

HARVESTING AND STORAGE THROUGH INDIGENOUS PRACTICES: A CASE OF GARHWAL HIMALAYA

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ABSTRACT

In Uttarakhand about 75 percent population predominantly depends on the cultivation of subsistence crops for their livelihood. Majority of the farmers have marginal to small land holdings. The traditional subsistence agriculture has never been economically rewarding venture because it is labour intensive in nature. Cultivation of cash crops may fetch better result for the farmers, nevertheless poor transportation network discourages the farmers to shift fully or partially because during rainy season majority of the villages are cut off from the main stream. However the region has always promoted sustainable indigenous methods of cultivation with crop diversity, For the present study the researchers interacted with the farmers of the villages in Chamoli district. to collect vital information from the different stake holders and the result has been presented in the coherent frame of the study.

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KEY WORDS : Indigenous practices, Organic farming, Subsistence crops, Sustainable development

Introduction

In Uttarakhand agriculture and livestock activities form a spectrum of economic activities ranging from nomadic (practiced by Gujjars), trans-humane (Bhotias) to settled agriculture which is practiced by a majority of the people⁵. This phenomenon is predominating over a broad range of altitudes between 300m and 2500m is organized as terraced agricultural fields on steep slopes and sometimes without terrace on gentle slopes of higher altitudinal areas. Majority of the farmers are marginal and possess less than 1.0 ha. agricultural land and that too in the scattered form. Animal dung and bedding material is important farmyard manure for the crops in traditional agriculture which is used in the fields to promote indigenous organic farming and at home for storage and prevention from pesticides⁷.

The knowledge, skill and survival strategy of farmers operating with low external inputs have often been ignored to promote modern agriculture in the region, thereby arresting the problem of migration. Farmers-based indigenous/traditional knowledge has scientific rationale and great deal of relevance for agricultural productivity and sustainability. It may be a blessing in disguise, the ill effects of synthetic chemical based agriculture are very limited in the region, the soil has not been polluted and the environment is clean and green with abundant biodiversity. Therefore, the present study was carried out based on the interaction with cultivators in the nine villages in Chamoli districts. These villages were Urgam, Bachher, Banj Bagar, Sarana, Dimar, Chopata, Simli, Mundoli and

Marora and representing each block.

Review of Literatures

Human communities have always generated, refined and passed on knowledge from generation to generation. Traditional knowledge (TK) is often an important part of human culture and identities and passed form generation to generation⁹. The term traditional is usually associated with primitive agricultural systems or pre-industrial peasant agriculture⁶. Traditional agricultural practices should be understood and conserved before they are lost with the rapid advance of modern agriculture in developing countries⁸. Traditional knowledge can be overvalued or romanticized, instead of despising or ignoring it. Combining the best of traditional agricultural methods with the best of modern agriculture should go a long way towards sustaining agriculture⁹.

The subsistence farming is still continuing in the remote areas where modern technology has not touched the system. These agro ecosystems still harbour a variety of crops (germplasm) that need careful protection and maintenance, for its'conservation³.

Objectives

In the present study main focus is laid on to understand the indigenous agriculture practices prevailing in the Garhwal Himalayan region, therefore the objectives of the study are:

- to analyse the pattern of land holding and land utilisation in the hilly region with a focus on study

area;

- ❑ to understand the indigenous agriculture practices adopted by the hill people;
- ❑ to understand the impact of the indigenous agricultural practices on farmers livelihood;
- ❑ to, suggest some intervention to improve the traditional cultivation based on the feedback from the stake holders; and
- ❑ to analyse the pattern of crop diversity and its consequential effects on the economic development.

Methodology

In order to conduct the study nine villages were selected from District Chamoli, Uttarakhand and selection of villages was based on the random stratified sampling techniques. While selecting the village's population of the village, area and its proximity to road network was also taken into consideration. All the villages were visited by researchers during Nov 2015-17 for the purpose of this study. In order to understand the indigenous agriculture practices information was collected by using techniques of Participatory Learning and Action (PLA) mainly Focus Group Discussion (FGD). While conducting the Focus Group Discussion representation to the cross section of the society was given in order to incorporate the feedback of all the interest groups. PLA exercises were very useful in understanding the complexities involved in agricultural operation in the area. It may also be noted that Chamoli is relatively at higher altitude and the cultivation practices adopted in the area may differ to some extent in the area closer to Doon Valley and Shivalik Hills of the region.

