

INDIGENOUS POST-HARVEST MANAGEMENT OF WHEAT CROP AMONG KUMAON REGION FARM FAMILIES

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ABSTRACT

Indigenous Technological Knowledge in the Himalayan region is the intergenerational wisdom of local inhabitants to perform their livelihood operations in a most eco-friendly manner. Post harvest management are of utmost importance, the grain being the staple diet of two-third of the Indian population. It has been observed that farmers of *Kumaon* region were performing harvesting, threshing, winnowing, milling and storage of wheat grain practices by using their indigenous knowledge. This indigenous knowledge is region and local specific. Participatory rural appraisal techniques like observation, focused group discussion and interview were used to collect information from 120 farm families belonging to eight villages on post harvest operations being performed by farm families in wheat crop. It was observed that farm families possess a vast reservoir of indigenous knowledge. Hence, it is recommended that there is need for identifying and documenting the indigenous knowledge and blend it with modern scientific practices for vast dissemination among general mass.

INTRODUCTION

Post- harvest technology is probably as old as the agriculture. Post harvest operations such as cleaning and grading(separation), drying or dehydration, storage, extraction, milling, fortification, packaging, transportation and handling carried out on a biomass from stage of harvesting till its consumption(ICAR, 2011). The post-harvesting operations of wheat grain after harvesting is as much important as producing the crop, because post-harvesting technology affects the quantity and quality of grains. If proper attention is not paid to handle the produce after post - harvesting, it may lead to a considerable loss to the producers. Generally, losses in cereals and pulses during the post-harvest operations amount to about 8-10 per cent of field production. Wheat crop suffers severe harvest and post harvest losses if appropriate technologies are not adopted, particularly during harvesting. It is, therefore, necessary to adopt proper technology after harvesting the crop for the improvement of the quantity and quality of food grains and harvest the crop as soon as it matures. If delayed, grain may be lost due to damage by rats, birds and insects. Along with that most farming communities have indigenous methods and structures for storing their produce.

Keeping this point in mind, the present study was undertaken with the objective to explore the indigenous post harvest practices followed by *Kumaon* region of farm families in wheat crop.

RESEARCH METHODOLOGY

The present study is descriptive and qualitative in nature and undertaken in two districts of Uttarakhand state i.e. Almora and Bageshwar. From each district, four villages were selected purposely. From each village, 15 farm families were selected on random basis. Thus the sample consisted in total 120 farm families. The respondents were personally contacted and the information on post harvest practices was collected through observation and interview method with the help of an open-ended schedule. Along with this focused group discussions were organised to get the desired information from the respondents and key informants of the village. Probing was done to get clear and complete information in local dialect (*Kumaoni*). On the basis of responses obtained from the farm families, the variables were classified into the different categories. The obtained data were classified, tabulated and quantified by calculating frequency and percentage.

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RESULTS AND DISCUSSION

Background Information

Majority of the farmers (82%) belonged to the age group of 45-50 years and 62 per cent were educated up to middle high school. Eighty five per cent of the respondents lived in joint family and all had agriculture as their main occupation. Besides that seventy five per cent farm families belonged to general caste (75%) and generally dependent on localite sources for information (90%). Majority of the farmers. (92%) dependent on rain fed agriculture(92%). About size of land holding, majority of the respondents had 6-10 *nali* of land (1 *nali*= 1/20th part of 1 *acre*).

Harvesting

Wheat grain must be harvested in a timely manner, before shattering, pre-harvest sprouting, bird damage or weathering, to minimize pre-harvest losses, yet must be dry enough for storage. A close observation of the data incorporated in Table 1 indicates that wheat crop is harvested when the grains harden and the straw turns light yellow, becomes dry and brittle. Farmers of *Kumaon* region reported that wheat is harvested in the month of March-April (*Chetra and Beshak*) from the ground level manually with serrate edged sickles by hand. After harvesting the crop is dried for 3-4 days on the threshing flour and then threshing is done by trampling bullocks. Farmers reasoned that drying in sun removed the moisture from the panicles.

Threshing by bullock trampling

Even in the *Kumaon* hills bullock are used for the threshing the wheat crop. After harvesting of crops in mid September to October (*Asoj*), the same are left to dry in courtyard (*Khau*). After complete drying, it is spread in circular heap formed around a centre. Farmers reported that for bullock trampling sun dried crop was spread on thrashing floor. This crop was covered with a layer of straw. Then bullocks were made to walk over the crop in a circle. Care was taken to collect the dung at the time of operation. Then again the crop were trampled for one hour after which the crop was turned over so that it may be trampled completely. This process of turning the crop over continue for 3-4 hours. After which the crushed material was collected and piled into a heap. The layer of straw helped in separating

the dung from the threshed grains (Table 1).

