

## Objective

The aim of this study is to analyze the agricultural practices in Rawain Valley that have evolved in their specific socio-economic-environmental context *and to* document the 'indigenous technical knowledge' arising there from.

## Criterion for Selection of Villages

Agriculture as is practiced in hills is conditioned by many factors, prominent among them:-

- a) A varied 'micro-climatic environment' ranging from piedmont zone to hill tops.
- b) 'Diffusion of modern technology' as influenced by:-
  - (i) Nearness to nodal markets/ cities.
  - (ii) Intervention by governmental/ non-governmental agencies in bringing about changes in agricultural practices.
- c) Gender specific management of agriculture. Women being more involved in agricultural operations than men.

While selecting villages, care was taken to make use of the above facts. The criteria thus included:

- ☞ A variety of micro-climatic zones varying with location of altitude.
- ☞ Both remote and relatively accessible villages.
- ☞ Villages where (a) Governmental or non-governmental agencies have effectively intervened. (b) No effective intervention is seen.
- ☞ Villages with a market oriented crop-rotation & villages still growing traditional crops. This was done to eliminate gender bias and have information, which is non-gender specific (villages growing more cash crops have more male involvement in agricultural operations than villages growing traditional crops).
- ☞ Villages encompassing the entire geographical span of Rawain Valley and covering all the three development blocks of Naugaon, Purola and Mori.

**Methodology:** included –

- ☞ Making field visits to the selected villages.
- ☞ Organizing meetings with knowledgeable villagers especially older persons.

- ☞ Interviewing members of Farmer’s Federations and Mahila Mangal Dals.
- ☞ Interviewing individuals.
- ☞ Personal observations made during field visits.

**Village Selected:**

22 villages covering Naugaon, Purola & Mori developmental blocks of Uttarkashi Districts (forming part of Rawain Valley) were selected:-

1	Than	9	Kanseru	17	Kafnol
2	Gangtadi	10	Chibala	18	Beef
3	Sarnol	11	Khaladi	19	Kharsali
4	Gair	12	Hudoli	20	Sorr
5	Dharali	13	Paani	21	Sankri
6	Dakhyar Gaon	14	Gundiyat Gaon	22	Sidri
7	Barasu	15	Bijori		
8	Tunalka	16	Dhaari		

**Pest & Nutrient Management**

Traditional agricultural practices evolved in the region maintained a balance with nature. Natural substances were generally used - fertilizers were organic as also the means of pest control. Moreover, certain practices and phenomenon exerted a dual effect of fertilizing and disinfecting the soil. While other practices were individual to either Pest or Nutrient Management.

Among the common ones :

**1. Fallowing**

Agriculture in the region is a kind of ‘two field system’. The entire land was divided into two fields at times separated from one another. One field was kept fallow, while the other was cropped.

Fallowing was widely considered to have certain benefits :

- a) It allowed the land to regain fertility naturally.
- b) It helped check proliferation of pests and diseases. If the crop immediately before fallowing was infested with pests and diseases – their transfer to next crop was effectively checked since no medium would be available for spreading.

Fallowing often lasted from October/ November to upto March and yielded best results after interaction with natural phenomenon like snowing and practices like manuring.

For instance, In some places (Kuthnor, Ojhri) – a layer of leaves, grasses and dung was laid on the field (at the start of fallowing season). Now the field was ploughed so that the leaves were overturned into the soil. These leaves remained sandwiched beneath layers of soil and decayed to form compost (snowing providing the necessary moisture). This practice was especially useful for clayey soils. It helped improve texture & aeration, imparted lightness to the soil and prevented the soils from getting sticky and forming lumps and aggregates. Moreover, crops grown in fields prepared in this manner were better than those grown in conventional manner.

## **2. Role of Snow**

Traditional agriculture was heavily dependent on timely and adequate snowing. In the absence of any pesticide or weedicide, snow was the only weapon available for pest and disease control. Snow had an antiseptic and germicidal effect and killed germs, pests and rats in the field.

Fallowing combined with snowing meant that the fallow field was almost sterile and disease-causing germs by the time sowing had to be done.

Besides, snow also had a fertilizing effect on standing crops. Infact, for wheat grown in the area, snow was considered among the best fertilizer available. This is borne out by the saying:

“जितना होगा हयूं उतना होगा ग्यूं”

(Greater the amount of snow, greater will be the amount of wheat produced). A direct correlation was believed to exist between snow cover and wheat production. So much so that if the standing falls down and gets buried under the weight of snow – a bumper harvest may be seen.

Snow was also attributed some other properties such as bringing about purity to the soil and heavy snowing was concomitant with early opening of natural water sources in the rainy season.

### **3. Role of burning**

Another mainstay of traditional agriculture was burning of bushes, grasses and stems (of harvested crops) in the field.

Burning of such litter on the field provided disinfection by killing all the germs, pests and rodents in the area. Moreover, this burning was a kind of ‘community burning’ exercise. It was resorted to especially after harvesting of a crop – and all the adjacent fields growing same crop were set on fire. This was a kind of ‘mass disinfection’ of the entire area.

Not only the fields were freed of pests and germs, the resultant ashes got mixed with the soil and provided vital nutrients to the soil. A good crop was observed in such freshly burnt areas.

### **4. Type of manure used:**

Dung of composted kind was the manure used earlier. Composting of dung and leaves was related to the way animals were managed.

Leaves were brought from forests and laid on the floor of cattleshed. The purpose being to insulate the animals from the cold ground. These leaves got mixed with dung. They were taken out and put in a heap. The heap was frequently overturned for proper mixing. Dung was collected for about 4-6 months in this manner [upto 12 months in some places (*Khaladi*)] by which time, it turned into fine compost.

This composted manure was applied to the fallow field, a few days before the sowing season. The two fields were thus manured alternately – season after season.

Nor only was this the main method of nutrient management, it was a good method too and if weather didn't play foul, a good yield was observed for next few crops.

Fresh dung as manure was avoided universally. This practice was particularly important for pest management since decaying of fresh dung leads to the growth of pests and worms which may be harmful to crops.

Another practice which had some relevance for nutrient and pest management was that of leaving the cattles to graze freely in the fields after harvesting of a crop (at the start of fallowing season). In the process, the dung would provide fertilizer to the soil and "*Gaumootra*" would act as a disinfectant.

Though dung of any available animal/ cattle was used as also locally abundant grass/ leaves, dung of different animal and leaves of different plant had vastly different properties.

Cow, buffalo, goat, sheep and mule were the main domesticated animals (draught and mulch). Among these, goat and sheep dung was considered the best. It provided certain amount of pest and disease resistance. Was considered 'warm' and growth promoting. Compost made from this has a very fine texture. It was considered best for 'Mandua', 'Chaulai', Wheat and oilseeds.

Though it gave good yields, goat/ sheep dung had certain limitations too :

- (a) Not to be used for rice. If used then either rice will be 'burnt' (yellowing) or it will grow very high but will not form grains.
- (b) It had to be applied in moderate quantities. If applied in excess, then too much growth generally caused the plant to fall down/ break under its own weight. Infact an indigenous indicator to the approximate amount generally sufficient was used. The sheep/ goats were left in a field overnight. The amount of dung excreted was considered enough for the field.
- (c) Did not give sustainable fertility to the soil. Its effect was considered akin to that of Urea – good production for one crop only, i.e., its effect lasted only for a single crop (maximum 6-8 months).

Cow dung was considered best insofar as sustained fertility to the soil was concerned. Once added to the soil, the effect was visible for upto 3-4 crops. Buffalo dung was considered inferior to cow dung.

Reason – While cow grazed freely in the open eating a wide variety of grasses and leaves, buffalo was stall fed only a limited type of grasses and leaves (*Dhaari, Kafnol*).

Mule dung was considered least best. But it had a few interesting specific uses in pest and nutrient management:

- a) Mule dung was applied in fields where water tends to come up from the soil or where water stagnates. It is believed to have some water absorbing properties which by absorbing the excess water saved the standing crop to an extent (*Beef, Kharsali*).
- b) Fields manured with mule dung are also seen to have lesser rat infestations and rat menace (*Dharali, Dakhyat Gaon*).

