

# Documentation of Indigenous Agricultural Implements, Practices and other Conservation Techniques in Subtropical Climatic Zone of Shivalik Hills, North Western Himalaya

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ABSTRACT: Present investigation attempts to document traditional practices and implements used in various agricultural operations and also other traditional conservation technologies practiced in subtropical climatic zone of Shivalik Hills (Hamirpur District, Himachal Pradesh), North Western Himalaya. The description and use of various tillage implements, indigenous crop production techniques, crop harvesting tools, water conservation techniques, crop protection techniques, post harvest technologies and agricultural by-products/resource utilization techniques have been discussed in the present document. However, most of the agricultural practices and traditional tools/implements are on the verge of extinction and need to be promoted for climate change mitigation and enhancing adaptive capability of farmers.

Keywords: Traditional tools; Implements; Indigenous; Agricultural practices; Shivalik Hills.

**INTRODUCTION:** Traditional agricultural tools/ implements are economical in terms of labour, money and time saving. These tools are made up of locally available materials like bamboo, timbers, fibers etc. which are operated easily by one and all without any special skills.<sup>1</sup> Draught animals were used for agricultural operations in 52% areas of the cultivated land of the world.<sup>2</sup> By the end of 20<sup>th</sup> century, the use of draught animals in agricultural practices has tremendously reduced.

Agriculture in general is handicapped in the study area due to steep and hilly terrain, hazards of climate, uneconomic scattered holdings comprising of shallow and stony soils. The tools and implements used are of a primitive nature throughout the Indian Himalayan ranges. Traditional farm tools and implements for self sustenance have been developed/modified through experience over generations to meet emerging socioeconomic and farming challenges.<sup>3</sup> Loss or disappearance of indigenous knowledge is rapidly occurring due to encroachment of state and market pressures and non-transferring of indigenous knowledge to new generations by the old people.<sup>4</sup> This traditional knowledge should be developed, preserved and protected.<sup>5</sup> During the present investigation efforts were made to document this traditional knowledge and

make it available to the next generation. The use of these agricultural tools and practices along with feed supplements to the drought animals need to be promoted for climate change adaptation and mitigations along with additional improvisation of other agritechniques.<sup>6</sup>

### **MATERIAL AND METHODS:**

**Study area (Hamirpur, Himachal Pradesh):** Himachal Pradesh is endowed with four agro-climatic zones with district Hamirpur located in subtropical climatic zone of Shivalik hills (North-Western Himalaya). The total geographical area of district Hamirpur is 1, 10,070 hectares. Cultivated area constitutes 33.09% of the total geographical area. The area under forest form 18.4% of total geographical area. The cultivable waste land occupies 5.21% and uncultivable waste land covers 19.2Total cropped area is 65.08%.

**Socio-economics:** Socio-economics of Hamirpur district is very diverse. Hamirpur district is inhabited by the people, who have their distinct way of life, language, tradition and cultural heritage. It offers a tremendous scope for anthropological and traditional



agricultural practices. Some of the aspects on their life style and culture are given below:

Language and Dress: Bulk of the people use dialect Pahari which, indeed, is akin to other dialects, spoken in Mandi and Bilaspur areas and the Kangri spoken in Kangra district. There is no such language like community language and all the castes who live in the district speak the same language. The common gent's dress is Kameez and Pyjama. The old people use turban as head-gear or Gandhi cap. Most of the women wear Kameez-Salwar and Chadroo. But, with the extension of education and greater mobility in society, there is a tremendous outside influence on the dress of the people. The ladies still have the liking for ornaments of which most common are *Nath, Chakk, Tikka* and *Ballu*.

**Dwellings:** Generally, the people have *Pukka* houses in the district, mainly in the urban areas but in villages, a majority of natives live in old fashioned *Kucha* houses.

Art & Folklore: The people inherit rich folk literature which is occasionally exhibited during marriages, fairs and festivals. In *Jatras* young girls sing folksongs. Group songs by men locally called 'Jheras' which literally means fight are sung during monsoon season. The most common *Jhera* being *Googa* - a legendary hero. Other *Jheras* sung in the district are Raja Sansar Chand, Raja Bhangal and Raja Sirmaur. It is generally the elderly people who narrate the folktales to youngsters during the winter, sitting around the hearth. Other folk-dance worth-mentioning are *Giddha* of women folk and *Chandrawali* dance of men-folk.

**The Artistic talent:** The artistic talent of the district is very much exhibited in the construct of various temples, palaces, old houses that are existent even today. The temples Narbadeshwar, Gauri Shankar and Murli Manohar built by Raja Sansar Chand are some of the living examples of the artistic talent of the people of this district.

