DOCUMENTATION, VALIDATION AND CONTEMPORARY RELEVANCE OF ITK IN AGRICULTURE AND HOMESTEAD AREAS IN KUMAON HILL REGION OF UTTARAKHAND STATE

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THESIS

Doctor of PhilosoPhy In home science

(Home Science Extension and Communication Management)

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DEPARTMENT OF HOME SCIENCE EXTENSION AND COMMUNICATION MANAGEMENT

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Dated: 12 / 05 / 2014

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ABSTRACT

The present study was undertaken with an objective to document and validate the ITK in the areas of agriculture and homestead in Kumaon hill region. An explorative study was conducted in Almora, Nainital and Bageshwar districts of Uttarakhand state. Total 12 villages were taken with 480 respondents. The information on indigenous knowledge was gathered through exhaustive interviews, focused group discussions and PRA technique. Interview schedule was used to collect data from farm families and scientific validation of indigenous practices was done by panel of experts using questionnaire method. Frequency and percentage were used for analysis of data. The findings of the present study indicates that nearly half of the farm men belonged to the age group of 51-60 years and more than half of the women (52.08%) belonged to the age group of 51-60 years. More than half of the male respondents (51.6%) were educated upto middle standard and majority (75.83%) of the female respondents were illiterate. More than 60 per cent of the respondents had agriculture as their main occupation with no subsidiary occupation.

Indigenous agriculture practices having scientific base and contemporary relevance are**:** Practice of keeping land fallow for 2-3 months followed by cleaning, broadcasting of organic manure, ploughing and sowing of seeds ;Ploughing of land several times before the onset of monsoon ;Performed primary and secondary tillage after the harvesting of previous crop ;Nursery bed is covered with paddy straw/ cowdung layer and broadcasting of fully decomposed organic manure in the field ;Hoeing and harrowing practices are performed 3-4 times during plant growth stage and growing of mixed crops in between the main crop ;Keeping the harvested crop in the field for 2-3 days before threshing and grains are sun dried for one week before storage ;Using dried leaves of walnut in paddy and wheat and application of mustard with salt oil for storing pulses.

Indigenous homestead practices having scientific base and contemporary relevance includes**:** *Dal* soup, cooked rice water, mashed rice and banana, mashed green leafy vegetables, *khichdi* and *lapsi* is given to child after six months ;Giving decoction of *tulsi*, carom seeds and ginger in cough and cold and in jaundice buttermilk and cooked black soybean to be given to the child ;Simple diet after 11 days of delivery is given to the women and chilli, spices and fried foods are avoided till six months ;Vegetables like cauliflower, potato and pumpkin is not given to the mother and sexual intercourse is advisable after 3-4 months of delivery ;Intake decoction of fenugreek seeds and *baheda* powder for curing cough and cold ;Consumption of *harad* pods for curing indigestion and constipation ;Bathing drinking of cow urine for removing itching and eczema ;Intake of *gahat dal(Macrotyloma uniflorum)* for dissolving

kidney stone and consumption of finger millet chapattis and foxtail millet for controlling diabetes.

Indigenous agriculture practices having no scientific base are : Planting dense plant population in any direction ; Broadcasting of common salt and ash after first ploughing @ 1 kg/*nali* for killing of white grub ; Stinging nettle and Barberry thorns are kept near the rodent hole for killing them; Burning of fire and smoking during night time to control insect attack.

Indigenous homestead practices having no scientific base are**:** The practice of delivering baby at home with the help of traditional midwives and resting of child and mother in a separate room without proper ventilation and light; Bathing and cleaning of child with luke warm water after 20-30 minutes of birth ;Starting breast feeding 8-10 hours after birth and burying the placenta under green fruit bearing tree by the women ;The practice of drinking one cap brandy and less amount of water after delivery.

Indigenous agriculture practices which need further research are**:** Land preparation and sowing method of *Saie* and *Khaggi dhaan* cultivation performed by the farm families; Sprinkling solution of common salt (250g) at the rate of 2 liters/*nali* in the field for controlling red spot in paddy plant.

Similarly indigenous homestead practices which need further research includes**:** The practice of giving root decoction of *hisalu* and *kaphlya* in curing stomach pain in children; Giving fried rice to women after delivery and massaging with apricot oil; Consumption of grinded roots of *makrujhaar* (*Thalictrum foliolosum*), *gokharu (Tribulus terrestis Linn.)* and *kilmora* in diabetes; Use of *gandrayani (Angelica glauca)* in constipation and practice of giving *timul raita* in diarrhoea; Intake of *geu kakkar (Soena amplexicaulis)* and *nirbisi* plant*(Delphinium denudatum)*in curing stomach pain, *aakashmatri (Cuscuta eurpaea)* for curing psoriases, *againbai (Premna mucronata* Rpxb), *mursagin (Tephrosia purpurea)* and *makrujhar* paste *(Thalictrum foliolosum)*for curing boils and pimples; Apply *pauyoli (Reinwardtia indica)*, *ghangara* (*Pyracantha crenulata)* and *geu kakkar (Soena amplexicaulis)* leaves paste in wounds and cut; Intake of *giloi*(*Tinospora cordifolia)* juice and carom seeds *(Cuminum cyminum)* in menstrual problem; Consumption of roasted raw banana and decoction of *denusha* for curing leucorrhoea; Intake of *indriani(Trichosanthes bracteata)*fruit and *shiwai* leaves*(Vitex negundo* Linn.*)* plant for killing intestinal parasites; The property of *buraansh* to reduce blood pressure, fiddlehead (*liun*) for curing jaundice and constipation and role of foxtail millet in curing measles.

The finding indicates that the practices having scientific base and contemporary relevance must be popularized among general masses whereas unscientific practices need to be stopped and uncertain practices needs further research.

Major advisor **Research Scholar**

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Chapter 1

INTRODUCTION

It is a well known fact that India has a charitable and glorious heritage of past both in richness and variety in performing agricultural tasks and allied practices. In India more than 60 per cent of the population lives in rural areas and are mainly engaged in agriculture for their livelihood (Kala, 2007). Due to spectacular achievements in the field of agricultural sciences, India has been able to reach the stage of self-sufficiency in the agriculture production. In order to enhance food production, India has adopted modern agriculture practices and achieved noteworthy success. But in this step-wise change in want of increased food, fiber and fuel for increasing population, we have overlooked and rejected sustainable natural farming and moved towards exploited type of agriculture with increasing dependency on farm machinery, chemicals, fertilizers and pesticides. Modern practices which are being used in today's world are acting like a slow poison and have created havoc on both man and his surroundings. The result is continuous degradation of environment in terms of increasing green house gases, climate change, depletion of soil fertility, receding water table, ecological imbalance, changing of natural cycles, salinization and alkalinization and above all increased human health problems such as genetic mutation, spreading of severe health effects by the use of contaminated water and agriculture land and over use of insecticides and pesticides. To overcome these serious shortcomings, man has been searching or trying to opt for cheaper, nature friendly, easily approachable alternatives for agriculture production and for that sustainable agriculture is the ultimate solution which ensures pollution free food production and continuation of agriculture with least damage to eco-system. According to Rao (2002), reduced use of synthetic chemical inputs, biological pest control, use of organic manures, soil and water conservation practices, crop rotations, biological nitrogen fixation, etc., are all relevant and important technological components of sustainable agriculture. For achieving the goal of sustainable development in agriculture there is an urgent need to focus our attention towards alternative agricultural practices which are environmental as well as user friendly. Blending of ITK with modern technologies is a better option for sustainable agricultural development. Studies conducted all over the world revealed that many indigenous practices have scientific base and are environment and user friendly.