Among the leaves/ grasses used, wild green grass was considered to form the best fertilizer. But its availability for composting was severely restricted owing to its demand as fodder. In its absence, leaves of '*Baanj*' & '*Burans*' were considered best. They decayed easily and imparted a deep dark colour to the soil. Leaves of '*Ayaanr*' and किटमेरी & pine needles were also used.

In areas of high altitude (*Beef, Kharsali*) & *Kharas, Rai & Morind* (called *khed* were used.

Though pine is the most abundant in most villages, it was avoided if there was an alternative available. Pine needles don't decay easily. Moreover, the manure from these leaves is also considered inferior and is believed to change the soil properties for worse.

### **Practices specific to pest management:**

Almost everywhere in the region, people asserted that severe pest and disease menace, as seen now, is a relatively new phenomenon. Reasons attributed to this are : (i) irregularity of seasons especially rains (ii) declining forest cover leading to (iii) less snowfall (iv) disuse of traditional seeds and traditional methods.

Infact, good snow cover is perhaps the single most important factor besides use of newer seeds – which has brought about this change. Areas, which used to receive a good two feet of snow annually, now gets barely a few inches. This lasts for a very short time – not long enough to bring about a complete annihilation of pests.

Moreover, temperate conditions with only warm summer and really cold winters hindered the growth of pests. But with forest cover on the decline and temperature on the rise, pests and diseases are now becoming a major problem.

It is probably because of pests and diseases being a not-too-distant phenomenon that there is no explicit tradition of pest management visible in the region. Pest management practices are mostly localized and at times individualized.

1. For a certain kind of borer disease on Walnut & Wild Apricot: -
  - Deodar oil was used. It was applied on the affected areas. The powerful germicidal effect of deodar oil cured the disease. Alternatively, husk of deodar was sprinkled around the tree (*Dharali, Gair*).
  - Sometimes (*Barasu, Dhaari*), kerosene was used as a pesticide/ insecticide. A cotton soaked in kerosene oil was plugged in the hole. This method was not as effective as deodar oil.
  - At times (*Barasu, Khaladi, Chhibala*) the hole was simply plugged by clayey soil. This method cured the disease ‘sometimes’.
  
2. For diseases on other crops, people experimented with different things. For instance –
  - Deodar oil was mixed with water and applied to the affected part of the crop by a cotton cloth. In case the affected area was large, the mixture was sprayed on the crop (*Dhaari*).
  - Though not as effective, mixture of Apricot oil & water was also used in the same manner (*Dhaari, Kafnol*).
  - Sometimes, jaggery mixed with kerosene was applied on the affected areas (*Dhaari*).
  - For ‘Chaulai’, Kaph (कफ) was used. Kaph – a layer of tar & Nicotine found on the inside wall of chillum (चिलम) pipe and inside a *hookah* (हुक्का) was mixed with kerosene and applied on the affected area. This cured the diseases of ‘Chaulai’. (*Dhaari*).

In case of Chaulai it is believed that though it is a delicate plant, its susceptibility to pest and disease attack is increased if there is less snowing and rains are delayed or erratic.

### 3. Seeds & seed treatment

Even in the Rawain Valley, seeds of most traditional crops were unique to a particular area. Having evolved and adapted to the particular climatic conditions, these seeds were sturdy, showed good pest and disease resistance and gave a stable yield.

The germplasm of such seeds have not been preserved. Infact native seeds of some crops have already become extinct. Newer seeds, though give higher yields are more prone to pest and disease shocks. What with their being less adapted to the climatic conditions of the area. Besides, their aroma and taste is also different.

The traditional seeds were also treated before sowing to impart them pest and disease resistance:

Gaumootra mixed with ashes was applied to wheat seeds. The seeds were then completely dried before sowing. Not only did the seeds exhibit a degree of pest and disease resistance, blackening of wheat ears/ spikes was also prevented (*Sorr, Sankri, Sidri*).

Sometimes wheat seeds were stored after mixing with 'Reo soil' (Red soil). This soil not only keeps the stored seeds insect-free, it also imparts sturdiness to the seeds in terms of increased disease resistance. (*Thaan, Gangtadi, Sarnol, Tunalka, Rajgarhi*).

Seeds of Koni (कौणी) were soaked in Gaumootra before sowing. This had the dual benefit of (a) sorting out the good and bad seeds (Bad ones float on top) and (b) providing disease-resisting properties to the seeds (*Sorr, Sankri, Sidri*).

### 4. For diseases on 'Moru' (मोरु) and Khersu' (खरसू), an effective local remedy is found in some areas (*Sorr, Sankri, Sidri*). The disease causes internal decay of the plant and manifests as yellowing of leaves and excessive falling of leaves.

These trees are very important from a cattle rearing point of view – their leaves being an extremely good fodder.

When yellowing of leaves is seen, a small hole of 6-8” diameter is made in the tree trunk – about twelve inches above the ground. The hole is almost half as deep as the diameter of the stem (i.e., goes till the centre of the stem).

Some people believe that the disease-causing germ is flushed out along with the liquid that drains out of this hole.

Another point of view is that , decaying in the tree is due to excessive water retention in the tree. This excess water is drained out through the hole, decaying stops and the tree is saved.

Whatever be the causative mechanism, the observed fact is that the dying tree is revitalized and turns green once again. There are many trees in the area bearing testimony to the effectiveness of this method.

5. Though mixed cropping is widely practiced in the area, for the explicit purpose of prevention of a crop – Ginger is grown with turmeric on the perimeter of the field. Insects and pests are attracted by the smell of turmeric thereby leaving ginger unharmed.

#### **6. Use of ashes**

For diseases of certain crops – Rajma, Garlic, Cabbage, Chillies, Kandali’, ashes were sprinkled on and around the plant (*Chhibala, Beef, Kafnol*).

For Jagru (जगरू) ashes of ‘Baanj’ were considered best (*Kafnol*).

Ashes from forest fires were also used sometimes (*Tunalka*). These ashes are believed to have properties distinct and different from ashes from domestic fire. These ashes were used to cure (a) yellowing and wilting of rice and (b) drying of fruit trees.

7. An interesting ritual associated with pest management was the ‘Morr’ fair near ‘Purola’.

The fair was organized on Sunday in the month of Jyestha (May-June). Bark and sticks of ‘Timroo’ tree were brought from forests. The bark was finely powdered and put into a ‘Khalda (goat skin bag). On the Sunday before the fair, vilagers would gather outside the

villages with the 'Khalda' and 'timroo' sticks in their hand. Men and children would go around the villages into the fields waving the 'timroo' sticks and chanting 'ले चूहा' (take it Rat !)

On the designated Sunday, people from every village would go to an assigned place on the banks of river 'Kamal Ganga' chanting ले-चूहा, ले-चूहा along the way. On the bank, 'Khaldas' containing 'timroo' powder was torn and the powder was dumped into the river.

This ritual had a dramatic effect on the pests and rats in the field and these nearly vanished.

The link between the fair and lessening of pests was 'timroo'. This plant is the hilly equivalent of 'Neem' – except that it is slightly more poisonous. Its poison has an anesthetic effect on bigger organisms and germicidal effect on micro-organisms.

The enormous quantity of timroo powder put in the river would thus disinfect the water flowing downstream. Moreover, the timing of the fair (Jyestha) probably coincided with the reproductive cycle of some micro-organisms. All such organisms would thus be wiped out when the fields are irrigated with the disinfected 'timroo containing' water.

### **Soil & Moisture Conservation:**

#### **➤ Leveling & Soil Conservation:**

Creating a field on a hill can be a tough task. Leveling it even more so. Moreover, when it rains, rain water washes away the productive top soil. Especially when no preventive measures are taken.

A few techniques have been adopted by the people living here to counter their problems.