Winnowing

A deep glance at the data further reveal that after threshing, the straw, chaff, immature grains, stones, and other substances were separated from the grain by sieving, winnowing or hand picking. Information presented in Table 1 reveals that 45.83 per cent of the respondents reported that after trampling of wheat crop, farm women used to winnow the threshed wheat by creating wind, holding a *chader* from two sides and then blew the *chader* continuously in wind direction called *fatau* in local parlance where wheat was placed in the *soop* and allowed to fall from a height of about 4-5 ft in a thin vertical flow and this *chader* which was being run by rural farm women acted as a blower or fan which created wind so that straw/*cheela* or any external particles were removed easily from the wheat. In other method more than half of the respondents (52.53%) performed indigenous manual winnowing, a shallow basket (*soop*) containing grain was held overhead, and the grain was tossed during periods of fast winds. Light weighted broken grain, straw, and weed seed were carried by the wind to one side and the whole grain fell to the ground by *soop*. Farmers further stated that large distance between winnowing device and ground gave the falling grain longer exposure to the wind.

Manual winnowing requires a continuous brisk wind and several repetitions. Even then, the results are erratic producing grain, which is far from satisfactory. Wheat cleaning is most often done manually by women. The grain is then separated by air winnowing and grain is subsequently dried again for some days before storing in houses.

Milling of wheat

A deep glance at the data further reveal that traditional water mills for grinding were being widely used in the Himalayan regions and about 2.5 lacs traditional wooden water mills are still in use in Himalayan and Sub-Himalayan regions and it is made by locally available material. Vertical shaft wooden water mills generally used for grinding grains only and are called as "*Gharats*" (*Sani, and Kumar, 2006*). It is observed from the present study that where there was abundant water availability in local vicinity of farmers in that area *Gharat* was being

Table 1: Post harvest practices in wheat crop followed by farm families with reason n=120

SNo	Indigenous practices	Reason given by farm families	f/ %
1.	Harvesting		
	Wheat is harvested from the ground level and dried for 3-4 days on the threshing floor	Drying in sun removes the moisture from the panicle and easy in threshing	120 (100)
2.	Threshing		
	Threshing is done by trampling Bullocks	It separates the panicle from paddy stalk	120 (100)
3.	Winnowing		
	<i>Fatau</i> acts as a blower or fan which creates wind where threshed wheat was placed in the <i>soop</i> and allowed to fall from a height of about 4-5 ft in a thin vertical flow	The straw, chaff, immature grains, stones, and other substances were separated from the grain	55 (45.83)
	The dry threshed grain was placed in the <i>soop</i> and allowed to fall from a height of about 4-5 ft in a thin vertical flow in the path of a cross wind	-do-	63 (52.50)
4.	Milling of wheat grain		
	Water mill or <i>gharat</i> commonly used for grinding of wheat grain	It was locally made and feasible	72 (60)
5.	Use of waste		
	Haymaking(<i>Lut</i>) of paddy stalks	It was used to feed the animal in winter season	120 (100)
		The <i>Paral</i> also used to make bed for sleeping purpose	105 (87.50)

used by the farm families. *Gharat* or water mill was basically situated near the river area or where water flow was continuous. In *Kumaon* hills 60 per cent farmers used to grind the wheat grain in *Gharat* which was run on sharing basis in a village community or owned by individual only. Farmers further stated that the main market was far away from their villages, so this indigenous technology was the only source to change their grain into the flour (Table 1).

Use of waste

After threshing of wheat crop, outer layer/husk was removed i.e. called *cheela* which was used to feed the cattle as a fodder whereas after harvesting the left over wheat straw was also used for feeding the cattle in *Kumaon* hills. Further data in Table 1 indicate that all the respondents used to make hay or *lut* (in local parlance) by paddy stalks. Farmers of *Kumaon* region cut the left over paddy stalks and made a bundle (*Poo*) by knotting tightly, then stacked the bundles one over other around the pine (*Pinus roxburghii* Sarg.) log which took the shape of pyramid. By this way hay was made. Farmers used to

feed the hay (*paral* in local dialect) to the animal in winter season when there was shortage of green fodder in forest and field. Apart from that 87.50 per cent of the farm families used to make sleeping bed by using *paral* as it is soft and gives warm feeling during rest.