ITK CONCEPT AND NEED

The advent of the concept of sustainable agriculture in late eighties in Indian agricultural scenario has evoked interest on indigenous technical knowledge (ITK) that has the element of use of natural products to solve the problems pertaining to agriculture and allied activities. This knowledge system is usually not found in written form and is transmitted from generation to generation through word of mouth. It includes concepts, belief, and perception and usually found in various folk forms (Jardhari, 2007; Kareem, 2008).ITK is a community based functional knowledge system, developed, preserved and refined by generations of people through continuous interaction, observation and experimentation with their surrounding environment. It is a dynamic system, ever charming, adapting and adjusting to the local situations and has close links with the culture, civilization and religious practices of the communities (Pushpangadan *et al*, 2002). ITK is based on experiences often tested over long period of use, adapted to local culture and environment, dynamic and changing and lays emphasis on minimizing risks rather than maximizing profits. Indigenous knowledge is a part of the lives of the rural poor; their livelihood depends almost entirely on specific skills and knowledge essential for their survival. The indigenous practices are farmer friendly, socially accepted, economically feasible, environmentally sound and suited to the specific local and environmental conditions. Tikai and Kama (2010) in a study on indigenous knowledge and its role to sustainable agriculture in Samoa recommended proper recording and documentation of indigenous knowledge for agriculture and that it is important to find who knows what in order to tap the right source for data to truly reflect indigenous knowledge in the community. Today, many indigenous knowledge systems are at risk of becoming extinct because of rapidly changing natural environment and fast pacing economic, political, and cultural changes on a global scale. However, many practices disappear only because of the intrusion of foreign technologies or development concepts that promise short-term gains or solutions to problems without being capable of sustaining them. The tragedy of impending disappearance of indigenous knowledge is most obvious to those who have developed it and make a living through it.

1.1 Justification of the study

India has unique and rich cultural diversity and people vary from place to place either living in rural or urban areas. Each region has its own distinctive culture, language and traditional wisdom which separate it from others. Farming system is also region specific as each region has its own local wisdom for performing agricultural operations. *Kumaon* region of Uttarakhand state is having rich store house of indigenous knowledge regarding agriculture

and homestead areas. The wisdom possessed by local inhabitants has emerged as a means to survive under remote, isolated and harsh climatic conditions in the mountainous region. It is believed that for long term security and happy life, the effective method is to adopt local and indigenous practices which are sustainable and create no disastrous effect on environment. Hilly rural people still today depends upon their traditional knowledge that they have learnt from their older generations not only of farming but also of forestry, animal husbandry, homestead and health care areas. This indigenous knowledge provides locally manageable, sustainable and cost effective survival strategies for local community, especially to the poor people who are residing in remote areas and have limited accessibility to modern technologies (Chandola *et al.,* 2011 and Singh and Tyagi, 2014). The problem is that this knowledge is confined only to limited number of people especially old aged persons whereas younger generation is not taking interest in knowing their own rich cultural heritage which is at the threshold of getting lost.

Agriculture is the main occupation and source of livelihood of Himalayan people. Inspite of green revolution in the country, the Himalayan people are still practicing indigenous agriculture and post harvest practices in different crops and managing them effectively for a long period of time. Like agriculture, Himalayan region has great wealth of flora and is characterized by a rich diversity of ethno medicinal plants as well as traditional medicine system. The prevalent practice of herbal remedies has descended down from generation to generation and includes, cure from simple ailments to the most complicated one. Negi *et al*., 2011 reported that in hilly remote region traditional system of medicine is a wise practice of indigenous knowledge system, which has saved the lives of poor people in the region.

Like agriculture and health care practices indigenous practices with respect to child care and postpartum has a strong hold in the area. The *Kumaon* region is also famous for its distinct and impressive festivals, traditions and culture and it's delicious, nutritious, mouth watering dishes. It has a very distinguished traditional cuisine which is highly nutritious, simple to prepare and at the same time appealing to the palate.

These indigenous practices are the products of centuries of accumulated experiences. Despite their importance, ITK practices are neglected and often disregarded on the pretext of being unscientific with no rationality. Indigenous knowledge may have some weaknesses, problems and constraints but it should not be forgotten that farmers have survived in past under extreme conditions based on real knowledge they possess. Documentation of their vital knowledge on different subjects is necessary before the old generation passes away. It

is essential to document and analyze ITK because it may give solution to many of the problems specific to various agro-ecological conditions. Further it is believed that the integration of scientific and traditional knowledge would help to develop technologies which are need based, better problem solving, locally available, easily acceptable, more intelligible, convincing and credible to the rural clientele and due to their being identical and appealing would bridge the technological gap. This will provide scientific explanation to the experientially generated knowledge which in turn will provide sound basis for growth of science. Farmers find the ITKs used by them very beneficial but for enhancing the authenticity of the same and make this knowledge scientifically rational, it becomes necessary to validate the knowledge scientifically (Rizwana and Lyaqet, 2011). In *Kumaon* region little work has been undertaken to document and validate indigenous practices with respect to agriculture and homestead areas. Hence it is high time to undertake a systematic research study in this regard so that the same can be documented among the general mass for its wider applicability, therefore the present study entitled "**Documentation, Validation and Contemporary Relevance of ITK in Agriculture and Homestead Areas in Kumaon Hill Region of Uttarakhand State**" was undertaken with the following objectives.

1.2 OBJECTIVES

1. To explore and document selected indigenous practices prevalent among farm families with respect to
    - Agriculture in selected cereal crops viz, Paddy (*Orizya sativam*), Finger millet (*Elusiene coracana*) and Whole horse gram (*Macryotyloma uniflorum*).
    - b) Homestead area
2. To find out the reasons of using the indigenous practices by rural farm families.
3. To make scientific validation of identified indigenous practices and their contemporary relevance.

1.3 OPERATIONAL DEFINITIONS

Indigenous Technical Knowledge: In the present study Indigenous Technical Knowledge is operationalized as the traditional knowledge which passes from one generation to other among the farm families.

Documentation: In the present study documentation refers to the compilation of information about selected indigenous practices prevalent in the field of agriculture and homestead areas.

Homestead practices: In the present study homestead refers to the practices followed by farm families with respect to post harvest operations, child care and postpartum practices and traditional food habit.

(a) Post harvest operations: It refers to the practices followed by farm families related to threshing, winnowing, drying, dehusking/milling and storage of selected cereals, millets and pulses.

(b) Child care practices: It refers to the practices followed by farm women with respect to child birth, child care, breastfeeding, supplementary food and common child health problems just after birth to two years.

(c) Postpartum practices: In the present study refers to the practices followed by farm women with respect to effective delivery, food avoided, food preferences and rest and relaxation practices just after delivery to six months.

Farm families: In the present study farm families refers to farm women and farm men who are above 40 years of age and belongs to either nuclear or joint family.

Contemporary relevance: It refers to the selected indigenous practices which are being used by the farm families and have relevance in present time.

1.4 **Delimitation of the study**

- The study was delimited to the only three major crops i.e. Paddy **(*Dhaan*),** Finger millet **(*Mandua*)** and Wholehorse gram **(*Gahat*)**.

1.5 **IMPLICATIONS**

- The documentation of selected indigenous practices will be helpful for the personnel and functionaries engaged in generation and transfer of technology among farm families in cataloging the practices otherwise, there is a danger of getting them lost.

- The findings of the present study will help to identify the reasons/logic of using the selected indigenous practices and to know whether the practices have scientific base or not, so that scientific practices could be promoted and unscientific could be checked.

- The findings of the present study will be helpful to the research scientists involve in developing location specific and need based technologies with prepare blending of modern as well as indigenous knowledge system.

Chapter 2

REVIEW OF LITERATURE

One of the most important early steps in a research work is the conducting of the literature review. A comprehensive review of relevant literature is imperative in any scientific investigation. It is designed to identify related research, to set the current research within a conceptual and theoretical context. Besides giving knowledge of work already done in the area and providing insight into the methods and procedure, it provides a basis for operational definition of a major concept. The available review related to the present study has been organised and presented into the following sections:

2.1 Indigenous Technical Knowledge- meaning, importance and need for documentation

2.2 Indigenous Practices related to Agriculture

2.3 Indigenous Homestead practices related to

- 2.3.1 Postharvest Practices
- 2.3.2 Health care Practices
- 2.3.3 Child care Practices
- 2.3.4 Postpartum Practices
- 2.3.5 Food Practices

2.4 Scientific Validation of Indigenous practices related to

- 2.4.1 Agriculture and
- 2.4.2 Homestead areas

2.1 Indigenous Technical Knowledge- meaning, importance and need for documentation

People in different places define indigenous knowledge in different ways, but all have the same focus. It is the local knowledge, which has been institutionalized, built upon and passed from one generation to the next (Odhianbo and Johan, 1990; Osunade, 1992; Warren, 1992).

The World Bank states that IK systems are "at risk of becoming extinct" (World bank, 1999) so there is a need to search for more effective and creative interactions between indigenous knowledge and scientific knowledge systems (Dewalt, 1994).