#### **Leveling Technique:-**

Newly created fields are not of terraced kind. They become terraced only after a period of time. These steep gradient fields are slowly levelled out to form terraces. The procedure adopted is somewhat like this:-

- 1) At the end of the field, put a wall or a bund higher than the field.

2) During rains, soil will be washed away from top only to get accumulated at the bottom (near the wall).

Overtime the gentler gradient would replace the steeper one from below – thereby nearly leveling it. Sometime after erosion at top, rocks are exposed. These rocks are then extracted from the soil and put on the bund (wall).

Not only is this a leveling technique but this technique makes leveling possible only through soil conservation. The technique is still used for sloping fields.

For terraced fields, the most widely practiced form of soil conservation is that of building a wall at the end of a field, so that there be no mass wasting of soil during heavy rains.

The wall or the bund was sometimes reinforced by vegetation. Though growing of trees was not the preferred mode of reinforcing the soil (so as to avoid competition for sunlight and soil water) – instances of growing ‘utility’ trees (Bhimal, Guriyal for fodder; Apricot, walnut, aru for fruits/ oil) on such bunds was not uncommon (*Dharali & Tunalka*).

**Mixed cropping** was also a good soil conservation measure. Certain crops grown on the perimeter of the fields held the soil together, e.g. Rice – Tur (on perimeter), Rice – Urad (on perimeter), Jhangora – often grown along with rice. It has fibers roots which hold the soil together. In certain areas (*Sorr, Sankri, Sidri*) Black Chaulai was grown on perimeter of most crops – as a soil binder.

Both in sloping as well as leveled fields, use of drainage lines was quite widespread, as a means of soil conservation (*Kanseru, Chhibala, Dhari, Sorr, Sidri*).

A network of drains would be created around the field so as to drain off excess water without damage to the field.

On steeper slopes, care was taken to not make the soil too loose. Thus, a light plough was used which would plough shallow. Alternatively only a *कुदाल* was used for ploughing the soil.

In some areas (*Khaladi*), a different pattern of ploughing was adopted as a measure for soil conservation – especially for sloping fields.

### **Moisture Conservation:**

Much rather most of the agriculture in the area is rainfed. Moisture or the lack of it is thus the difference between a bumper harvest and a crop failure. Rains are known to be erratic, beliefs of techniques have therefore been developed to cope with its whims and fancies.

- 1) Use of Organic Manures: Composted manure has the property of locking the moisture in. Presence of ‘humus’ makes these manures conserve moisture for some time.
- 2) An older technique, no longer continued now, was that of single ploughing :  
The field was ploughed only once and wheat was sown. Bigger lumps of soil were allowed to remain. The reason – if rains were delayed, these lumps would conserve some moisture and wheat saplings under them would remain alive. During winters, when it snowed (and it snowed much more than it does at present) these lumps got saturated. If it rained thereafter, these lumps would simply melt away. (*Chibala, Gundiyaat gaon*)
- 3) The near universal technique of moisture conservation was to plough while the field is still wet and put (पारत) leveller.
- 4) If there was less moisture in the soil & sowing had to be done then – sow before sunrise and apply leveller immediately on the sown area – i.e., no sowing after sunrise. (*khaladi*)
- 5) For some crops such as Ginger – ‘mulching’ was done and the entire field was covered by grass, leaves and bhoosa ( ) to keep the moisture locked in.
- 6) **Role of Snow** – Snow nourishes the soil and the moisture from snow seeps deep inside the soil. This moisture stays on for really long. Infact good snowing was co-terminus with adequate moisture in the soil. This also brings about a crucial fact about soil condition at that time – the soil was so light that lumps could actually melt in rain.
- 7) **Role of ‘Phalgun Kumbh’** : On certain dates in the Hindu month of Phalgun (February-March), Kumbh (aquarius) is believed to bring rain. On such occasions, the rains are believed to quench the thirst of earth and the moisture that seeps is remains there for upto *Jyestha & Asadh*.

### **Techniques for Enhancing Growth:**

Certain indigenous techniques were used to enhance the size of tubers. These included :

making and keeping the soil light by exclusive usage of leaves as fertilizer; putting mud around the plant in a conical shape so as to nearly cover the plant. This makes plant grow taller.

Other techniques:-

- (i) In case of *Arbi*: (*khaladi, pujeli, bijori*)
  - (a) Two months before harvest, i.e., in the month of 'saawan' the leaves are tied to each other.
  - (b) This provides support to the plant.
  - (c) Since the leaves are tied together, the root area also gets sunlight.
  - (d) More importantly, this limits the growth of the plant above the soil. As a result the tuber below the ground starts growing faster and increase in size.
- (ii) In some areas(*Sorr, Sankri, Sidri*), instead of tying the *Arbi* leaves together, the bigger leaf is cut from the joint and only smaller ones are left. This too effectively limits growth of plants above the soil and tuber below, grow larger.

**Precaution:** The leaf must be cut from the very bottom, else the leaf remains would decay.
- (iii) In case of Garlic too, the leaves are tied to each other. This (a) prevents flowering & (b) restricts growth above the ground. Thereby promoting growth below the ground.
- (iv) In case of turmeric, powdered husk of rice is considered a growth promoting fertilizer.

### **Ripening Techniques:-**

Being a temperate area, the area displays amazing diversity of fruits and vegetables grown. Some fruits however do not ripen by themselves in such a cool environ. Banana being a good example.

The techniques used for ripening bananas are equally diverse and are sometimes localized. The operating principle behind each method is to raise the temperature of the bananas to enable them to ripen easily.

- 1) The simplest and the most rudimentary of all techniques is to hang the bananas in kitchen. Warmth will cause them to ripen.

- 2) Another widely followed technique is to put a heap of rice husk in a corner of the kitchen and put bananas in them. They will ripen within 7-9 days.
- 3) In some areas (*Rajgarhi, Dakhyat Gaon*), Bansai (बांसाई) was used for ripening bananas. Bananas were put together with *bansai* leaves in a box (often wooden). These leaves are considered warm and the bananas ripen in about 7-9 days.
- 4) **Use of Wool:** The bananas were allowed to dry for 1-2 days and put in a box containing wool. Ripening would take place within 5-7 days. This technique was followed in places and by people who had abundant goats and sheeps. (*dhaari*)
- 5) In case the quantity to be ripened was huge, a trench was dig. Fine twigs of leaves were put into it and set on fire. Being thin, they get burnt fast without forming ‘ambers’. When about to burn completely, douse the fire by spraying some water. When vapours are still coming out, seal the heat inside by putting a layer of husk. Then put the bananas, cover with husk and pooral and put a stone/ wooden plank on top. The trench is the sealed by soil. This will cause bananas to ripen within 5-7 days. Moreover, the quality of bananas ripened this way is quite good. (*khaladi*).

**Precaution:** Ensure that heat vapours are sealed in.

- 6) In some areas (*dhaari*), leaves of ‘Bameru’ (बमेरू) - a bush, were used. The procedure adopted was similar to the above – A trench was dug in a warm room. This warm room was often ‘goat & sheep-shed’. Some ‘pooral’ (dried grass of rice) was burnt inside the trench. When still warm, a layer of pooral was laid. Now, bananas – each wrapped in ‘Bameru’ leaf were put in the trench. Again a layer of pooral and leaves was laid and the trench was covered with a stone slab or wooden plank and sealed with soil. Bananas would ripen within 5-7 days.
- 7) All the above techniques involved a ripening period in excess of 5 days. A fast ripening technique was also adopted in some areas (*Sonara*) through which the bananas ripened within 3 days. The bananas were dried in high sun along with ‘Bansai’ leaves for about two days. Put some salt at the top end of bananas (point where bananas join together). When still warm, put the bananas and the bansai leaves together in a box. The bananas ripen within 3 days.

For ripening of ‘Mehal’ fruit, they are put in husk, which has been pre-warmed. They ripen in a few days (*kanseru*).

Though pomegranates are not grown widely and are only for personal consumption – a technique to enable the fruit ripen better was practiced in some areas (*Rajgarhi*). It involved making as many pouches of cloth as there were fruits on the tree. These pouches were then wrapped around each fruit. The fruits ripened inside the pouches. The method was believed to improve the flavour and the taste of the pomegranates. It made them sweeter & juicier. Their appearance too improved with a lustrous red colour becoming predominant.