**Social and Cultural events:** The people of Hamirpur district celebrate a good number of fairs and festivals. Some of the important fairs are: Gasota Mahadev fair, holi fair at Tihra sujanpur, Gashian fair, Awahdevi fair and Chaniari Devi fair. Apart from the aforesaid important fairs/festivals other comparatively minor fairs/festivals are: Piplu fair which is held in honour of Lord Shiva, Tauni-Devi fair, Markanda fair and Dei-ka-Naon fair. All these fairs have religious sanctity after them, though, with the passage of time, they

have also become the fairs of commercial importance. Cattle fairs are also held at Chakmoh, Jahu and Dhirad every year which have only commercial significance.

**RESULTS AND DISCUSSION:** The description and use of various tillage implements, indigenous crop production techniques, crop harvesting tools, water conservation techniques, crop protection techniques, post harvest technologies and agricultural byproducts/resource utilization techniques are presented below. The local names of implements and techniques etc. are given in bold italics.

Wooden Plough/ Hall: From the ancient time, in lower parts of Himachal Pradesh wooden plough (Hall) has been practiced to cultivate the fields (Plate 1; Figure 1). Generally, it is made from the species Melia azadarach locally known as darek. The basic components of the plough are a shoe, a share, a body, a handle and a beam. In front end of Fluedi or Phalla (Shoe) a sharpened iron was inserted known as Lohalloo (Share) by which the field were ploughed (Plate 2; Figure 2). Wooden slabs are used to tighten or adjustement of the Lohalloo. At the posterior end of the Hall wooden handle locally called as Lahadii (Handel) of about three feet or more depending upon the size of person operating the plough (Halli) is fitted.

**Neck Yoke** (*Jungra/Jungla*): It is generally made from the wood of *Morus alba* locally known as *Toot*. It is kept upon the shoulders of the two equivalent oxen to drag the *Hall*. To tighten the two bullocks, two bamboo sticks locally known as *Shalein* are used (Plate 1; Figure 3). It has a projection at the centre to which a beam of implements like plough, leveller and harrow etc. are secured by a rope.

*Jottar*: It is a rope made up from the fibres of *Grewia* optiva locally called **Buel**. It is used to bind the **Hall** and **Jungla** by knot of figure eight (Plate 1; Figure 4).

Leveller (*Maidda/Moe*): It is used by the *Halli* to plain and break compact soil structure (Plate 1; Figure 5). It is generally made up from the wood of *Morus alba* or *Salix disperma* or *Albizia lebbeck*. It is used by tying two long ropes, one end of the ropes is tied with *Jungra/Jungla* and another with *Maidda/Moe*. In some parts of the district, Bamboo pole *Bambusa arundinaria* (*Bainzi-ri-Naal*) is also used as substitute of rope.

Mallot (*Parrouta* or *Bhikkar Bhan*): It is used to break clods by women after ploughing with the help of bullocks especially in the paddy growing fields



(Plate 1; Figure 6). It has a wooden block with tapering ends to which a handle is attached. *Prainthh/Prann*: An agricultural article made of mature twigs of bamboo, used for the oxen to be pinned (if they misfit) at the time of logging or ploughing.



Figure 1: Wooden Plough



Figure 3: Neck Yoke (Jungla/Jungra)



Figure 2: Share (Lohalloo)



Figure 4: Rope (Jottar)



Figure 5: Leveller (Maidda/Moe)

**Sickle** (*Darati*): It is used for harvesting of crops (Plate 2; Figure 7).

**Wooden pin** (*Su-aa*): It is a wooden pin made of bamboo and is used to remove the outer covering of maize cobs.

**Chiman/Tamman:** It is an agricultural domestic article which is made up of long culms of bamboo. It is fitted with a special kind of sickle or reaping-hook permanently attached its anterior end. It is used for pegging the unapproachable sides of long flexible trees and Bamboo (Plate 2; Figure 8).

*Kadyathi*: It is a hooked-stick made from the maturetwigs of bamboo and is used for collecting, spreading of grass and hay making during winter season by the natives (Plate 2; Figure 9).



Figure 6: Mallot (Parrouta)

**Bamboo**: Different kinds of agricultural and domestic articles are made up of *Bambusa* sp. (Plate 2; Figure 10) by the people of a particular cast known as "*Bhanjaira*" tribe in Hamirpur district. It is used for making roofs of the house and animal sheds, ladder (*Sangah or Manz*) for doing different activities at heights and also to carry the dead bodies of human beings for funeral through this holy plant. That's why it is called as "Poor man's timber" or "Green Gold". The article prepared from it includes:

**Samll Bamboo Basket** (*Tokru*): Baskets are of different sizes, the small ones, locally called *Tokru* (Plate 2; Figure 11) are used for drawing out grains from *Perru* (a big sized cylindrical bottomed article).