Indigenous knowledge systems can help in the adoption of technology packages where there is poor cooperation with farmers (Lightfoot, 1995), some more importance of the IK are- i) it provides problem solving strategies for local communities, especially for the poor. ii) It represents an important contribution to global development knowledge. iii) It is relevant for the development process and iv) It is an under-utilized resource in the development process.

Recording and documentation of traditional knowledge requires close participatory interaction with communities, as they help in the identification and preservation of traditional knowledge in various ways. The participation of local communities would also lead to greater use of traditional practices. It is therefore necessary to document such a knowledge base through a properly designed research programme and to analyze their economic, technological and socio-cultural sustainability (Ramakrishnan *et al*., 1998).

The term indigenous traditional knowledge delineates a cognitive structure in which theories and perceptions of nature and culture are conceptualized. It thus includes definitions, classifications and concepts of physical, natural, social, economic, and ideational environments. Indigenous practices can be either an expression or a result of indigenous traditional knowledge, or osmosis of indigenous knowledge with the global scientific knowledge (Brouwer, 2003).

Rural people's knowledge is dynamic and unique to given culture and society. It changes through indigenous creativity and innovativeness as well as through contact

with knowledge system. At present these pass from generation to generation orally and in the wake of intensive interventions are likely to be lost as the people become old and leave the world (Naraina *et al*., 2003).

Traditional knowledge refers to the knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, indigenous knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds (Singh, 2003).

According to Sundamari and Ranganathan (2003), Indigenous Knowledge is an unwritten body of knowledge. It is held in different brains, languages and skills, in as many groups, cultures and environment as are available today.

According to Satapathy and Mishra (2009), ITK collected from the farmers of the different state particularly from tribal farmers needs rationalization, verification and experimentation for common use. Therefore, it is important to bring out publications in very simple language for common use. The sustainability of practices in different field can be achieved to a greater extent through the scientific use of ITK. It is further suggested that younger generation should be trained in ITK.

Indigenous knowledge is found in people’s memories and activities and is expressed in the form of stories, songs, folklores, proverbs, dance myths, cultural values, beliefs, rituals, community laws, local language and taxonomy, agricultural practices, equipments, materials, plant species, and animal breeds (Basu, 2009).

Tikai and Kama (2010) in a study on "Indigenous knowledge and its role to sustainable agriculture in Samoa" recommended proper recording and documentation of indigenous knowledge for agriculture and that it is important to find who knows what in order to tap the right source for data to truly reflect indigenous knowledge in the community when documenting. Majority of the respondents (44 or 92%) claimed to document AIK in paper format. The interview session revealed that in view of the oral nature of indigenous knowledge, documentation process entails recording, usually on tape which is then transcribed and put in paper format. Only four

respondents (8%) reported to have AIK documented in compact disc. It is rather disappointing that despite the present level of information and communication technology (ICT) development, none of the institutes documented AIK in digital format. This is a reflection of the level of ICT adoption in these libraries and the society they are set up to serve.

Indigenous knowledge is different with scientific knowledge that was established by universities and scientific communities. This knowledge is basis for decision making at field of agriculture, health, education, food and natural sources. Indigenous knowledge is set of all knowledge and skills that people enjoy in one geographical area (in one environmental condition), so indigenous knowledge is consequent of indigenous people interaction with their environment (Arjmandi *et al.*, 2011).

The rural farm families are still practicing indigenous methods known to them. This pool of knowledge is of great significance in conserving the environment and maintaining the sustainability of the agricultural production system. ITKs are cheaper and locally available. Thus it can be concluded that indigenous technical knowledge possessed by the farm families shall be identified and given due importance and recognition (Joshi and Singh, 2006; Rhizwana and Lyaqet, 2011).

Villagers in hilly areas are more sensitive to adopt ITK practices as they are far away to recent agricultural as well as social developments. They easily follow the traditional knowledge that they have learnt from their older generations. It is the basis for local-level decision –making in agriculture, health care, food preparation, education, natural resources management, and several other activities in rural communities(Singh and Tyagi, 2014).

2.2 Indigenous Practices Related to Agriculture

Chanu *et al*. (2001) in a study explored some indigenous technical knowledge (ITKs) of ethnic tribes for the management of upland rice against pests and diseases as given below:

- Burning of soil mixed with dried debris in heaps to avoid soil borne plant pathogen vis-à-vis enrichment of soil. Upland rice cultivars often slash the upper portion of the soil along with the plant debris in case of one or two year

jhum fallow site and burn the accumulated soil mixed dried debris in heap at different locations over the field. This practice enables the farmers to get rid of soil borne pest pathogens. These overnight burnt soils mixed dried debris are later spread uniformly over the field which also acts as fertilizer for luxurious growth of the plant.

- Removal of weed pests from upland rice field at regular interval to avoid weed competition with rice and infection by other pests and pathogens. First weeding is done after a month of seed sowing and the weeded grasses were allowed to decomposed in the field between rice seedlings which get gradually decomposed in course of time that provide not only nutrients to the plants but also create unfavourable environment for the incidence of pests and pathogen of rice plants. Second, weeding is done just at the tillering stage (a vulnerable stage for the attack by insect pest -pathogen) which play similar role as that of the first weeding. Third weeding is done just before the ripening stage of rice in order to avoid the sheltering of rodents.

- Farmers in hills make use of plants by placing leaves of *Clerodendron serratum* near the rice field so as to avoid the incidence of insect pests over the rice field. As the leaves of *C.serratum* get decomposed, it slowly emits an unpleasant odour that inhibits the occurrence of pests and pathogen over the field. This practice was noticed in *Kuki* system of upland rice cultivation.

Singh *et al*. (2001) reported that in higher reaches of Pithoragarh district the farmers spread the FYM in a thick layer of mulch after wheat sowing in the month of October. During the winters when the temperature drop, the seed/seedlings were protected by FYM and the moisture retained by it provide conducive environment for germination when the temperature rises.

Singh and Tulachan (2002) reported in a study that wet ploughing loosens and softens the soil there by improves nutrient uptake, water retention, aeration and also improves root growth.

Das *et al.* (2003) in a study on “Sustainable management of land and water resources through indigenous technological knowledge in Orissa” reported that excess water during rainy season was stored in small or big ponds, which is utilized to provide

supplementary irrigation to the crops during *rabi* season. Farmers make earthen bunds around the field for boundary demarcation, control of excess runoff, and conservation of water and some farmers dig small wells in the corner of the field under shallow water table condition for conjunctive use of groundwater and rainwater.

Study further reported that in mixed cropping system among Orissa farmers, more than one crop was cultivated at the same time on the same piece of land. It is considered as a soil conservation and fertility management practice. Some farmers grow traditionally mixed crops or intercrops such as groundnut (*Arachis hypogaea* L.) and pigeonpea (*Cajanus cajan* L.) during *kharif* season to increase rainwater use efficiency and productivity of the land.

Tofinga (2003) reported that mixed cropping is the growing two or more crops simultaneously on the same piece of land with or without distinct row management. Mixed cropping systems create favourable condition for the soil, water, nutrients and provide excellent environmental conservation and sustainability.

Bhagat (2005) in a study on " Indigenous and scientific knowledge of the farmers about various uses of *neem*" reported that 25 per cent farmers used *neem* tree as a wind break, 98.33 per cent for the best utilization of fellow land, 100 per cent to check soil erosion and shadow and 65 per cent to make farm implements. Further study revealed that 75 per cent farmers used *neem* leaves for storage of grains, 98.33 per cent as fertilizer, and 91.66 per cent to avoid mosquito incidence and 72.50 per cent as a medicine for worms.

De and Sarangi (2006) in a study on use of "Indigenous Technical Knowledge in organic agriculture" reported following ITK practices:

- In Rajasthan, soil fertility is renewed by using farmyard manure(cowdung, sheep, goat and camel faecal pellets), wood ash animal urine, growing nitrogen fixing leguminous crops intermixed/intercropped with cereals/oilseeds, allowing certain local weeds and xerophytic plants viz, *bui(Kochia Indica), Fog(Calligonum polygonoids), Kheinp(crotalaria burhia), bordi(zizyphus maruritiana)* to grow undisturbed and maintaining adequate *Khejri* (Prosopis cineraria) tree population (8-12 trees/ha) in the field.