## **Storage:**

Perhaps the best exhibition of use of locally abundant resources is given by the number of storage techniques found in the area. Being remote and isolated from mainstream meant that the villages here had to be self-sufficient to the extent possible. This translated to growing crops, which fulfilled the nutritional requirements to the extent possible. Therefore, a variety of crops had to be grown. Moreover, since one crop or a maximum of two crops could be grown per year – storing the produce for consumption during lean period was particularly important. Furthermore, seed too had to be stored for next season. Efforts were therefore, made for keeping them in best possible manner – free from pests and diseases.

Towards this end, a number of techniques had evolved:

Grains were traditionally stored in wooden houses called “kothar”. These kothar were made from Deodar wood (is insect & pest repellent). [In some places, especially at higher altitude (*Beef & Kharsali*), due to extreme cold, pest infestation is minimal. Wood other than Deodar was also used for construction of Kothar.]

Moreover, these Kothars were constructed at a distance from main building so that in the event of a fire, atleast foodgrains remain safe and food is available.

Kothars were constructed in a manner so as to avoid:

- 1) Water and moisture seeping in. For instance, they had – sloping roofs, socket type joints (where one piece fits into the other), raised floor (not touching the ground).

- 2) Rate infestation: raised floor, door kept open only for a short period - as and when required.
- 3) Proliferation of insects – deodar wood.
- 4) Thieves – a specially made lock which could be opened only by seasoned hands was used. Moreover, a chain with a bell on it was tied to the door in a manner that as and when the door opened the bell also rang.

Inside the Kothar were many compartments called “Ganja” (गांजा) in which grains were kept. Each compartment had a separate lid.

Besides Kothar, grains were also stored in ‘pesti’ (a basket made from fine straws of ‘Ringaal’ - a bamboo like variety) and ‘Khalda’ (a goat skin bag).

Among the most important precautions taken during storage were:-

- ▶▶ Drying – the single factor which almost entirely decided the proliferation or the absence of insects and diseases. Before storage grains must be dried completely and seeds even more so. Cleaning of Kothar/ compartments. Every compartment must be thoroughly cleaned before new grains are put in it. Moreover, old and new grains should not be mixed and kept in same compartment.
- ▶▶ In some areas, disinfections of Kothar was also done:
  - The inside walls of Kothar were disinfected by applying a coat of ‘*Gaumootra*’ (cow urine) on them. (*Thaan, Gangtadi*).
  - In some areas (*Kanseru*), the walls of compartment were first coated with water. When still wet, ashes were sprayed. These got stuck to the walls. The compartments were then allowed to dry completely before filling them with grains.
  - Another widely adopted technique (*Rajgarhi, Dharali, Dhaari, Khaladi, Chibala*) was to use mixture of ‘*Gaumootra*’ and ‘*Gobar*’ (cowdung) (at times mixed with soil). This mixture was applied on the inside of the compartment. It served two purposes. First it converted the compartment into a kind of air tight chamber with all holes of crevices

completely filled. Second, it disinfected the entire chamber (*Gaumootra* & *Gobar* have insect-repelling properties).

### **Storage Techniques for ‘Seeds’:-**

Generally, the best portion of the crop with bigger grains – free from disease marks and completely ripened – was chosen as seed. Proper storage meant that not only is the produce to be prevented from insects of rats, the seed quality & germination rate must also not be affected.

In each of the techniques described here, drying is the first & the most crucial step. Other steps include:

**For wheat** : Use of walnut leaves was most widespread (*Tunalka, Chhibala, Khaladi, Dhaari, Kafnol, Sorr, Sidri*). Wheat was often stored either (a) between layers of walnut leaves (leaves at the top and bottom and wheat seeds in the middle) or (b) Walnut leaves were shredded and mixed with wheat (*dhaari*). Both were dried and then stored.

Red soil (‘Reo’ soil) from a natural spring near Gangtadi was also used quite frequently (*Thaan, Gangtadi, Sarnol, Rajgarhi, Dharali, Gair, Barasu*). The soil from this area was first cured and treated in fire before using. A large thick, chapati was made. This was put inside a heap of husk, which was set on fire. Some 15-20 minutes later the chapati was taken out. It acquires a deep red colour. After cooling, the soil is ready to be used as preservative.

This red soil is powdered and mixed with wheat seeds. Seeds stored this way, if there be no moisture, remain good in quality even after 1-2 years. This method was considered as being most effective.

Sometimes, ‘Cinnamon (दालचीनी) leaves were also mixed with wheat seeds.

Paddy was often stored without any preservative. In some areas, ‘*pesti*’ (baskets made from bamboo like material) coated with *Gaumootra* & *Gobar* both from inside and outside – was used for storing rice seeds (Khaladi).

A 'Khalda' (goat skin bag) was also used to store paddy (*Khaladi, Chhibala, Gundiya Gaon and Hudoli*).

### **For Pulses:**

For storing the seeds of pulses – Tur, Gahat, Masoor & Urad, Reo soil (red soil) was widely used [*Thaan, Gangtadi, Sarnol, Dharali, Barasu, Rajgarhi, Tunalka, Gair*]. It was mixed with the pulses.

Mixing ashes was another popular practice observed almost everywhere.

Use of oil as a preservative was observed in most areas [*Dhari, Kafnol, Chhibala, Khaladi, Sorr, Tunalka, Beef, Kharsali*]. Mustard oil was warmed and coated on the pulses.

In areas where wild apricot was found in plenty, its oil was used in place of mustard oil.

### **Turmeric/ Ginger:**

Entire plant was allowed to remain inside the soil till the sowing season (till about March) (*Gundiya Gaon, Chhibala*). In some areas, this procedure was used in case of Garlic also (*Dhaari, Kafnol*).

### **Garlic:**

The entire plant (leaves intact) was uprooted. Leaves of 5-6 plants were twisted and tied together. These are then hanged inside Kothar. Garlic is stored from April till November (sowing time) using this method (*Chibala*).

In some areas (*Gundiya Gaon*), 'Mandua' seeds were stored in form of ear/ spike with a little twig/ stick still attached to it.

## **Techniques for Storing Produce meant for Self-Consumption;**

For wheat, walnut leaves were used as insect, repellent (as was done for wheat seeds).

Paddy was generally considered sturdy enough to resist insects. But at times – due to improper drying or due to some moisture creeping into the compartment – small flea-like-insects (called *Farri* {फड़ी})

infested the grains, the most common remedy was to put some water in a wide saucer (*Thaan, Sarnol, Chhibala, Khaladi, Hudoli, Dhaari, Tunalka, Sorr*). This saucer was kept in the compartment. Fleas got attracted to the water and died in it. The water was changed from time to time till all the fleas died.

In some places (*Barasu, Thaan*), '*Gaumootra*' was put in the saucer in place of water. Spraying of '*Gaumootra*' on infested paddy was not uncommon (*Gundiyyat Gaon*). This killed the fleas. Deodar oil was also used to combat the fleas (*Kafnol*). A saucer containing Deodar oil was put in the compartment. Its strong smell drove away all the fleas.

Since, husking was almost a daily routine, rice was often not stored in large quantities. If it had to be stored in large quantities – husking was done only in the months of '*Marghashish*' (Nov-Dec.) and '*Poush*' (Dec-Jan.). It was widely believed (*Dharali, Rajgarhi, Tunalka, Khaladi, Chhibala*) that rice husked in these months remain insect-free for a long period (upto 6-7 months).

Sometimes rice was stored in a '*Khalda*' (goat skin bag) (*Gundiyyat Gaon, Dhaari, Khaladi*). It was believed that rice would remain insect-free as long as it was not touched by hand. Therefore, a long handled ladle was often used to take rice out. (Same belief prevailed in case of storage of wheat flour too). A less widespread technique was to mix turmeric pieces with the rice. This too resisted insects.