Analysis of indigenous agriculture practices and use of animal excrete

Based on the interaction with the villagers various issues were classified and presented below. An attempt has been made to present the indigenous agriculture practice along with method applied in completion of the activities, its application and possible benefits to be derived by the farmers. Following is the result of the discussions held with the farmers.

- ❑ Farmers have the deep understanding of the characteristics of the soil and in their opinion black colored soil has higher productivity than **dhangar**, the soil mixed with gravel.
- ❑ Soil having **kitola** (earthworm) is a productive soil and the **kitola** is also seen in compost prepared from animal excrete.
- ❑ Dry leaves and grasses are spread for the bedding of the animal and animal excrete and urine mixed with this material is collected every day primarily by the

women and heaped near animal shed for decomposition.

- ❑ Decomposed material known as **gobar** (dung) is spread in the field by the women and used as manure this ultimately promote organic farming.
- ❑ While preparing the agriculture fields green residue is also burred for decomposition which enhances soil fertility.
- ❑ Decomposed material is carried by the women in containers known as **Kanddi** (made of bamboo) and spread in the field and this is not only used as a manure but also saves seeds and plants from very low temperature during winter.
- ❑ Although manure is spread in the field during autumn season, however in some places this decomposed manure is carried to the field round the year. Whenever women visit the fields for any agricultural activities they carry the manure to the field and store in a heap either at the corner of the field or spread across the field.
- ❑ Women help each other through a system called **padiyal** (exchange mandays), which involve 4-5 women working together for a particular household and later on the woman from the served household will return working hours. This system is frequently followed in operation including, ploughing, transplantation and weeding out and harvesting activities.
- ❑ Spread of compost is essential as if remain unused for longer period of time its nutrient value will be lost. Therefore the farmers generally clear entire decomposed animal excretes during winter.
- ❑ Firewood is the major source of fuel collected from the forest and the ash obtained from the fuel wood is either mixed with the animal excrete or some time heaped separately. This ash is applied in the field, particularly for vegetable crops and it is also used protecting plants from insects. In the study area crop rotation is followed and half of the land is left fallow during winter season (rabi season) and opened for grazing. This helps to increase the soil fertility. While grazing animal droppings is also spread in the fields and this helps in improving the fertility.
- ❑ The system is followed in such a way that every piece of land is left fallow once in two years. Animals are taken to the fallow land for grazing and the excrete of these animals dropped during grazing add organic matter to the soil. This organic matter increases soil fertility. In some area farmers also stay with their animals in the fallow land but now this practice is rare. However, the Bhutia nomad still make their