- Beaushening is an old age indigenous method of cultivation practice of rice growing in a risk-prone rainfed low land systems generally followed in certain pockets of Bihar, Jharkhand, Madhya Pradesh, Chhattishgarh, Uttar Pradesh and Orissa. Farmers believe that beaushening loosens soil, controls weeds, achieves desired plant stand and contains moderate level of production with lesser labour inputs than in the transplanted rice.

- In rice, spray with a solution of cowdung prepared by mixing 3kg cowdung in 3 liters of water was effective against the control of rice blast and bacterial blight.

- Use of kerosene is a common practice against control of termites in the field.

- In rice, spraying a solution of 4 liters of cow urine and 10 g asafetida in 10 liters of water repel aphids and jassids.

- *Adi* tribes of *Basar* put five wooden/bamboo sticks randomly in the rice field during flowering stage and place dead frog/dry salted fish/crabs on the stick to attack adult Gundhi bugs.

Joshi and Singh (2006) in a study on "Indigenous Agriculture Knowledge in *Kumaon* Hills of Uttaranchal" reported that the organic manure has been broadcasted in the field before the ploughing of the field. During ploughing the manure get mixed into the soil. In high hills of some villages the manure has been spread over the field. The reason for this practice was to save the sown seed from cold and very low temperature during the winter. For sowing of paddy crops farmer plough the field two times. Where for hardy crops like *Mandua (*Finger millet) single ploughing has been followed, for wheat, mustard, chilly, *Gahat*(a pulse crop),*Bhatt*(Black Soyabean), ploughing has been carried out only once. The seed is treated with the mixture of ash of cowdung and cow urine. Farmers believe that this help in enhancing productivity and minimizing damage to the seed by the pests.

Lal and Verma (2006) reported that farmers manage the paddy insects by sweeping the paddy field with brooms made up of branches of *Vitex Negundo*, which is known to act as an insecticide and enhance growth of paddy. It is practiced throughout the hilly areas of Himachal Pradesh. It is widely used, technically feasible, compatible

with internal resources of the household. It checks insects' pests and, ensures better growth of paddy and increased crop production.

Singh *et al*. (2006) in a study on "Shifting Cultivation in Hilly areas of Manipur" reported that burning of forest bring some changes in the nutrient content of soil. Field preparation differs from place to place, some *jhumias* simply burn the forest and cut down the wood for utilization as fire wood and some wood is left for making bunds to stop the run off soils. Some *jhumias* cut wood and shrubs after burning reserve for fire wood. After digging, they remove the roots of trees and shrubs and the field is ready for sowing. Burns are also made with banana plant and branches of trees.

Mishra *et al.* (2008) reported that the practice of mixed cropping exists in the traditional farming system of *Garhwal* Himalaya. Paddy, millet and pulses are the crops of *Kharif* (April - October) season and wheat, barley, mustard, lentils and peas of winter season. Farmers generally cultivate 10 – 12 staple food crops together in a year to meet their food requirements. This system, locally known as '*Barahnaja'* (which means growing at least 12 staple food crops in a year). This practice is considered beneficial mainly because diverse canopies of a variety of crops help to check the soil erosion, minimize the weed growth and reduce competition for soil nutrients. More emphasis is however given to the leguminous crops, grown either as a crop or as a green manure, for their ability to fix the atmospheric nitrogen. Although, farmers were not aware of the scientific reasons of growing legume crops, they were well aware that legume crops are good for enhancing and maintaining the fertility of soil. They opine that after harvesting leguminous crop, the productivity of crops grown subsequently is high with less application of FYM.

Sen (2008) in a study on "Threatened Indigenous Rice Biodiversity of old Alluvival Region of North and South Dinajpur, West Bengal" stated that Beushening is practices mostly in case of *aus*(most aromatic rice) rice, which is grown by direct sowing. About 30 days after sowing, cross ploughing is done with light country plough under shallow standing water. This practice is done mainly to check the weed problem and for proper crop stand.

Kediyal *et al.* (2009) reported that in Uttarakhand hills spring rice is cultivated to capture the winter moisture. The seed is sown by direct sowing method through broadcasting. Partially decomposed farmyard manure (FYM) is dumped at farm site for complete decomposition and 18-20/ha compost is applied at the time of ploughing. Usually profuse weeds appear during rainy season and weeding is one of the most cumbersome operations in the fields.

Rawat and Sah (2009) in a study on "Traditional knowledge of water management in *Kumaon* Himalayan" reported that the main systems of water harvesting are *gulls, naulas, dharas, lakes, kund, khal,simar or gazar and water mills or gharat. Guls* are for drinking water and for running *gharats. Naulas* are designed to collect water from subterranean springs.

Maruthamuthu and Yuvarni (2011) reported that in land preparation for cultivation of basmati rice, the main field is dry ploughed by farmers 3 weeks before planting and submerged with 5-10 cm standing water. After incorporating 10 tones of green manure, the field is properly levelled. Land preparation in rice is one time ploughing and one time puddling. Field should be flooded atleast 3 days before transplanting. Manuring is done by applying FYM at the rate of 5 tonnes per hectare and vermicompost at the rate of 5 tones per hectare.

Mishra *et al.* (2011) documented Indigenous Agricultural Knowledge of Bihar Farmers in crop management practices.

- Incorporation of paddy, maize and cucurbits stubbles in the field through harrowing increase significant number of earthworms in the field during rainy season.

- Mixed cropping of turmeric (*Curcuma longa*) (haldi) + potato (*Solanum tuberosum*) + chilies (*Capsicum annuum*) gives good production for all three crops in Bihar.

- Spraying of ash mixed with kerosene oil in the morning (except dew condition), will protect paddy from '*Phank*' infestation.

Kanwar and Sharma (2012) in a study on "Rain water harvesting using *Khatri* in Himachal Pradesh" reported that *Khatris* are hand – hewn caves located through seepage from rocks. This rain water harvesting structure is a testimony of the traditional knowledge of people as to how they cope with adverse environment. Two types of *khatris* were used by the farmers in one, rainwater is collected from the roofs of houses through pipes in reservoirs and is used for animals and washing purposes, in second type, rain water is collected by seepage through rocks and is used for human consumption. Local people generally belief that water in a *khatri* is safe as it is stored after filtration through different types of rocks.

Rathore *et al.* (2012) in a study reveal that the age old practice of using common salt for weed control under acidic conditions of *jhum* paddy in north east India is not only effective in minimization of weed competition with cultivated crop (paddy) but also results in comparatively high paddy productivity without having any negative effect on growth, yield and attributes of paddy. The practice of use of salt for weed management is also cost effective compared to other popular practice of weed management like hand weeding.

Ahuja and Ahuja (2013) in a study on "Traditional utilization of paddy straw, husk and bran" reported that Paddy straw is recommended as mulch on paddy fields in Japan, where the air temperature is around 16°C at the time of planting. The straw conserves moisture and improves the physical conditions resulting in conspicuous increase in growth and yield of fruit. It is also used in ponds to reduce algae by changes the nutrient ratios in the water.

Singh and Tyagi (2014) reported that in hilly areas, farmers give equal importance both to rice grain and straw. The upper 8–10 cm tips of rice leaves are cut one month after transplanting. This practice helps in increasing the vegetative growth of the plant; also farmers use the cut leaves as nutritious fodder. Another advantage is control of stem borer. By cutting the leaf tips, unknowingly farmers are also controlling the stem borer population because in the early stage of the crop the insect lays eggs on the tips of leaves.

2.2 Indigenous Homestead Practices

2.3.1 Indigenous Postharvest Practices

Sanadhya *et al.* (2002) in a study on "Indigenous post-harvest management in tribal and non-tribal areas of Rajasthan" reported that to protect food grains from insect infestation, it is essential to dry the produce properly. It was found that 100 per cent respondents of both the areas (tribal and non-tribal) were using sun-drying method, which is a traditional practice and has a scientific rationality. Sun drying has been found effective in protecting grain from insect infestation.