In case of Pulses, (*Gahat, Tur, Urad, Masoor*), coating them with oil was the most widespread technique. Generally, mustard oil was used for this purpose.

In places where wild apricot grew abundantly – its oil was used for coating (*Chhibala, Sorr, Gundiyyat Gaon, Dhaari*) the pulses.

Oil cake was also mixed with pulses to keep them pest free.

'*Masoor*' & '*Ghahat*' were considered most prone to such pest attacks. Special precautions are taken in their case:

For instance, '*Ghahat*' is first warmed (roasted), often on kitchen fire (also done for '*Tur*'), before coating with oil (*Rajgarhi, Tunalka, Kotiyal gaon*).

Since these pests (called 'Teru' (टेरू)) proliferate more on full grain (not on half grains), *Masoor* was often 'coarse-ground' to half grain (*dhaari, tunalka*).

To make this storage:

- 1) **Dig:** A trench was dug (often at places protected from direct rain and excessive moisture). It's size was determined by the quantity to be stored. In case the quantity was huge many trenches were dug.
- 2) **Disinfect:** This was done by (a) igniting a fire in the trench which helped remove moisture and (b) applying a coat of mixture of *Gaumootra & Gobar* on the walls.
- 3) **Drying:** The coat was allowed to dry before storing.
- 4) **For storing citrus fruits (Malta, Narangi, Lemon, Orange),** a layer of '*pooral*' (dried grass from paddy) or '*Bawai*' – a grass was laid.

No layer was required in case of storing tubers.

The trench was then covered by a stone slab and sealed by soil, so as to make it air-tight. Fruits & tubers (Potato, Ginger, Arbi) stored in this manner remained fresh for upto a year. (Even seeds were stored in this manner).

**Precaution:**

No water should be allowed to seep inside the chamber. Otherwise, the produce may get spoiled.

*Darrim* (दाड़िम) - a local variety of pomegranate was stored in 'Chaulai' (*Tunalka, Chhibala, Khaladi*) and also in '*Mandua*' (*Gundiyat Gaon, Dhaari*). Lemon was also stored in this manner some places (*Tunalka*) [will last about 4-5 months]. Other ways of storing '*Darrim*' included allowing the outer cover to dry and then storing them in baskets in a well-ventilated place.

Green vegetables were cut into pieces of dried. These were then stored in moisture less place (kitchen). This was a widely followed practice.

Pumpkins (ripened) were stored almost anywhere – on rooftops, in rooms, in *Kothar*, or in kitchen. They could be kept for more than one year in this manner – the only precaution being that its cap (the point where pumpkin joins the plant) should remain in place. In case cap was damaged, some cowdung was put on it.

Since the taste of a ripened pumpkin differs from a green one, (ripened ones are considered less tasty), green pumpkin was stored in the same manner as green vegetables were i.e. by drying them in sunlight.

Onion not being a traditional crop of the region is little difficult to store (Germinates very fast). In some areas (*Tunalka, Rajgarhi*) it was first dried in *Jyestha* (May-June) and then stored in a ‘single layer’ (not stacked up) in a well-ventilated area. The base must be wooden for storing them for longer periods. This way they can be stored without sprouting for 4-6 months. A variation of this method is also followed (*Tunalka, Sunara*) wherein the onions were stored in the kitchen after drying. The smoke from kitchen fire prevents sprouting of onions. Could be stored for upto 6-8 months using this method.

Maize is not grown widely, but in places it is grown (*Barasu, Dakhyat Gaon*) it is stored by tying ends of the corn-ear to each other and hanging them in shade (protected from direct rain & sunlight). Can be stored for upto 6 months in this manner.

A variety of Pumpkin (called ‘*Bhujela*’) grown in some places (*Dhaari*) is considered pure & holy. A ripened ‘*Bhujela*’ pumpkin can be stored for upto 5 years if certain precautions are observed: (a) Must be stored near worship place (*Devasthaan*) (b) Should not be touched by women during periods & anyone in the event of death or birth in the family for certain specified days.

### **Cropping Techniques:**

In some areas, a form of slash and burn agriculture was practiced earlier – especially those at higher altitudes (*Beef, Kharsali*). This was called the ‘Kushala System’ (कुशला) of agriculture under it land was cleared of forests, burnt and the seeds were sprinkled. The crop was taken and the land abandoned for someone else to use. Crop would be taken for about 2-3 years before abandoning the land completely.

The most striking aspect of cultivation is the rich tradition of mixed cropping in the area.

**Rationale :**

(a) Mixed cropping was an answer to the many 'limitations; posed by hills – cultivable land being limited (could be increased only by cutting down forests), the available land was put to best use through this method.

This technique also ensures 'diversification of risks' in the event of crop failure. If more than one crop is grown in an area, during drought, some of them will fail, but some will survive. And in the event of a pest attack, a particular crop might be destroyed but not every crop in the field (Pests are generally crop-specified and pest of one crop may not affect other crops). The technique thus ensured "Stability & Certainty of Yield". Infact, yield per unit area is maximized by this process.

**(b) Mixed cropping was also an answer to the 'needs' of hill people:** To remain healthy, a balanced diet is required for a balanced diet – a multiplicity of food items is required – grains, pulses and vegetables. Given the amount of land, these nutritional requirements could be best met only through mixed cropping. Moreover, it also satisfied the need for variety in food and taste.

The particular combination of crops grown together were based on certain principles:-

- ▶▶ Different crops had different maturing periods, some mature early, some late.
- ▶▶ Different crops grow to different heights; such crops can be easily grown together since there is no competition among them for sunlight.

Moreover, some such crops can be harvested from top while others from bottom – without damaging the other.

- ▶▶ Certain crops need support to grow (Rajma, Lobia, Urad) which can be provided by stems of crops growing higher.

The most wide-spread example is:-

Chaulai – Mandua – Urad/ Lobia/ Soyabean

Chaulai grows tallest, Mandua also grows to some height (less than Chaulai) & Urad spreads only around level. It needs support, which is provided by stems of Chaulai & Mandua. This forms a kind of multi-layered structure where Mandua and Chaulai can be harvested from top (early maturity) and Urad can be harvested later.

Another combination grown in certain areas (*Baransu, Rajgarhi*) using these principles is :

Maize – Rajma (short growing variety)

Here maize grows higher up and provides support for Rajma to grow.

Spinach – Coriander – Pea (Spinach & coriander mature early)

- ▶▶ Certain crops grow inside the soil (tubers) and other grows above it.

e.g. – Spinach – Coriander – Potato (*Tunalka, Dharali, Gair*)

Here potato grows inside the soil and matures last. Spinach & coriander mature early of are taken out. By taking them out, the field is also sort of ploughed and the soil gets loose. This is good for potatoes.

Also Potato – चाबरी (*Rajgarhi, Dhaari*), Chabri – a green leafy vegetable was taken out first.

- ▶▶ Certain crops can grow even in less fertile and pebbly soils. These crops were often grown on perimeter.

Rice-Jhangora; Pea-Mustard, Wheat-Mustard.

- ▶▶ Certain crops have relatively thick stem and roots, which expand of hold soil better. These crops are often used as wind-breaks for delicate crops and also for soil conservation and are often grown on perimeter of the field.

Examples - Rice – Jhangora

Wheat – Tur (*Barasu, Rajgarhi, Tunalka*)

## Rice – Urad (*Gundiya Gaon*)

Here Jhangora, Tur & Urad are grown on perimeter. These bind the soil together. Moreover, Jhangora grown dense and acts as a wind break for rice – which if grown beyond a certain height – falls easily (even by slightest breeze).

- ▶ Certain crops were grown because they would grow up fast (fast maturing) and would then of people during lean season especially rainy season. Rice-Koni & Rice-Cheena (*Kafnol*) were combinations grown with the explicit purpose of food security during rainy season.

During this season, the rice stocks are generally depleted, cheena (चीणा) and koni (कौणी), thus substituted for rice. Both varieties are fast maturing type. For instance ‘cheena’ was sown in “Jyestha” and reaped in “Saawan” (July-Aug).