# PLATE 2



Figure 7: Sickle (Darati)



Figure 9: Kadyathi



Figure 11: Tokru

**Middle sized Bamboo Basket** (*Dall*): This middle sized basket is used for carrying grass from fields and also to take cow-dung (*Mail*) to the fields (Plate 2; Figure 12).

**Big Bamboo Basket** (*Khara*): It is the basket of maximum size (Plate 3; Figure 13) and is used to store cooked rice in them during marriage feast and similar other big functions or "*Dhaams*" (Lunch or Dinner). Approximately 40 kg cooked rice can be stored in this at a time.

**Winnower** (*Suplli/Chhaz*): It is a household article used for winnowing, spreading dust and shingles etc. from cereals and pulses (Plate 3; Figure 14). In old times when a function was to be organized in the village like: marriage, mundane and other religious ceremonies, each women of the village vistis to the house concerned with this article and do all the above said activities by singing local folk and religious songs.

**Changaer:** It is used to dry & store homemade materials like **Makris/Bukadian** (pieces of unripe mango for later on uses), **Bhaturoos** (fermented flour Chapattis) and **Badian** (prepared mash flour). People of Himachal Pradesh also use this to put religious materials during various ceremonies (Plate 3; Figure 15).



Figure 8: Chiman/Tamman



Figure 10: Bamboo Thicket



Figure 12: Dall

**Umbrella** (*Obbern*): A unique and rare article for rainy season is the local umbrella known as *Obbern*. It is made by interworking fine strips of the culms, pressing the leaves of *Bauhinia vahli* (*Tour*) between the anterior and posterior strips. It saves the man from heavy showers of rain from head to toe.

# INDIGENOUS CROP PRODUCTION TECHNIQUES:

**Kharip Crop/Maize:** It is an important crop of the district Hamirpur and farmers have evolved unique practices for raising good crops. Some of these practices are:

*Hallod* in Maize: The fields of maize are plough when plants are at knee high stage with the help of wooden plough. The ploughing is done between two rows of maize. This practice helps in thinning of the crop, control of weeds, loosening and partial earthling up of maize and help in drainage of excess water. Locally this practice is called as "*Hallod*".

**Chhamb:** After cultivation of maize; due to light rainfall, uppermost layer of field's soil become compact and thick, and maize seeds do not germinate properly. Since, special nine-fingerts like projection plough have been practiced with bullocks. This spe-



cial plough (Harrow) is locally called as "*Dandalti*" and this practice is known as "*Chhamb*" (Plate 3; Figure 16). It has a wooden plank to which wood/iron

pegs, handle and bamboo shaft are fitted. It is used for breaking soil crust after rain and also for uprooting weeds.





Figure 13: Khara



Figure 15: Changaer



Figure 17: Khatti

### **Rabbi Crop/Rice**

**Direct Seed Rice (DSR) technique**/*Miyann* in Paddy Fields: After 3-4 weeks of direct seed rice (DSR) technique, the fields are flooded with water and plowing is done using wooden plough at wider distance of about 30 cm. and then, planking is done. This practice helps in equal distribution of seedlings, control of weeds and disturbed soil structure help in better tillering, water ponding. Locally this practice is called as "*Miyann*".

### WATER STORAGE TECHNIQUE:

**Khatti:** Water availability is a major problem in lower parts of Himachal Pradesh including Hamirpur district. Plenty of rain water is available in rainy season, but there is scarcity for irrigation, drinking, washing and for animals during other seasons. For making water available for drinking, washing and irrigation, farmers dig rocks to collect percolated water and such structure is commonly known as "*Khatti*" (Plate 3; Figure 17). These are prepared by every household



Figure 14: Winnower (Splli/Chaz)



Figure 16: Harrow (Dandalti)



Figure 18: Trap (Kaddaki)

where in rainwater or sub surface seepage from unconfined aquifer are the main sources of water and it is used for irrigating, kitchen, gardens, drinking and washing during shortage of water.

# WATER CONSERVATION TECHNIQUE:

**Ridge and Furrow Technique:** In Bhoranj and Bijhar blocks of Hamirpur district after completing the sowing of wheat and finally planking the fields, dead furrow across the slope at 2-3 m distance are made. These furrows slow down the speed of runoff water and thus, reduce soil erosion and help in better infiltration of rain water. Thus, the practice helps both in soil and water conservation besides helping in reducing of ground water.