Yadav *et al.* (2003) in study of "Indigenous grain storage practices adopted by farm women" found that majority of farm women (93.5%) used dry *neem* leaves for checking damage of stored food grains by insects, while 89 per cent of the farm women mixed the sand with gram to avoid loss due to *Dhora (Callosobruchus chinensis)* in storage. About one-fourth of the women applied mustard oil for storage of pulses for the control of *Dhora.*

Verma *et al.* (2005) reported that *Duli* is used as storage of cereal in Assam. It is a basket woven with bamboo strips. The container is round in the shape and the inner side is plastered with mud. It is used for storage of paddy in small quantity whereas *Peru* is a traditional bamboo basket that is used by *Dumna* community for storing seeds in Himachal Pradesh. *Peru* is cylindrical or oval in shape and it is kept on a rectangular wooden frame, locally called *tarein*. The inside and outside of the container is plastered with cowdung and dried in sunlight before keeping it inside the room. The lid made out of bamboo is sealed with cow dung. *Peti* is a wooden box that is used for the storage of grains in hilly areas of Himachal Pradesh. These boxes are made of *tuni* (red cedar) or walnut (*Juglans regia*) wood that is not attacked by woodborers.

De and Sarangi (2006) in a study on "Use of indigenous technical/traditional knowledge in organic agriculture" reported the following postharvest practices:

- ITK and post harvest management in threshing -use of paddy threshers, maize shellers, paddy dehusker are common in rural areas even in mechanized agriculture. Still 36.6 per cent tribal population use traditional methods of

threshing or winnowing operation in wheat manually. In maize traditional method of shelling and beating of cobs was followed.

- It has been found that 100 per cent women in Rajasthan use traditional storage structures such as mud bins, stone bins and bamboo bins for storage. Before storage, they used to disinfect the grains with smoke of cowdung cake and *neem* leaves. In Arunachal Pradesh the farmers store food grains and meat near the kitchen where the smoke of burning fire wood penetrates. They also use leaves of *neem or tulsi* on the top of the storage structure to keep free from insect-pest infestation.

Kanwar and Sharma (2006) in a study on "Indigenous crop storage practices", reported that majority of the respondents(93.33%) stated that rice can be stored for 6-7 months by mixing 2-3 bulbs of onion or turmeric in 50 kg of rice or mixing mint(*Mentha longifolia)* leaves. About 50-90 per cent respondents stated that addition of 10-12 roots/leaves of *baren* in 5 kg of rice or placing a piece of asafoetida in rice can avoid insect pest attack. Other methods suggested to store rice includes keeping a pouch of powdered *neem* leaves and mixing 100g salt in 100 kg of rice. Salt helps in reducing moisture and reduces insect pest attack. Rice is also stored in *peru*, a dry bamboo storage structure and plaster the lid with cow dung to make it airtight, *peru* helps in maintaining temperature inside the container and thus reduces spoilage of stored material.

Karthikeyan *et al*. (2006) reported that the practice of storing pulse grains with treatment of oil varied widely among the farmers of Malamanoor village, Mecheri taluk and Salem district. Pulses like black gram, green gram were treated with coconut oil and kept in containers made up of plastic or tin. This treatment helped the farmers in storing pulse grains for a period of 6-8 months without any pest infestation. About 50 ml of oil was enough for treating 1 kg of pulse grains. Oil treatment of pulse before storage increased the storage quality of pulses and prevented the damage caused by storage pest up to 80 per cent. The oil treatment was more effective when the grains were exposed to sun once in five months. Oil being an easily available and cheaper material, it was preferred widely by the poor farmers. Nearly 40 per cent pulse growers in this village had adopted this indigenous storage technology.

Basavaprabhu and Kumari (2007) in a study on "Documentation and validation of conventional seed storage methods in selected Darbhanga district of Bihar state" reported that regarding protection from insect pest and rodent, mixing pulse seed with oil (edible or non edible) before storage were the most common traditional methods practiced by 93 per cent of the farmers. It was followed by storing seeds in wheat straw to control storage grain pest (92%), using container coated with a paste of *neem* leaf or dry *neem* seed kernel powder (85%), addition of dry *neem* leaves and its powder to bags or storage container (86%) and plastering of floor and room in which the seeds are stored with Cow dung (60% farmers).

Gupta *et al.* (2007) reported that turmeric powder mixed thoroughly with rice grains and filled in jute bags/airtight containers can prevent rice from insect attack. The reason was that turmeric has pesticidal, insecticidal, and antifungal properties. It also has hygroscopic and insecticidal properties. Further suggested that mix 5 g of oil and one tsp salt for one kg pulse before filling in airtight containers. Oil is anti-feedent or feeding repellent and lubricating. Salt is hygroscopic and insecticidal and thus protects the pulses from spoilage.

Verma *et al.*(2007) reported that *Kuthar* is an indigenous wooden outdoor grain storage structure that is used in Himachal Pradesh. It is a hut like structure made up of deodar (*Cedrus deodara*) wood. This structure has a partition that makes six to eight open wooden boxes. Each box is used to store an individual item like maize, rajma, dry apple pieces, dry apricot, etc. Each box has the capacity of 0.4 to 0.5 tonnes. These structures are built outside the house and on a raised platform of about 3 to 4 feet from the ground level. The chances of infestation are very less as the structure is airtight. The *kuthar* lasts for 70 to 80 years.

Meena and Dangi (2009-10) in a study on “Traditional wisdom of farmers in the post-harvest technology of food grains” revealed that majority of the farmers used to thresh the wheat crop by means of bullocks. In doing so, animals are required to take hundreds of revolutions around the wooden pole. Regarding winnowing of the food grains, it was found that out of total 150 respondents, 111(74%) preferred the natural wind for separating the grains from the straw. It was also observed that the farmers, who used to thresh the wheat crop with the help of thresher, also need to go for winnowing of food grains with the help of wind. To prevent food grains from insect

infestation it is essential that the produce should be dried properly and for this, cent per cent respondents preferred sunlight for drying.

Mishra *et al.* (2009) in a study on "Storage Techniques" reported that special traditional techniques are strictly followed for safe storage of the traditional food crops. Rice and millets are stored in earthen pots, bamboo baskets and gunny bags covered with straw and plastered with cow dung to make the baskets airtight. Pulses like pigeon pea and black gram were mixed with red soil, dried and then stored in a bamboo basket plastered with red soil and covered with straw and cow dung. Panicles of pop sorghum are normally hung from the roof near the fireplace to keep them free from moisture and insects.

Rizwana and Lyaqet (2011) reported that to save the paddy crop from the attack of Insect/pests in the field, farmers mix kerosene oil with cow dung and straw. Small pellets are made out of this mix and spread in the field. Farmers were found to store the grains in a structure, called *Kothi* made of mud. The size of the *Khoti* depends upon the amount of the produce. In *Tarra* village, respondents used to clean the *Kothi* and sprinkled it with salt water before storing the seeds in it. After sprinkling the water, it is allowed to dry and then paddy grains are kept inside it. Jute bags are placed over the stored grains. A paste of dung and ash is prepared and applied on the top of jute bags so as to seal the *Kothi* and thereby preventing the entry of the pests inside it.

Mehta *et al.* (2012) reported that more than 80 per cent storage bins are made up of wooden material and rest are made of tins. The bins made of wooden splinter are locally known as *Bhakar*. The bins made of Bamboo and *Ningal* are called *Topare* or *Doke*. Grains of cereals, pulses, oilseeds, etc. are treated with cow urine and are dried in shade overnight. These grains are stored in bins along with dry leaves of walnut, *timur(Zanthoxylum armatum),* and *bakain(Melia azedarach)* and sealed with the paste of cow dung and soil mixture to protect from storage pests.

Sundaramari *et al.* (2012) reported that indigenous grain storage structures like *Kulumai, Kaambara, Kudhir* and *Modappanai* provide excellent moist proof environment to the stored grains thereby avoiding the occurrence of pests and diseases rather than controlling them after their attack. Apart from insects and diseases, these

structures also prevent the damage by rats, rodents, etc. These structures are very cheap in both fabrication and maintenance than the modern storage units. Since they are fabricated with organic materials; they do not cause any problem of environmental pollution. Grains stored in these structures are safe for the health of both human beings and animals. As these structures require only the locally available materials and technologies for their fabrication and maintenance, dependence on urban centres is reduced. Common people get easily familiarized with their fabrication, use and maintenance. Seeds stored in these structures are protected for a period of 2-3 yrs.

Singh and Tyagi (2014) in a study on "Popular ITK practices in *Kumaon* region of Uttarakhand" reported that rice stalks are the major source of fodder during winter. After manual threshing, small bundles of the rice stalks are prepared. In the lean months, i.e., winter, when there is acute shortage of fodder, the rice stalk bundles are taken out, chopped, and fed to cattle.