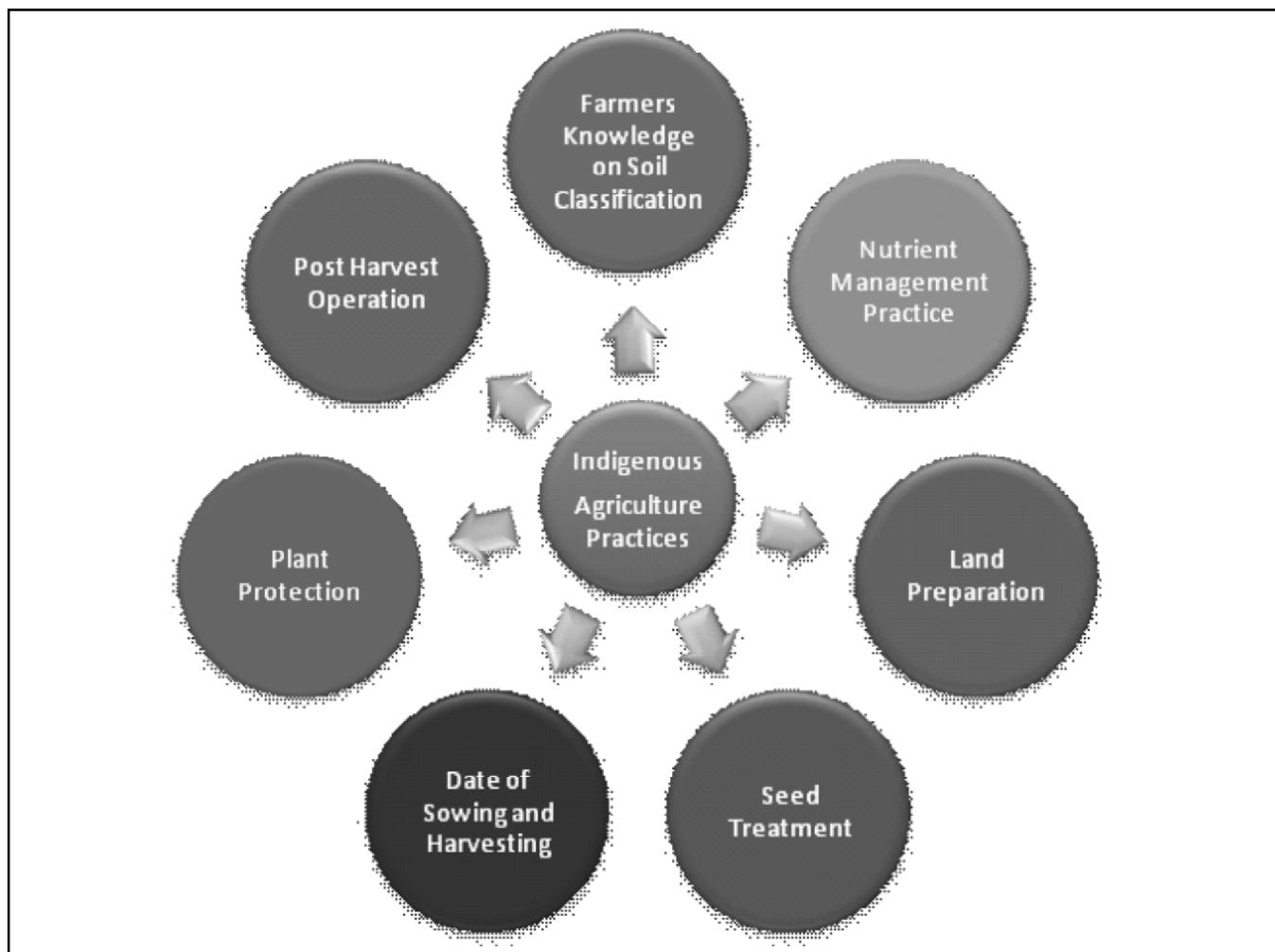


Fig.1: Flow Chart of Agriculture Operation carried out by Indigenous Methods

temporary house in the fallow land along with their animals mainly goats adding more organic manure to their fields. This practice is followed every year during winter.

- ❑ In some of the villages majority of the households members shift to the high altitude villages (**Chappar or Chhni**) along with their animals during summer season to grow certain high altitude crops.
- ❑ During Kharif cultivation, fields are left fallow for six months. During this period farmer clears all surrounding of the fields covered with creepers and thorny bushes *etc.* The residues left after as a part of harvesting is also collected and the entire waste is burnt in the field. The ash obtained from burning is mixed in the soil by ploughing. The dry organic matter of the harvested crop takes long time in its degradation that is why farmers prefer to burn it.
- ❑ Village priest (**pujari or baman**) announces the date to start agricultural activities including preparation of land through ploughing and ploughing is done by **haldia** (a person hired to plough the fields with the help of bullock) who is hired with or without bullock and the rate for operation vary depending on whether the ploughing is carried out in irrigated land (**sera**) or unirrigated land (**ulkhard**) with or without food and bullock.
- ❑ The dates are also announced for harvesting the crops. These dates are important as the calculation is such that there will be no obstruction in terms of rain/snowfall otherwise it will make the ploughing operation difficult, however the farmers like the mild showers as it ease out the soil which has become hard due to excessive grazing by the animals as the land was left fallow before starting kharif crop.
- ❑ Depending on the type and nature of crop two to three round of ploughing is carried out for wheat and paddy. On the other hand less preparation is required for mandwa and other millets. It is generally transplanted during rainy season where rough ploughing is carried out followed by transplantation

TABLE- 1: Seasonal Calendar

Activities	Months											
	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Land Preparation		←————→								←————→		
Sowing			←————→			←————→				←————→		
Preparation of manure	←————→											
Application of Manure	←————→			←————→							←————→	
Fallow land crop rotation	←————→									←————→		
Use of Ass as manure	←————→						←————→				←————→	
Weeding out					←————→							
Burning the residue	←————→											
Fallow land for Grazing	←————→										←————→	
Harvesting			←————→					←————→				
Threshing by bullock trampling					←————→					←————→		
Threshing by family members					←————→					←————→		

Note: Based on the Feedback given in the Focus Group Discussion

and weeding out activities by the women. At the high altitude irrigation facilities is not available and the agriculture activities is more labour intensive. On the other hand in the valley areas, relatively at low altitude irrigation facilities are available and agriculture is less labor intensive. The productivity and production is also more at the low altitude in the irrigated land and it is suitable for cultivation of paddy, wheat, pulses, and vegetables such as potato, onion, peas and green vegetables. On the other hand at high altitude millets such as mandwa, jhangora, kauni, gahet, bhatt, chua *etc* are more productive.