Other examples of mixed cropping:-

- **Mandua – बाजरू (a bush – has long ears which are used for making brooms).**

Here बाजरू is grown on perimeter. It is grown for the twin purpose of fodder and material for making broom.

- **Wheat – Pea (*Tunalka*).**

The pea grown is of pulses variety, has market orientation and also matures early.

- **Methi (Fenugreek) – Ajwain – Potato (*Tunalka*)**

This is a combination grown for the purpose of getting green leafy vegetables and also medicinal crops. Methi and Ajwain mature early and potato is harvested later.

- **Potato – Koni – Chaulai (Red) – Maize/ Rajma [*Dhaari*]**

Here maize and Rajma is grown on the periment is harvested first in *Asadh* (June-July). Koni is harvested in *Saawan* (July-Aug), Chaulai in *Bhaadon* (Aug-July) while potato is harvested last.

- **Pea – Barley (जौ) [*Khaladi, Pujeli, Hudoli, Chhibala*]**

Barley was grown on the perimeter of the field and was generally grown for providing green fodder for cattle.

- **Wheat – Mustard** [*Khaladi, Gair, Dharali, Hudoli*]

Mustard was grown on perimeter. It is believed to thrive even in less fertile soil. Moreover, it matures early and can therefore, be harvested from outside the field without damaging wheat. Sometimes, wheat and pea were sown together in the same field [*Khaladi*]. But this was done in rows so that mustard can be harvested with ease without damaging wheat.

## **Other Techniques**

### **Fast Germination:**

Goat/ Sheep dung is warm. This property is exploited in some areas (*Dharali*) for fast germination of paddy. The dung was added to field filled with water, its warmth resulted in fast germination.

For chilies of Tomato – the field is covered by grass for fast germination [*Gangtadi, Thaan*].

### **Stable yield:**

Alternating red and white rice in same field year after year gives stable yield.

Another combination giving stable yield was ‘Wheat and Barley’ alternated in the same field [*Sarnol*].

Sometimes crops are sown very dense. In case of timely rains, the extra will be weeded out and in case rain failure – only few will germinate. Thus a stable yield can be had [*Gangtadi*].

## **DEWEEDING:**

De-weeding of wheat was generally not done. In areas where it is, the reason was to pull out a wild grass (called कूर) from the field. This grass is a very good green fodder for cattle and is believed to stimulate milk production in them (*Rajgarhi, Dakhyat Gaon, Dhaari*). Deweeding is thus unintentional – focus being on pulling कूर out.

De-weeding of rice plants (in irrigated lands) was done in a certain manner (*khaladi*). Done in this way, not only is the field cleared of weeds and grasses, but the roots of these rice plants also expand and get strengthened.

For best results 3 weeding must be done within a month of planting the saplings.

### **Emergency Technique**

In case it rains while rice has been harvested. Entire paddy is heaped at a place in a conical shape and covered by grass (pooral). This procedure (called कुष्का लगाना) required expertise and if done properly then no moisture generally seeps into the rice.

In case it rained heavily during or after sowing, then to prevent the seeds (those not requiring much moisture) or the saplings, a drainage line was made, running across the field, by ploughing slightly deeper into the soil. This was done to facilitate drainage and not allow water to stagnate in the fields.

## Indigenous Knowledge Expressed as Beliefs & Sayings

Sayings are often an expression of collective wisdom accumulated over the years through experience and observation.

Since agriculture in the region is so crucially dependent on rains - a variety of beliefs (expressed as sayings) about weather and rains have been formed. Most of these beliefs are in form of weather forecasts, indicators of appropriate time of sowing etc.

### Weather related:

1. "माघ न बरसे पंचमी, जेठ न बरसे मूल,  
आषाढ न बरसे आरुद्रा, सावन में उड़ेगी धूल"

[If it does not rain (i) on Panchami (5<sup>th</sup> day) of Maagh (Jan-Feb) month

(ii) in 'Moola Nakshatra' (constellation) in month of *Jyestha* (May-June &

(iii) In 'Aarrodra Nakshatra' (constellation) in 'Aashara' month, then rains may fail and 'Saawan (July Aug.) will be so dry that winds laden with dust & soil will blow].

Rains on these 3 occasions thus heralded a normal monsoon and if it did not rain on any of these occasions then even 'Saawan' – the peak of monsoon will remain absolutely dry.

2. "माघ, पूस दक्षिणी चले तो समझो सावन के लक्षण भले"

[If winds blow from South in months of 'Maagh' (Jan-Feb.) and 'Pousha' (Dec-Jan.), then these are good indications of 'Saawan']].

Southerly winds in the months of 'Maagh' and 'Pousha', improve the chances of a good monsoon.

3. If in any Hindu months, there are 5 Sundays and the 'Sankranti day' (1<sup>st</sup> day of Lunar Month) is a Sunday. Then if it rains on the Sunday (Sankranti day), there will be good rains

throughout the month. Alternatively if it did not rain on that day, entire month might go dry.

4. 'Kumbh of Phalgun': Some days in the month of 'Phalgun' (Feb-March) are considered auspicious with the constellation 'Kumbh' (Aquarius) falling on these days. 4<sup>th</sup>, 8<sup>th</sup>, 12<sup>th</sup>, 18<sup>th</sup> are four major 'Kumbh' and 24<sup>th</sup> & 28<sup>th</sup> (Shivratri day) are considered minor 'Kumbh'.

Rains on these days are considered extremely beneficial & it must rain on these days for a good harvest. These rains percolates deep into the soil, quenches its thirst & saturates it. Infact, after Kumbh has rained, even if it does not rain a drop till May (Monsoon), there will still be moisture in the soil.

In the year 2002, atleast one Kumbh rained. Farmers of the area were, therefore, quite assured about moisture availability for the crops.

Some believe (*Khaladi, Dhari*) that effect of these rains last for upto an year.

5. **Indigenous Indicators for Forecasting Rains:** In summers, a sudden rise in humidity was associated with rains. Some indicators were used to forecast such rains (*Khaladi, Chhibala, Dhaari*):

- a) Tobacco was often mixed with Molasses (शीरा) and kept in Kothar (for smoking purposes). The mixture was normally hard, if it got soft – rains were near.
- b) If some dew drops were seen on a thin long stone (in the fields) before sunrise – it heralded rains.

Other indicators used for this purpose:

- a) If the bird सिटार्ई was seen bathing in running water then rains were quite near.
- b) Halo around the moon also indicates rains; Bigger the halo, nearer the rains and smaller the halo, farther the rains.
- c) If ants leave their holes and start climbing trees then rains are not far.

- d) A bird called चातक starts making noises when monsoons are near (It is believed to call for rains).
- e) In some areas (*Khaladi, Hudoli*), if after sunset, lightening was seen in East – it indicates rains and if seen in South – indicates dryness.
- f) In some other areas, (*Kafnol*) thundering of clouds above a particular mountain was associated with rains.

In this traditional wisdom must be tempered by another saying prevalent in the area:

“मेघ और मृत्यु का कोई भरोसा नहीं”

(One cannot trust rain and death – they can arrive anytime).

### **Sowing Related**

A variety of beliefs are observed especially related to the most appropriate sowing time. These beliefs tied a particular day & time to a particular crop. These days often indicated change of season and therefore, just the right time for sowing crops.

1. Yellow mustard is believed to grow best when sowed on “*Kaartik Amavasya*” (New moon day).
2. Vegetables, especially pumpkins, must be sown on ‘Shivratri’ day.
3. In high altitude areas (*Kafnol, Beef*) wheat is to be sown on ‘Kartik Sankranti day’.
4. Sowing time of ‘Til’ & ‘Mandua’ is associated with local fairs and is expressed as sayings:

▶ “भाटिया की जातर, तिल की बातर”

(Til is to sown when fair in Bhatia village takes place) This fair is organised on Sankranti day in the months of *Jyestha* (May-June).

▶ “डांडा की जातर, कोदू की बातर”

(Mandua is to be sown when fair in 'Danda' takes place). This fair is organized in the months of 'Aasadh' (June-July).