2.3.2 Indigenous child care practices

The findings of Jain (2000) on "Breast feeding practices in rural areas of Bikaner district" reported that child was made to sleep straight on the back as reported by almost all the respondents. The reason put forth by the majority (81.7%) was that the child is very comfortable and sleeps well in straight position (on the back).Further baby may be unable to breathe if made to sleep on stomach (44.7%). It was also a traditional belief that the head of the baby enlarges when he sleeps on side (54.7%).

Thrash and Thrash (2001) reported that a blend of two cloves and garlic should be given with warm water to the children to cure pinworm problem. It is also useful for influenza and fever as the garlic constituents are absorbed directly into the blood stream.

According to NIN (2002) majority of the women breast fed their children up to 18-24 months as according to them it is the traditional practice in their community.

Sinha (2004) in a study reported that when milk of mother is not sufficient then majority of the respondents (81%) gave cow/goat milk and cow/goat milk was diluted with equal proportion of water and milk (1:1) as it helps in easy digestion.

Raven *et al.* (2007) reported in a study that all the families believed that breast milk was the best food for the baby. They said breast milk has enough nutrition for up to four months; promotes immunity in the baby; makes the uterus smaller; is convenient and is easily absorbed. They also noted that breastfeeding helps the relationship between the mother and baby.

According to Gurung (2008) that there are cultural beliefs associated with newborn bathing. In Nepal, bathing a baby soon after birth was widely prevalent because the baby's body was coated with vernix, which is considered dirty. Therefore, bathing a baby soon is a custom followed to purify the baby. People also fear that if the baby's skin is not cleaned soon, the baby will get skin infections. Usually, babies are bathed with lukewarm water after cord cutting and cleaning the spot within half to one hour of duration.

Nagnur *et al.* (2010) reported that *Ghutti* feeding is a traditional child rearing practice widely prevalent in most parts of India. *Ghutti* is a polyherbal combination of spices, dry fruits, nuts, roots and leaves of medicinal plants. Various combinations / ingredients of *ghutti* are prepared by Karnataka rural women viz., *neem* leaf, nutmeg, marking nut, turmeric, clove, long pepper, and sweet flag, ginger, and garlic, *ashvagandha* and rock sugar. This *ghutti* feeding to infants made them strong, put them to sound sleep and enabled them to develop resistance against common disease/ailments.

In a study conducted by Joseph (2013) on "Infant rearing practices in South India" reported that 41.7 per cent mothers exclusively breastfed their infants for 6 months, 39.7 per cent mothers for less than 6 months and 18.6 per cent mothers for more than 6 months and 10.3 per cent mothers discontinued breastfeeding before the end of 1 year. Infant's feds semi solid and solid diet by 57.7 per cent of the mothers. Further stated that oil massage was done using coconut oil and it was given before bathing the infant (97.4%).More than half of the mothers were instilling oil into eyes and ears of the infant which are harmful practice and have to be stopped.

Decoction of "*ajwain*" seeds (*Trachyspermum ammi*) is highly prescribed for infants and children for stomachache. Usually 5–10 tablespoons are given to infants and children after every 2–3 hours until relief. Decoction of aerial parts (leaves, stem,

inflorescence and even seeds) of "*tulsi*" (*Ocimum sanctum*) is highly prescribed for couch and fever. The fruits of "*harad*" (*Terminalia chebula*) are rubbed over a clean stone or in "*kundi*"– a mortar type household article and a pinch of its paste along with lukewarm water is prescribed thrice a day against constipation until relief (Rawat and Kharwal, 2013).

Salvi (n.d.) on "Traditional beliefs and practices regarding newborn care among Postnatal Mothers Residing in Selected Rural areas of Pune District, Maharashtra" suggested that 97 per cent used to massage with sesame seed oil and also applied to baby's skull bones as they believed that massage is useful for baby's skin, keeps the body clean, helps in gaining weight and prevents baby from becoming handicapped, strengthens baby's bones especially skull bones and prevents common cold to baby.

2.3.3 Indigenous Postpartum Practices

According to Gaur (2001), it was reported that during the lactation period foods such as oil, curd, sour foods were avoided by all mothers since they were assumed to be harmful for stitches. Chillies and spices were avoided to prevent loose motions to the baby. Further it was revealed that rice, maize, potato, cauliflower, cabbage, brinjal ere thought to cause flatulence.

Megharaj and Choudhry (2002) in a study on "Dietary practices and macro nutrient intake of women at varying periods of lactation" reported that the traditional supplementary foods are consumed by lactating women upto 40-45 days of lactation after which they returned to normal. They consumed *gur pani(*prepared by boiling jiggery and ghee in water), *haldi jhol*(prepared by boiling sugar, turmeric powder and ghee in water), *ajwain/fikki/kaifal*(prepared by adding *ajwain, jeers, kaifal* i.e. root, jaggery, coconut powder and dry fruits in hot ghee). *Batissa laddoo(* prepared from *ghee, sugar,* jaggery, *gond* and dry fruits) almond *halwa(*prepared from almond, wheat flour, sugar and ghee) and *harisa*(made of ghee, sugar, jiggery, wheat flour and dry fruits). These are consumed on the belief that they increase milk secretion, help in regaining lost strength, regulate blood loss and clear the reproductive system. bindia Sharma thesis.

Sharma (2003) clearly reveal that at the onset of labour pain for an easy and less painful delivery, the *Gaddi* tribal women in Himachal Pradesh used to give strong

kadha of cloves, *jaiphal, mullathi, sonth* and *gur* to women. The respondents believed *kadha* as a type of homely injection used to facilitate easiest and quickest delivery. Out of these 37 per cent respondents used to gave *kadha* with 3 to 4 tsp of *ghee* in it so that child moves downward easily. Few respondents (i.e. only 8%) also reported to gave boiled milk with 2-3 tsp of *ghee*, to provide strength to bear the labour pains by the pregnant women. The amounts of foods were given as per the desire of pregnant lady.

According to Thai *et al*. (2003) traditional postpartum practices are still dominant in contemporary Vietnamese culture and perpetuated by close female family relatives. These practices are embedded by the cultural and social factors. Women believed that certain food might have bad physically or mentally effect to the body, both mother and her child, and in the long run. The typical meal consuming by postpartum mothers was quite simple and comprises rice, boiled *raungot* (one kind of vegetable named *Sauropus androgynus*), and fish sauce. All of food was boiled or cooked without oil/fat. They used lots of vegetable to boil in a small bowl with little of water in order to have a thick soup. Lean pork was mixed with fish sauce and then boiled. Sometimes, they added turmeric in the pork dish to eat. For the drink, postpartum mothers drank warm boiled water but they had to limit as much as possible. Vietnamese women after delivery are encouraged to rest throughout the period regardless of the type of delivery experience. The women during this period do not have to go to the field or they should avoid performing the hard physical activities. It is believed that performing the hard and heavy work could lead to low back pain and prolapsed uterus in the future. The rest and healing after giving birth are also connected with the customs of sexual abstinence. Sexual abstinence is one of prohibitions during the sensitive time of a postpartum woman.

Nagnur *et al*. (2006) in a study on “Indigenous pre- and post- delivery care practices of rural women” reported that to increase the milk secretion there are remedies like fenugreek seeds are soaked in sufficient water and cooked along with rice. This is consumed with salt or with sugar. Other one is, coconut milk is extracted from fresh grated coconut. Rice is cooked in this milk and consumed with either sugar or jaggery. Poppy seeds are soaked in just enough water and ground into a paste. The

paste is boiled in one cup water. Sugar and ghee are added and one cup of this mixture is consumed daily for three days.

Sharma and Verma (2007) in a study on “Indigenous Postpartum maternal and child care practices among Rural Folk of Himachal Pradesh” reported that immediately after delivery, the mother is given half piece of nutmeg (*Myristica fragrans*) to chew which provides warmth and sound sleep. Different types of food preparations served to the mother include *kharani,* which is prepared by boiling *sund,*i.e.,dried ginger(*Zingiber officinale*) and crushed nuts in milk. This preparation is given twice a day up to 11 days after delivery. Another special preparation for the mother is *sund ke ladoo,* which is prepared by roasting semolina, *meethi sauf* (*Foeniculum vulgare*), gum, dry fruits, *aasganda*(*Withania somnifera*), dry ginger powder and sugar powder in pure ghee. Apart from these preparations, *moong dal halwa* and wheat flour *halwa* are also served. Consumption of milk with pure ghee to provide strength and semi-liquid foods like *dalia* and *khichadi* for easy digestibility are also recommended.