- Sowing is carried though broadcasting methods, however, potato and onion are sown in rows. Paddy cultivation is done both through the transplantation in **sera** land and broadcasting methods in **ulkhad**.

However the production and productivity is more in sera land.

- Farmers clear the creepers and other thorny bushes grown on the wall of the field (**bhitta**) and collect them at a common place in the field. This operation is conducted from middle of January- to February. The crop residue also burnt along with the creepers and thorny bushes (**kaanda**) and the ash make the soil highly fertile.
- Farmers have traditional knowledge to treat the seeds in order to save them from insects. The common insect which destroy the seeds is **teru**. However, farmers mix ash with the seed to save them from **teru** (pest). Cow dung and cow urine is also used to protect the seeds from pests. Seeds are dried in sheet made

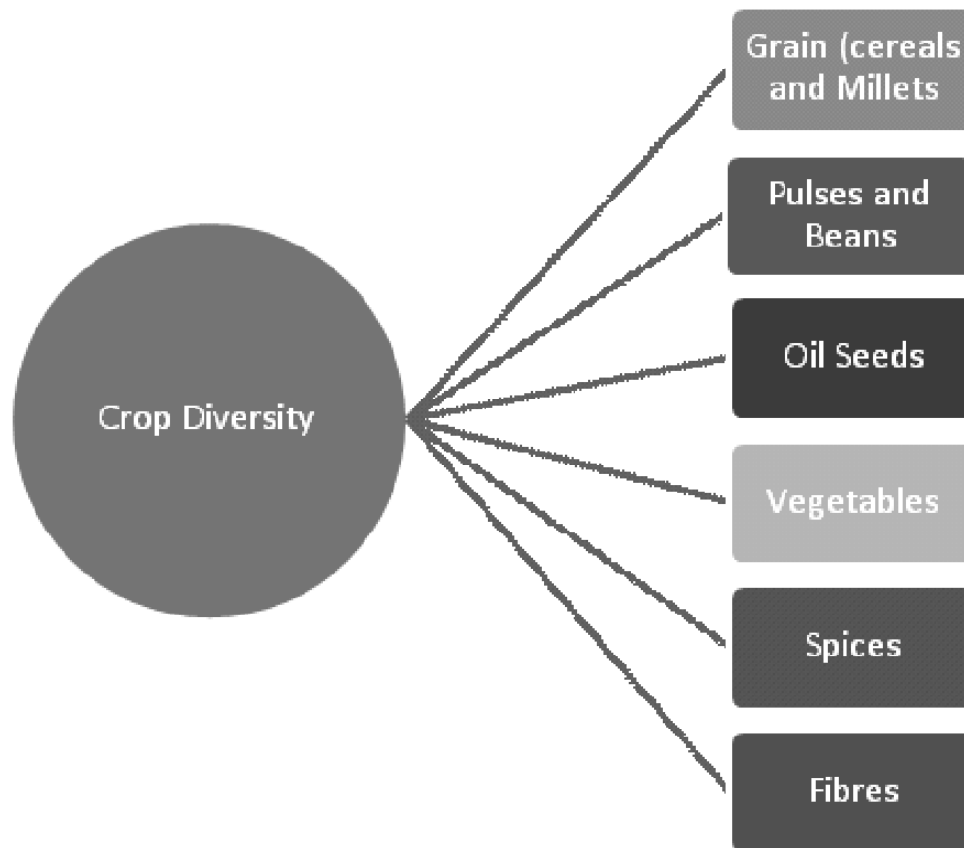


Fig. 2 : Crop diversity system

of ringl (**bamboo**) and know as **bisawa, Mathula and Chhhabra**

- ❑ For this purpose a big basket made of rigal locally known as **Kwalanon** is prepared and cow dung and urine is applied both from inside and outside to make it anti insect/pest and is safe for keeping seeds as it remains air tight. Wooden box, locally known as **manch** is also used for storage of grain and seeds.
- ❑ Farmers use cow urine and ash on infected plants, and ash and cow urine is also used to save chilly plant from **tara** (earthworm).
- ❑ Farmers harvest crops before it is fully matured, paddy is heaped in the middle of the field in a systematic manner to make a **quanka** (round heap). This quanka is left for 15-20 days before paddy is fully seasoned and ripens. Paddy is harvested when plants are relatively less matured to minimize the loss as the fully matured plant may increase considerable loss of production while harvesting.
- ❑ Threshing of paddy is done by household members or hired labour by using their feet and this process is called **mandai**, which is done in a sheet made of ringal (**mauthula**) it is time consuming and hard exercise, however, in some of the villages bullock trampling is