**Patrri/Leaf mulching Technique:** The moisture is conserved through leave mulching commonly known as "**Patrri**". Mulching of leaves, twigs of *Eucalyptus*, *Mangifera indica*, *Dalbergia sisoo* and sometimes other easily available material such as paddy husk etc. are used by farmers. The practice is very old and has



been successful in saving the underground rhizomes of Colocassia (*Colocassia esculenta*), Jinger (*Jingiber officinale*) and *Jimikand* (Elephant foot yam) crops from moisture stress and desiccation from heat of May to June till the onset of Monsoon.

**INTER-CROPPING TECHNIQUE:** From the very ancient time, people have established that the mixed farming and intercropping are very useful for food and income security.

**Intercropping of Maize and Tomato:** Maize is sown at a row distance of 75 cm in the month of June and tomato (tall variety) is planted on ridges in between these rows with onset of Monsoon. Maize plants serve the purpose of staking material as tomato plants are tied with maize using polythene ropes. Maize cobs are harvested in August/September while tomato continues up to October/November. Though, the practice has weakness of being affected by insect-pest diseases in both crops.

**Intercropping of Wheat and Colocasia:** Farmers sow wheat crop behind plough/line sowing (*Kerra* method) in November along with Colocasia. In Wheat crop, one row of Colocasia is sown at a row distance of 45 cm. Normal sowing time of Colocasia is in the month of June. The advantage of this method is that moisture of winter rains is utilized by Colocasia and soon after wheat harvest, Colocasia starts germinating. After germination, earthing up and mixing of farm yard manure (FYM) is intermingled in the Colocasia crop.

**Intercropping of Onion and Ginger:** Onion is grown under rain-fed conditions. Onion is transplanted in December/January depending on rains. Row distance is kept 20 cm. In alternate rows, ginger rhizomes are planted at a depth of 8-10 cm, whereas ginger is normally sown in April/May, and ginger starts germinating. After harvesting of Onion, earthing up of ginger is done and well decomposed FYM is incorporated in soil. Onion leaves after harvests are also utilized as mulch.

# PLANT PROTECTION TECHNIQUES:

**Use of Scarecrow/Effigies:** Wild animals damage the crops during night. To protect crop from these animals, the use of scarecrow/effigies in the fields is very common.

**Use of** *Kaddaki***/Trap:** Bluebull, rabbit, swine etc. cause damage to the crops to great extent. Farmers use

a trap locally called "*Kaddaki*" for catching these animals (Plate 3; Figure 18).

**Controlling Monkey Menace:** In district Hamirpur, monkey menace has assumed serious problems and is one of the major concerns of farmers. The problem is so serious, that in many areas farmers have stopped cultivation of vegetables, fruits and maize. Killing of monkeys is avoided due to social, ethical and religious reasons. In some areas of district, people use their own technique, gram-grain is soaked in water and mixed with pepper-powder and these grains are kept on the entry points of monkeys, as monkeys approach the field, they feel hot and get irritated and fight with each other, they run away from the field and avoid returning on same field.

**Use of ash for insect control:** In most of the vegetable growing areas of district Hamirpur dusting of "*chullah-ash*" on vegetable crops like onion, tomato, cucurbits, okra, brinjal, etc. is very common to protect these crops from insect attack especially chewing and sucking type insects.

**Use of** *Banna***-twigs in paddy:** *Banna* plant (*Vitex negundo*) is commonly found in District Hamirpur. The farmers after transplanting or "*Miyann*" in paddy fields fix 5-10 no. of "*Banna*" twig in about 400 sqm (one kanal) areas. It is believed that this practice protects the crop from insect-pests and epidemic diseases.

# **POST HARVEST TECHNOLOGIES:**

**Storage of Paddy straw/Wheat straw and Grasses:** Since limited area under cultivation, it is essential for the farmers who keep animals also, to preserve the crop-residues like straw of maize, paddy, and wheat. The grasses harvested in the months of October/November are also required to be stored for feeding during lean periods. And grasses are stored in heaps that are locally called as "*Sarloo-ra-kadda*" (Plate 4; Figure 19).

Paddy straw (locally called as Paral) is bulky, it is stored in heaps which are conical in shape are Known as "*Paralla-ri-Kundli*". Similarly, the bundles of paddy straw are taken down from trees as per requirement. Farmers make round hut like structure with locally available materials like bamboo, *Sarkanda/Surrad* (*Saccharum munja*). The wheat straw is filled in it and pressed.