Raven *et al.* (2007) in a study on "Traditional beliefs and practices in the postpartum period in Fujian Province, China" reported the common view is that sexual activity should be forbidden during the postpartum period. There were several reasons for this restriction: the woman is weak; she has no energy and is concentrating on looking after the baby; she needs to rest; the scar has not healed; she is still bleeding; and it can cause an infection. Health workers and traditional medicine practitioners supported this restriction. All families followed this restriction for a period ranging from one to three months.

Gupta *et al.* (2009) in a study on “Indigenous foods given to women during lactation” reported that *Sonth Ladoo* prepared from *sonth*(dried ginger), edible gum, ghee, sugar, wheat flour, dry coconut and dry fruits given daily for 15 days improves liver functions hence, increases appetite and thus indirectly improves lactation. *Sonth* is hot in nature and therefore increases blood circulation. It makes ligaments tight. Edible gum helps in resuming menstrual cycle and reduces post-effects of delivery and is lactogenic. It is also effective in reviving strength and health whereas dry coconut is a rich source of calcium and protein, it increases milk production. Ghee provides strength and energy.

Khan and Khan (2012) in a study on "Dietary practices of women at varying periods of lactation" reported that the traditional supplementary foods are consumed by lactating women up to 40 to 45 days of lactation after which they return to normal. They consumed *gur pani, haldi jhol*(prepared by boiling sugar, jaggery, *gond* and dry fruits). These were consumed in belief that they increase milk secretion, help in regaining lost strength, and regulate blood loss and clear reproductive system.

2.3.4 Indigenous Health care practices

According to Bright (2000) mud therapy is regarded as 1000 year old traditional Indian Ayurvedic therapy in which mud paste is applied in different layers on the body for treatment against diseases. Basically Indian rural and tribal people believe that mud has many medicinal properties for all kinds of diseases such as migraine, insomnia, mental disorders, sinusitis, asthma, indigestion, arthritis, spondylitis, sciatica, paralysis, eczema, viral infection and general ill health.

Hegdge (2001) suggested the use of *ajwain (Trachyspermum ammi;ammi;ohm)* seeds for painful menstruation, cardamom(*Elettaria cardamomum)*powder mixed with honey for morning sickness, application of paste of sandalwood and vetiver (*Vetiveria zizanioides)* for reducing stretch marks.

Kumar *et al.* (2002) in a study on "Traditional medicinal plants of Uttaranchal Himalayas" revealed that different plant species are used to cure health problems, among them the major are *Atees's* roots *(Aconitum heterophyllum)* mainly used for stomach and intestinal disorder, *Choru* roots (*Pleurospermum angellcoides*) is used in fever and headache, *Van- kakri* (*Podophyllum hexandrum* Royle) fruit is use to cure skin diseases and *Brahmi* (*Centella asiatica* L.) leaves is used for memory stimulant. The Himalayan tribal communities have been known to cultivate and conserve medicinal plants for centuries. More over they have conserved their natural resources by using their indigenous skills.

Jasrai and Chaplot (2003) in a study on "Traditional knowledge on plant conservation linked to beliefs and religious rites" reported that the dry fruit of *Aegle marmelos (bel)* in decoction is used for diarrhoea and is also a good laxative. The fruit pulp is an excellent cure for dysentery, while unripe fruit is often a miraculous medicine for acute or chronic digestive ailments including constipation, mal absorption, ulceration

and swelling in the intestine. *Ocimum sanctum (tulsi)* is useful in the treatment of various diseases; leaves are very effective in curing cold, cough, sinus infection, chest congestion, and other similar respiratory diseases. Powdered bark of *Cassia fistula* has high medicinal property, and is effective against dysentery, skin disorders and jaundice.

Samal *et al.* (2004) in a study on "Indigenous healthcare practices in central Himalayan region of India" suggested following indigenous practices in different diseases/disorders.

- Vomiting- one onion (*Allium cepa),* leaves of coriander (*Coriandrum satium)* and 5-10 gm of cumin (*Carum carvii)* are ground and mixed to 1to 2 glass of curd. About half tea spoon of salt is added to the mixture and taken twice a day. One or two tea spoon of *gandrani (Angelica glauca)* mixed and ground with water is given to children twice or thrice a day.

- Toothache- paste of salt and mustard oil (*Brasica campestris)* is rubbed/applied on the affected tooth twice a day.

- Joint pain- oil of pine wood (*Pine roxburghii)* is applied on the affected joint in the evening time. Branches of *sisur* or *bichhu (Urtica pavriflora)*with leaves are gently rubbed on joints or muscle having pain.

- Ear ache- a decoction of 5 gm garlic (*Allium sativum)* with 10 g of ghee and 25gm of mustard oil is prepared; 3-5 drops are dropped in to the ear twice a day.

- Urine infection- about 5 gm of seeds of cucumber (*Cucumber sativam)* is crushed and mixed in water. The water is filtered and taken twice a day.

- Burns- about 200 gm of dry leaves of silver oak (*Grewia oppositifolia)* is taken in red hot saucepan, cooled and mixed in 1-2 tsp of mustard oil. The paste thus prepared is applied on the burnt part of the body only during the evening time to clear the burnt spots.

- Jaundice- about 50 to 100 gm of mustard oil is put in a bronze plate. 8 to 10 leaves of *doob* grass (*Cynodon dactylon)* are immersed in the oil and run over

the head of patient again and again by a *vaidya* (local medicine man) for more than 15-30 minutes along with some hymns silently chanted once a day.

- Indigestion- 3-5 fruits of *timul* (*Ficus auriculata* Lour) are boiled in water for 5-10 minutes. The half boiled fruits are further burnt with ash of wood. The fruits are taken, washed and mixed with 1 or half tsp of powder of black pepper (*Piper nigrum)* and mixed in curd. Common salt according to taste is added to this mixture (locally called *Raita)* and is eaten twice a day.

- Dysentery- Rice (*Oryza sativa)* is cooked. Then curd is added to the cooked rice which is recooked for 10-15 minutes. The patient takes the finally cooked item (locally called *jaula).*

- Stone problem- A bowl of *Gahat* pulse is consumed daily.

- Minor eye injury- a chapatti made of flour of Ragi(*Eleucine coracana)* is placed on the affected part of eye.

Joshi and Dhawan (2005) reported that *Swertia chirayita* is a medicinal plant indigenous to temperate Himalaya. Its medicinal usage is reported in Indian pharmaceutical codex, the British and the American pharmacopoeias and in different traditional systems of medicines such as the Ayurveda, Unani and Siddha. Concoction of *chirata* with cardamom and turmeric is given for gastrointestinal infections, and along with ginger it is considered good for fever. When given along with *neem, manjishta* and *gotu kola*, it serves as a cure for various skin problems. It is used in combination with other drugs in cases of scorpion bite.

Sidhu and Kaur (2007) reported indigenous knowledge on home made remedies made by rural women by using medicinal plants for maternal health as follow:

- All the rural women were aware of the usefulness of Jaggery and were also aware that it prevents anemia and controls cough. Majority were aware that it controls cold (98.0%), increase secretion of milk (81.6%), provides strength (81.0%) and induces delivery pains (73.7%).
- ***Awareness regarding Turmeric* (*Curcuma longa):*** Turmeric was also known for most of its uses to all the respondents. All of them were aware that it prevents

infection, controls skin diseases, softens the skin and purifies the blood. Its ability to controls skin allergies was known to 93.0 per cent of the respondents. More than 70.0 per cent knew that it increases appetite (90.3%), heals the cuts and wounds (83.7%) and prevents discoloration of the skin (79.0%). Fifty eight per cent were aware that it prevents acne and pimples.

- ***Awareness regarding Dry Ginger* (*Zingiber officinale*):** Commonly used in Punjabi household and called '*Sundh'* is known for its use for various purposes. More than 90.0 % knew that it controls cough and cold. Its effectiveness in killing intestinal worms and improving digestion was known to 88.0 and 87.0 per cent of the respondents respectively. Nearly seventy per cent were aware that it acts as laxative, improves digestion and controls weight.
- ***Awareness regarding Chebulic Myrobalan* (*Terminalia chebula*):** Commonly known as '*Harad*' in Punjab is known to all the respondents for its effectiveness in cleaning bowel. More than 99.0 % were aware that it controls constipation and promotes digestion (93.1%). Its use in controlling weight, reducing fatness and preventing infection was known to nearly seventy percent of the women.