5. The general belief about best day of the week for sowing & harvesting is again given by the saying:

“बुध बोना, शुक्र लेना”

(Sow on Wednesday, Reap on Friday). The general pattern of sowing & harvesting in the area is dictated by the above belief.

6. In some areas (*Tunalka*), an older belief was to sow tubers especially Potato & Arbi on Sunday for good production.
7. Another belief found (*Tunalka, Dhaari, Khaladi*) was associated with sowing according to Lunar Cycle. The brighter grains (wheat, rice) must be sown during waxing period of moon and darker grains/ crops (*Mandua, Urad, Til*) be sown during waning period of moon.
8. Nursery for Onion must be started on Amavasya for better crop (*Chhibala*).

### **Purity of Seeds of Crops**

A traditional Hindu belief is that food grain being vital to our sustenance and existence; they must be seen as a form of god (अन्न देवता) and worshipped as such. Moreover, since 'seeds' contain in them the latent energy which grows out to produce crops, they are revered even more. The seeds, therefore, must not be touched by anyone impure.

About impurity, the widespread Hindu belief is that:-

- a) After birth & after death – there is impurity on all around in the family and the house.
- b) During menstrual periods, a woman is considered impure for six days.

Touching of seeds and of certain categories of plant (creepers) by any impure person was believed to bring about decay to seeds and wilting of creepers.

If during such times, creepers of cucumber, pumpkin and gourd growing around the house start wilting and drying up, then freshly brought '*Gangajal*' (Ganga Water) mixed with *Gaumootra* was sprayed on the plant (*Dhaari, Kafnoul, Beef, Sorr, Gundiya Gaon*).

**A Precaution:** Urine of '*Desi cow*' (indigenous variety) and not of '*Jersey*' variety must be sprayed. *Desi cow* is considered pure since it feeds on umpteen varieties of herbs of grasses.

If "*Sutak-Patak*" (impurity due to birth/ death) happened to coincide with sowing and harvesting, certain precautions had to be observed:-

- No one from the family will touch the seeds. If sowing has to be done then a third person (often a distant relative but at time unrelated) would do the sowing.
- In case sowing has to be done by the family itself, it could only be done after a certain specified period – thirteen days in case of death and 7-21 days in case of birth.
- No new crop could be harvested during this period. If someone in the family happened to be serious (*Dhaari*) then a small quantity was harvested early – to circumvent this abstention period.

In case of Ginger – no woman could step onto the field till it had germinated and was visible to the eye. If a woman did step onto the field, it was believed, that the entire ginger seed would be decayed and there won't be any crop (*Rajgarhi, Chhibala, Dhaari, Sorr*).

### **Other Beliefs:-**

Related to opening of new compartment in Kothar :-

- ▶▶ In case, grains from one compartment in Kothar are finished, a new compartment could only be opened on certain specified days. It was believed that if opened on these days, the grains would last longer.
- ▶▶ Most widely accepted days for opening a new compartment were the Sek (सेक) & Sankranti day.
- ▶▶ This was also expressed in form of saying (*Tunalka*), "सेक लगाबल टेक" (new compartment must be opened on 'Sek' day – a day before Sankranti or the last day of the month).

- ▶▶ Moreover, before opening the compartment, Dhoop (incense) etc. were offered (as worship) to God. In some areas, 'Poornima' (full moon day) was also accepted as a day for opening new compartment (*Chhibala, Gundiya Gaon*).
- ▶▶ Besides, no new compartment could be opened in the month of 'Pousha' (Dec-Jan). If opened, the grains would finish up very fast (*Kafnol, Dotiyal Gaon*).
- ▶▶ Opening a new compartment on such specified days probably conferred the advantage of an easy to remember calendar schedule. It would be easier to calculate the number of days grains from that compartment lasted.
- ▶▶ **While harvesting rice:** No whistling is to be done and no sound to be made (including speech) while putting paddy in sacks. Any such sound was believed to make the grains last less longer than otherwise (*Kotiyal Gaon, Sunara, Naugaon*).

## **Rituals Complementing Agricultural Operations**

Being part of 'Devabhoomi' (land of Gods) – Uttarakhand, the region has an old tradition of rituals celebrating agricultural operations.

These rituals are of broadly three types and overlap with three basic Hindu beliefs:

- 'Thanks giving' – Have a sense of gratitude for whatever the Gods give and thank them for it. Rituals celebrated in the month of Ashwin (Sept-Oct.) (called 'Asoj' in local parlance) before harvesting of paddy fall under this category.
- Start every new endeavor after praying to God for its success. Rituals on 'Basant Panchmi' day fall under this category.
- Gods as the last resort – when everything fails, go to the Gods. Thus, emergencies of grave kind were fought off by 'invoking the gods'. Rituals during rain-delay and rain failure fall under this category.

### **Thanks giving Rituals**

These are celebrated during 'Ashwin' (Sept.-Oct.) month (often during 'Navaratri') when the paddy crop is ready for harvest.

Before harvesting the crop, villagers go to the fields taking some '*halwa-puri*' and other sweets along with them. In the field, these sweets are offered to the gods along with the new paddy crop. Gods are thanked for the crop and prayed for restraining them from causing any hailstorm or rains till the rice is harvested and taken home. After praying to god, anyone can harvest their crop according to their convenience.

It is an overwhelming belief in the area that if first offering is not made to the gods, hailstorms and heavy rains will occur which may damage the crop.

## **Rituals before starting a new Endeavor**

Basant Panchami (5<sup>th</sup> day of 'Basant' according to Himdu calender) falling in the month of 'Magh' (January-February) heralds the arrival of 'Basant' or the spring season. This season, which is transitory from winter to summer, is also the sowing season.

On the Basant Panchmi day, before sowing, i.e., starting a new endeavor, god is prayed for giving success. On this day, Mother Earth and the fertile soil, which helps produce the food for our sustenance, are worshipped. Seeds – which contain within them the new crop and cattle – with which entire agriculture is managed are also worshipped.

Gods are prayed for their help so that the coming year be a good one and the harvest be a bumper one.

On the Basant Panchmi day, the villagers gather at a place and the priests then make astrological forecasts about the coming year and about the monsoon, diseases to crops and about the harvest. The priest also announces the auspicious time for starting the ritual (i.e., sowing) in the fields.

In the fields, worship takes the form of sowing seeds at one place, manuring, and ploughing seven times in a circular manner around the seeds. What is significant that each member of the family would perform only one specific task on the day. One member would plough, another sow and yet another adds fertilizer to the soil. More importantly, only that member will perform that task with whose horoscope it matches best.

After the ritual, sowing was done some 7-8 days later.

A difference is noticed with respect to this ritual vis-a-vis areas at higher altitude and those at lower level. *Basant* representing a change of season manifests itself only in lower altitude areas. The ritual is thus conspicuous by its absence in the higher altitude areas (*Beef, Kharsali, Sorr, Sankri, Kafnaul*).

## **Emergency Rituals or Gods as the last Resort**

Emergency rituals represent the most colorful aspect of the area with wide regional variations.

During summers, there is a general moisture stress what with a strong sun and dry winds blowing through the day. This moisture stress is exacerbated and takes extreme forms bordering on drought like situations when winter rains, especially those in month of Magh & Phalgun – fail. Or when the monsoon is delayed considerably.

Under these circumstances, the standing crop may be destroyed due to lack of moisture and the newly sown crop (eg. Mandua) may fail to germinate. A general crop failure thus becomes imminent. The situation can be very depressing if all the indicators do not point towards early rains.

Faced with the prospect of a crop failure and with food scarcity looming large (i.e. with all options closed), people go to the gods – as a last resort – to give rains.

Being the favoured land of gods in the Hindu mythology, the region has a rich tradition of gods and goddesses. The area is subdivided into smaller regions, often separated by hills, called ‘patti’. Each ‘patti’ comprises few villages having common traditions and agricultural practices. Each of these ‘patti’ has its own ‘devta’ (demi-god) looking after the area. Sometimes a ‘patti’ could have more than one ‘devta’.