# Use of locally made bins for grain storage:

*Pedu*: In District Hamirpur, bamboo-bins are made, then pasted with cow-dung and used for grain storage.



It is locally called as "*Pedu*" (Plate 4; Figure 20). This pasting makes it air tight and cow dung also acts as repellent to some insect-pests.

**Padolla:** It is made up of mud (earth) called "*Earth-en-padolla*" which is dome shaped about 5 feet in height and 3 feet in width and it is mostly used in district Hamirpur for storing flour of wheat, maize, rice, and Mandal (Millet sps.) cereals (Plate 4; Figure 21). The structure is reported to moderate the temperature, result in insulting effect and also restrict humidity and help in safe storage of flour.

**Local Balance**/*Tarakkadi* and Weights: *Tarakkadi* or local balance is used to measure cereals, pulses and vegetables with local weights (Plate 4; Figure 22). Local weights of soft stones are as equivalent as following:

1 *Paw* = 2.50gm 2 *Sher* = 500 gm *Dosser* = 1 kg *Vatti* = 2 kg *Taddi* = 4 kg *Besar* = 8kg *Mann* = 15 kg



Figure 19: Sarloo-ra-kadda



Figure 21: Padolla



Figure 23: Hand Mill (Chakodu)

**Hand mill (***Chakodu***):** It is locally known as "*Chakodu*" (Plate 4; Figure 23). It is used to grind grains and pulses etc. It consists of two round stones, one of which is having hole at the centre for placing the grains. The upper stone is rotated manually with the help of wooden handle fitted in it.



Figure 20: Bamboo Bin (Pedu)



Figure 22: Local Balance (Trakkadi)



Figure 24: Pestle and Mortar (Okhli)

**Indigenous Pestle and Mortar:** It is locally known as "Okhli" (Plate 4; Figure 24). It is used to process indigenous edible *Seera* (Sweet cuison) after crushing fermented wheat grains with the help of mortar.

Water Mill/Gharat: This is very common in hills and mountains. Flowing water of streams is used for running flour mill to grind grains (Plate 5; Figure 25).



Water is made to fall on the forks of a wooden wheel locally called *Gharat* which gets roasted and in turn, rotated and in turn, rotate one of the two stone wheels or Pestles locally called *Butts*. A Funnel type basket is fixed above these stone wheels, which is filled with grains to be ground. Grains fall in the hole at the middle of the upper rotating pestle at a constant speed and are ground. Flour is collected at the base of the two pestles or stone-wheels. This is an excellent example of utilization of water energy.



Figure 25: Water Mill (Gharat)



Figure 27: Cushion (Binna)

**Binna:** Dried maize-cobes are also woven into cushions that are locally called "**Binna**". These cushions are used for sitting on the ground (Plate 5; Figure 27).

Making cow dung-cake/Gootu: Fresh cow dung is shaped into small flattened circular-discs called Gootu or Uplas, by patting it against the ground and is Sundried and stacked in decreasing order from bottom to top and this special shape is locally called as "Kodi". These cow dung cakes are burnt for cooking, boiling milk, heating water and making food (Plate 5; Figure 28).

**CONCLUSION:** Present investigation is a pioneer attempt to document indigenous practices, agriimplements and other natural resource conservation technologies that are popularly practiced in the study area. Indigenous tools are also considered as heritage tools *and are* economical and easy to operate. Various tillage implements used are: Wooden plough, Neck

#### **RESOURCE UTILISATION TECHNIQUES:**

#### Using paddy straw (*Paral*) for mattress and Maizecob/*Bugg/Fambe* for cushion:

**Straw Bedding**/*Manjjari*: The paddy straw is woven into mattresses with the help of cotton or jute ropes. These mattresses are used as bed by most of rural families especially during winter season. These mattresses are locally called as "*Manjjari*" (Plate 5; Figure 26).





Figure 26: Straw Bedding (Manjjari)



Figure 28: Cow Dung Cake (Gootu)

Yoke, Harrow, Laveller, etc. Indigenous crop production techniques practiced are: intercropping of cereal crop with rhizomes and pulses, DSR, Hallod, etc. Sickle is the most commonly used harvesting tool. Water conservation techniques are: Khatti. Crop protection techniques include: local traps, scarecrow, effigies, etc. Post harvest technologies and agricultural by-products/resource utilization techniques include: storing of grass, storing of grains in **pedu**, making of bedding of paddy straw. Water mills are used for grinding cereals. Most of these agricultural practices and traditional tools/implements are on the verge of extinction and need to be promoted for climate change mitigation and enhancing adaptive capability of farmers.

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