member is more than IRs. 100,000, since almost all inputs - labour, seeds and manure are supplied by the household

themselves. Thus, this turnover is a substantial contribution to the income of these households that have an average size of five to six members, in majority of cases, possessing less than one hectare of land.

These women cultivators, more importantly than just getting a modest income, have learnt an important lesson in marketing that that proper processing and selling through organised channels can enhance the market value of their product by 50 to 100 percent.

Prospects

It is unlikely that migrated male labour that has been absorbed in the non-farm sector will return to agriculture. Moreover with the sustained campaign to control the rising population, population growth in the mountain districts of the state has slowed down significantly. For example, in Pauri district in Garhwal, according to the census of 2001, the population is growing at a rate of less than one percent per annum. By and large this is the story in the other districts as well. These factors are gradually reducing the pressure of population on agricultural land and are creating an opportunity to focus agriculture to meet the growing demand for bio-products.

The above illustrations show that women by their ingenuity have successfully managed changes and turned adversities into fortune. These efforts need institutional support lest they gradually lose momentum. However, the possibilities of utilising bio-farming traditions of the region to commercial advantage could be emulated elsewhere that has similar agro-climatic and social settings in the Himalayan region. The cultivators, especially Himalayan women, have the necessary skill, indigenous knowledge and acumen to utilise opportunities, with the only necessity being to evolve a community-based institutional mechanism to utilise this in policy-making.

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Table 1. Traditional commercial crops cultivated in survey villages

English name	Vernacular name	English name	Vernacular name
Amaranth	Chaulai	Soybean	Bhatt
Amaranth	Chuwa/Marcha/Ramdana	Soybean	Kala Bhatt
Pigeon pea	Tor	Soybean	Soybean
Pig-weed	Bethu	Naked barley	O-wa-jau
Taro	Pindalu/Kuchain	Horesgram	Gahat
Buckwheat	Oggal	Potato	Alu
Buckwheat	Phaphar	Mat bean	Bhirnga
Maize	Mungri	Adjuki bean	Rains
Rice bean	Bhotia	Black gram	Urd
Zinger	Adrak	Cow pea	Sonta
Poppy	Post	Hog-millet	Cheena
			Jakhiya

Source: Data collected from survey villages