According to Hindu mythology, there are some 330 million demi-gods and goddesses. And though god is the creator, organiser and destroyer of this universe, it is these demi-gods and goddesses who are believed to assist the almighty in managing the natural phenomenon and hence the universe. Being governors on behalf of the lord, these demi gods are the immediate link between man and god and are therefore treated like god. Hindu rituals of ‘Shraadh’ in ‘Ashwin’ (Sept-Oct) and of making offerings through ‘*havan and yajnas*’ are celebrated to worship these demi-gods and goddesses.

Therefore, in the event of an impending drought, these demi-gods are invoked and prayed to give rains.

How the gods are invoked and even proked to give rains differ from region to region:-

- 1) In *Khaladi, Pujeli, Purola*, in the event of a rain failure a young male goat was sacrificed in a certain area stop the surrounding hills. Some believe that the ‘devta’ becomes happy with such an offering and gives rains as a result. A contrarian view is that by sacrificing the goat

in the particular area, the area got impure. Devta had to thus give rains to wash the entire area.

- 2) In the 'Banal patti' area (*Gair, Koti*), lack of rains force people to take the 'devta' – 'Mahadev' out of the temple. The 'devta' is then taken in a procession to the top of adjoining hills (hill tops, especially forested ones, are considered sacred and holy as demi gods, goddesses and holy spirits are believed to reside here).

Once people reach the particular spot, people make the entire area dirty by food-leftovers, human and animal excreta. The 'devta' is left in the dirty and impure area. Perforce, he has to give rains to wash the entire area. Devta is taken back to the temple only after (i) an assurance about rains within sometime (ii) it rains.

- 3) In *Sorr, Sankri & Sidri*, villagers especially children go to a lake called 'Jura Taal' (जूड़ा ताल) in 'Kedar Kantha' area.

Once there, children do everything to disturb the tranquility of the area. They bathe in the lake, throw stones in the placid waters, sing songs and shout at the top of their voices. They stand in the shallow water of the lake and with their hands create movement and turbulence in the otherwise calm waters.

This noise and movement of water is believed to wake up the gods and provoke them to give rains.

- 4) In *Beef, Kharsali*, the local deity has its own drum called 'Nagara' (नगाड़ा). This drum is kept in his temple in Kharsali.

In case of rain failure, villagers take the drum to a particular rock called 'Pandav Shila' (पांडव शिला) situated some 7-800 metres away from the village. The drum is put on the 'Pandav Shila' and a shoe placed on the drum. This insult provoked the 'devta' to give rains.

Another practice in the area was that of going to a place called ‘Sunapla dhaar’ (सुनाप्ला धार). This place associated with Lord Shiva is considered sacred. Villagers go to the place, sing, dance, cook and eat. They make the place dirty and disturb the peace of gods. The gods are believed to be provoked into giving rains as a result.

Besides these interesting traditions, some villages (Thaan, Gangtadi) had a tradition of invoking gods. The ‘devta’ would then make appearance on a person by possessing him. He assured the villagers of rains within a stipulated timeframe. In return, villagers take the devta for pilgrimage or give offerings as demanded by him.

Sometimes, ‘yajnas’ were performed in the event of rain delay. Villages near Barkot (*Kanseru*) collectively performed ‘yajnas’ at ‘Sahastrabahu Taal’ in Barkot. This was believed to give rains.

Another tradition, indirectly linked to appearing gods was that of ‘bathing a cat’. In certain areas (*Dharali, Rajgarhi, Barasu, Dakhyat Gaon, Dhari, Kafnaul*), a cat was taken to the fields. It was kept on big boulder. The boulder was itself placed on the boundary of two different fields belonging to two different persons.

Amidst chanting of mantras, the priest would bathe the cat in a mixture of water and milk. Thereafter, the cat was given something to eat. This, it was believed, made the gods happy and they gave rains as a result.

Amidst the diversity of traditions, a common belief was that earlier ‘devta’ unfailingly brought rains. Not only would rains come, they would at times be localized as to be confined only to the area under the devta. But today, due to declining faith in god and failure to observe and celebrate rituals in the specified manners has led to the ‘devta’ not giving rains every time.

## Women's Traditional Knowledge – Case Study

‘Meet her, you’ll definitely get to know quite a few things – she’s smart’. So said Ms. Veena, my guide for Tunalka village.

Few minutes into conversation with Shyama Devi Chand and one knew that she’s not just smart, she’s fiery. This 60-year-old lady has been spearheading movement for ban of liquor in the village. She’s involved in making women Self Help Groups and in encouraging women to learn income earning skills especially those relating to food processing.

Talk of indigenous techniques, and she sure has many. Take storage for instance – Onions not being a traditional crop of the area is amenable to storage easily (it sprouts). But Shyama Devi has, through experience developed methods to keep onions without sprouting for long. She stores them (i) in a single layer on a wooden base in a well ventilated room or (ii) she stores them by keeping them in the kitchen. Either way, onions can be stored for 4-6 months without sprouting though, she admits, latter method is more effective.

Talking of pest management, she mentioned that irregularity of seasons has been a major factor in increasing pest menace. She recalled instances where ashes from forest fires were used for reviving wilting rice plants and yellowing fruit trees.

A wonderful exhibition of indigenous techniques adopted by her is given by the novel combinations of crops grown by her as mixed cropping. The idea is to maximize yield and make best use of land. For example, she grows :

- 1) Wheat – pea (Perimeter) – what makes the combination different is that pea is off-season pulses variety. Is grown as a cash crop.
- 2) Mandua – ‘Bajru’ (बाजरू) (Perimeter) – this combination satisfies the need for fodder for cattle and foodgrains.
- 3) Potato – Ajwain – Fenugreek – this unique combination satisfies the twin needs of (a) leafy vegetables & (b) herbs for domestic use.

Beliefs are an integral part of agriculture and lifestyle of the region and Shyama Devi is no exception. She believes in the old saying of 'सेक लगावल टेक' i.e, new compartments in Kothar can be opened only on *sek day*. She also follows the traditional practice of sowing pumpkin on 'Shivratri Day' and of sowing food grains according to Lunar cycle.

## **Women's Traditional Knowledge – Case Study**

This eighty years old lady can be still seen working quietly in the fields adjacent to her house in Rajgarhi. Seeing her work meditatively in the fields, one got interested in meeting her and probing her about traditional techniques. The meeting came about the night before leaving from Rajgarhi.

With some 70 years of experience behind her, meeting Patam Devi, mother of social worker Mr. Jayaveer Singh Jayada, was always going to be an experience in learning. And she didn't disappoint.

Talking of older practices, she revealed that after harvesting pulses, their plant must not be uprooted. The roots must be allowed to decay inside the soil. "Next crop comes out better," she said.

Fallowing is very important for allowing the soil to recoup and regain fertility, she told. No wonder, despite the fact that fallowing is on the decline all over the region, it is still practiced by her family.

Among the many techniques she learnt through experience are increasing the size of garlic bulb by twisting its leaves and using cloth pouches for improving the taste and for better ripening of pomegranate.

She realized, through experience, that turmeric grew better if it was covered by rice husk. As a result, it is now grown nearer to the husking area. Thus, as soon as rice is husked, the husk is thrown on the field.

Among the many storage techniques she learnt, she explained in great detail the most effective methods – especially those related to baking and preparing the 'Red Reo' soil.

When asked about weeding and pruning, she gave an interesting explanation to de-weeding of wheat. De-weeding of wheat, she said, is unintentional. Women actually go to take out a wild grass (a lentil like creeper), which grows along with wheat. This grass is considered milk enhancing and is a good fodder for cattle. While pulling out the grass, the weed too comes out.

Patam Devi lamented the disuse of coarse grains grown earlier. Cheena (चीणा) was the case in point. This crop was nutritious but lost to wheat and rice on account of lower social status and a different taste.

Being on the wrong side of old age, she did have problems recalling minor details, but that did not make the experience any less enlightening.