also used for threshing particularly the wheat crops and other millets such as manduwa and pulses. The bullocks make continuous round walk on the crops till grain/pulses is separated. Proper care is taken to collect dung, if releases by animal during operation. This operation is carried out in the open space called **chok** or **chaok** made of stone, and this place is prepared properly by applying cow dung and urine (open place in front of the house) on a sunny day. The residue is used as a fodder and residue from pulses is given to the milch animal and it helps in faster milching.

- ❑ Food grains are dried properly before stored for consumption and seed material either in open space or in **chhabra or bisowa** (round sheet made of ringal)
- ❑ In some places mustard oil is also used to protect pulses and it was informed that 20 ml mustered oil is sufficient to one **paatha** (instrument used for measurement in volume -**one paatha is equivalent to one to two kg depending on its size**). It is known with different names in different area.
- ❑ Ash is used to save grain particularly pulses from weevils (**teru or ghun**) and stored separately for consumption and seed. This may be possible mainly

due to moisture absorbing capacity of ash and making insect difficult to move in the grain.

- Wheat is highly susceptible to **ghun(pest)**, whereas pulses are susceptible to teru. On the other hand paddy is stored in place of rice as rice is more susceptible to insect. The outer cover of paddy is separated by threshing it indigenously done in the **urkhyala** (Okhali) mainly by women. Now a day's people with better economic condition take it to rice mills in the nearby market. Similarly local **jandhara** (Hand driven grinding appliance made of hard stone) is used for grinding wheat, mandwa and pulses. However, its very limited in the recent past.
- Barter system still followed in the villages and agriculture produced is frequently exchanged. The agriculture produced is borrowed from the household with relatively higher produce. For this purpose important local measuring instrument made of ringal used are **sher, paatha, suppa and dala** for different quality. For instance **ser** contains half to one kg, **paatha** two kg **suppa** 5 kg and **dala** 10-15-20 kg depending on their sizes.

Seasonal Calendar for Various operations

In the following table various agricultural operations and its time period has been presented which is based on the interaction with villagers. Weeding out is another important activities and this operation is done thrice in paddy crops particularly in *ulkhard* land (unirrigated area) which is carried out in May to July and some time at high altitude in August (this operation is known as **pangaud, dungauwd and nilai**). One such operation is also carried out in mandwa crop and depending on manpower available at disposal. Some time two operations are also carried out.

Traditional mixed farming systems practiced across the rain fed region of Uttarakhand. In the baranaja (twelve crops) system, there is intercropping of twelve

crops or more crops together in a piece of land. In this system cereals, lentils, vegetables, creepers and root vegetables are grown simultaneously. All crops are planted together on the same terraced field in the kharif season during **chaumasa** which is known as monsoon season. The twelve crops are selected in such a way that they can grow in harmonization with each other. The creepers of legumes use the stems of grains/plants as a natural support, while the grain roots grip the soil firmly, preventing soil erosion as sometimes land is slightly slanting with loose soil. Due to their nitrogen fixing abilities, legume crops return to the soil nutrients which are used by other crops. Besides, plants grow at different levels or storeys much like a natural forest, thereby utilising multiple levels of space on the same terrace. No external chemical inputs are used and pest control is applied. However, some time leaves of the walnut and neem, and the application of ash and cow's urine is applied to protect the plant from insects.

Conclusion

It has been realised that the traditional system of cultivation has promoted sustainable indigenous practices in agriculture and its operation including storage in the region. The farmers have rich knowledge indigenous methods and uses which need to be preserved for future generation as due to subsistence nature of agriculture a large segment of its populace migrate outside the region in search of employment opportunities. Efforts should be made to promote traditional practices in the region which support organic farming by developing and strengthening forward and backward linkages, particularly transport and marketing network which is the major bottleneck in the development of the region as during rainy season, major part of the region experiences heavy monsoon rain and villages and towns remain cut off within and from the rest of the country.

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