Indigenous Storage practices in wheat crop

Storage is the process of keeping grains to protect them from inclement weather and pests for a short or long period. Storage may be considered as an important step in guarantee/process of food security. The basic requirement of a good storage practice is a healthy, clean, and uniformly dried grain and a structure that will maintain a suitable environment and prevent pests, rodents, and spoilage (*Ahuja et al., 2010*). The bins made of wooden splinter were locally known as *Bhakar*. The bins made of Bamboo or *Ningal* were called *Topare* or *Doke*. In indigenous storage practices a number of locally available plant products, leaves, leaf powder, oils and ashes were being used by farmers for more than one century to store the paddy, wheat, millets and pulses.

Use of dried leaves for storage of food grains

A perusal of data given in Table 2 reveal that all the respondents under study used leaves of *akharot*(*Juglans regia* Linn.) and *bithon* (a tree of *Neem* family) in storage structures. Wheat grains were dried properly before storage. In an informal group discussion farm family revealed that the leaves of these plants were taken and kept under the sun for one day. Then the dried leaves were crushed and mixed in the food grains. The food grains were kept in storage structures. Farmers reasoned that these leaves gave pungent smell, which do not allow the attack of insect, pests and protect grains from infestation for six to eight months. When the grain were to be consumed, the crushed leaves were separated from the grains. One important consideration was that while filling up the locally prepared bamboo bins such as *bhakar* and *doka* with grains, 3-4 cm thick layer of leaves at an interval of 30-40 cm was made and then these bins were covered with lid of bamboo.

Gupta *et al.*(2007) reported that rural women of Rajasthan used dry *neem* leaves in wheat storage

box by making bags of dry *neem* leaves and placed them at bottom, middle and top of the container. The scientific rationale behind keeping the *neem* leaves was that *neem* leaves were sterilant, antifungal, anti-parasitic, insect and pest repellent, thus prevented spoilage of grains.

Use of cow dung ash in wheat

Table 2 shows that 81.66 per cent of the farm families mixed the ash of cowdung(*Khar* in local dialect) with grains before storing in *bhakar* and *doka*, plastered with cow dung and drled it properly. Farmers roughly mixed 10-20 kg ash of cow dung cakes in 60-70 kg seed and covered the storage structure with a lid. This will preserved the wheat from insects and pest infestation for one year.

The study is in consonance with Kanwar *et al.* (2006) on a study on “indigenous crop storage practices prevalent among rural people” reported that rural people of Himachal Pradesh stored wheat seed in *peru*, plastered with cow dung from outside and inside then mixed 10 kg ash of cow dung cakes in 50 kg seed and covered the *peru* with a lid. It protected the seed gain from infestation of insects and pests.

Table 2: Indigenous wheat grain storage practices followed by farm families with reason n=120

SNo	Indigenous practices	Reason given by farm families	f	%
Indigenous grain storages practices				
1.	Use of dried leaves for storage of food grains- The leaves of walnut (<i>Juglans regia</i>), <i>bithon</i> (a tree of <i>neem</i> family) are used for grain storage	These leaves gave pungent smell, which did not lallow the attack of store grain insect pests	120	(100)
2.	Mix 10 kg cowdung ash in 60-70 Kg of wheat grain	This preserved the wheat from insects and pest infestation for one year	98	(81.66)
3.	Use of <i>Chuna</i> (Lime) and wood ash for controlling of grain insect pest insect pests	By using this practice the grains could be stored for two to three years without any spoilage by insect bests.	25	(20.83)

Use of *Chuna* (Lime) and wood ash for controlling of grain insect pest in wheat

Farmers of Almora and Bageshwar district (20.83%) were using *chuna* (lime) along with wood ash for grain storage. During the month of May-June wheat grains were dried in sun and then lime @ 2 kg and wood ash @ 10 kg per quintal was rubbed by 2-3 persons for about one hour. By using this practice the grain could be stored for two to three years without any spoilage by insect pests.

CONCLUSION

From the present study it is clear that the people of *Kumaon* region believe in indigenous agricultural system. The farm families were using indigenous practices in all the components of post-harvest operations. These practices are in vogue since ancient times and this pool of knowledge is of great significance in conserving the environment and maintaining the sustainability of the agricultural production

system. The need of the hour is to identify and document the location specific indigenous practices and modify them by conducting location specific field trials. In order to ensure keeping quality of food products and other material at domestic level, there is a dire need to follow scientific postharvest practices. Therefore, modern practices should be blended with the indigenous practices, so that the production can be enhanced without hampering the sustainability of the system.

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