Balkrishna (2008) revealed secrets of Indian herb and described that *Calotropis procera(Madar,Aak).*The plant has swallow-wort milk is warm, fatty, salty and light. It cures digestive ailments. It is very effective purgative and cures flatulence. Root barks are a cardiac tonic, blood purifier and relieve oedema. It increases the heart beat and contractility. The leaves cures vomiting are purgative and effective in curing breathing problems. Flowers of *Madar* are anthelmintic, and effective in curing cough, bleeding disorders and swelling.

Lal and Singh (2008) documented the medicinal importance of plants used to cure skin disorders by the native people inhabiting Lahaul-Spiti district of Himachal Pradesh. Information on 18 plants, used by the inhabitants for curing different skin disorders including boils and blisters, itching, skin infection, leprosy, skin eruptions, cuts and wounds, were recorded through interview schedules. Singh (2008) reported that *Bergenia ciliata* (*Seel-phoda* and *Pasan-bhed*) roots are used in the treatment of stone in kidney or urinary tract. The plant usually grows on crakes of stones and rocky places.\

Singh (2008) in a study reported that *Bergenia ciliata* (*Seel-phoda* and *Pasan-bhed*) roots are used in the treatment of stone in kidney or urinary tract. The plant usually grows on crakes of stones and rocky places.

Antwal *et al.* (2009) in a study on "Medicinal plants for diabetes" reported that stalk of *Tinospora cordifolia(Geloi)* acts as a anti-diabetic and purifies blood and improves peripheral glucose uptake by drinking one cup juice daily whereas Barotia (2009) mentioned that farmers had adequate adoption regarding *Neem* as tooth brush; act as a mosquito repellent and also found that 54 per cent respondents possessed medium level of scientific knowledge and 21 per cent respondents had low and high level of scientific knowledge about uses of *Neem.*

Pant *et al.* (2009) in a study on "Diversity and indigenous household remedies of the inhabitants surrounding *Mornaula* reserve forest in West Himalaya" reported that *Kala Bhatt dal*(*Glycine max* L.) cures jaundice. Paste of seeds soaked in water for overnight is cooked in the iron vessel (*Karahi*), called *Bhatt ka Dubka* is given to patients, regularly.

Singh and Singh (2009) reported that fermented and filtered juice of *Jamun* (*Syzygium cuminii* Linn.) fruits is given twice a day to the people suffering from acute diabetes.

Logamadevi (2010) reported that ginger is an excellent remedy for morning sickness and motion sickness. It acts as a decongestant. An infusion of fresh ginger helps in sore throat. Ginger can also stop diarrhoea and provide relief from arthritic inflammation. A small piece of ginger can be chewed to relief toothache and mouth ulcers. It aids digestion and eases flatulence and gripping pains. It reduces joint pain i.e. rheumatoid arthritis.

Mariappan *et al.* (2010) mentioned that *Madhuca latifolia* also known as butter tree is indigenous to central India and used in healing power, bronchitis, rheumatism, diabetes, piles, problem of breast milk secretion, bleeding gums, tonsillitis, eczema and skin disorders.

Patil *et al.* (2010) in a study reported that *Bryophyllum pinnatum (panphuti)* leaf paste is given internally as a diuretic and to treat piles and kidney stone. Further *Buteas monosperma(palas)* seed and bark paste prepared from seeds is applied on infected

skin and during headache. Bark powder is used for cough and *vitex negundo (Nirgundi)* leaf and root leaves are boiled with mustard oil and the solution is applied externally for rheumatism; root powder is used for piles. Further reported the importance of *Acacia catechu* (*khair*), the bark powder is used to rub on teeth and gums for related problems. *Terminalia bellirica (behada)* bark is used for piles and headache and used as laxative and hair tonic. Dried fruit is used as astringent and for prolonged dry cough, dropsy and diarrhoea.

Rajendra (2010) reported that Aloe Vera a plaster of leaf is said to be a folk remedy for tumours; the root decoction for stomach cancer. Pulp is used in menstrual suppressions and roots for colic. Parts of plants are chewed to purify the blood. In India traditionally it is being used for piles and rector fissures. It produces pelvic congestion and is used for uterine carminatives. Recent research revealed that through strengthening the T-lymphocyte cells of the body it helps to heal the wounds and improve immunity.

The study conducted by Semwal *et al.* (2010) reported that bulb of *Allium sativum* L.(*Lahsun*)is extracted and mixed with mustard oil and boiled is taken orally as well as applied externally in case of arthritis and joints pain further also reported that *Urtica dioica* L. (*Kandali)* dry leaf extract is taken orally; also useful during joints and muscular pain.

Shah (2010) reported that *Rauvolfia serpentine,* commonly known in India as Sarpagandha is an important contribution of Indian folk medicine to modern medicine. Rauvolfia root is a powerful sedative and it was administered to the victim of snake bite or who had become nervous, shocked, excited, and often got hysterical fits, and in common after-effects of snake bite. Due to its sedative action *Rauvolfia* was used to calm down the victims.

According to Verma *et al.* (2010) *Harad* rubbed with water was also given by rural women (18%) for treating constipation as it helps in easy digestion of food, reduce formation of gas and avoid constipation. Half teaspoon of *harad* powder and one tsp of *ajwain* if taken with water after both the meals helps in curing constipation.

Rawat and Jalal(2011) in a study on "Medicinal plants" reported that *Berberis aristata* is used to cure skin disease, malaria, piles, and eye diseases. *Bergenia Stracheyi* is

diuretic, analgesic and anti-inflammatory and *Cannabis sativa* leaves and seeds are used in headache, healing of wounds and cuts.

Suganyadevi (2011) reported that concoction of *bael* leaves is considered an effective solution for peptic ulcer. The fresh aromatic leaves of *bael* tree are to be soaked in water for more than 10 hours and then the water is strained; this water has to be consumed in the morning on empty stomach to reduce the pain and cure the ulcer. Other benefits of the roots are astringent, bitter and febrifuge and are useful in diarrhoea, dysentery, dyspepsia, stomachalgia, cardiopalmus, weakness, and vomiting, intermittent fever and swelling.

Khare *et al*. (2012) reported that *Utric dioica* or stinging nettle traditionally employed as a folklore remedy for a wide spectrum of ailments. The leaves and roots both are used internally as a blood purifier, diuretic. An infusion of the plant is used for nasal and menstrual haemorrhage, diabetes, rheumatism, eczema, anaemia, hair loss and as an anti-diarrhoeal. Leaves of this plant reported to be hypertensive, anti-inflammatory, to be useful in the therapy of prostatic hyperplasia, diuretic, immune modulator to alleviate rheumatic pain, and to serve as an adjuvant therapeutic agent in rheumatoid arthritis.

Mathur and Joshi(2012) in a study on "Traditional remedies being used in *Tarai* region of *Kumaun"* reported that the important diseases being cured by use of indigenous practices are diarrhoea, heart ailments, cough and cold, fever, piles, high blood pressure, gonorrhea, stone in kidney and urinary bladder, diabetes, jaundice, epitaxis, baldness, for abortion, regaining vitality and as contraceptive. *Tritium aestivum* Linn., *Abelmoschus esculentus* Linn., *Allium cepa* Linn., *coriandrum sativum* Linn., *Musa paradisiaca* Linn. are being used for curing sterility in men. The plants being used for curing baldness are *Coriandrum sativum* Linn., *Lawsonia inermis* Linn. and *Raphanus sativus* Linn. Two plants, *Allium sativum* Linn. and *Rouvolfia serpentina* Linn. are used in high blood pressure. Stone in kidney and in urinary bladder is being treated with two plants *Amaranthus blitum* Linn. and *Coccinia grandis* Linn.. *Asparagus racemosus* Willd. is used in the treatment of diabetes. *Calotropis procera* Willd. is used in Parkinson disease. Leaf juice of *Nerium indicum* Mill. is used in migraine and liver cirrhosis. In Jaundice, *Chenopodium*

album Linn. is reported very effective. *Punica granatum* Linn. and *Coriandrum sativum* Linn. are reported very effective in treating excessive menstruation.

A total of 47 plants species were reported by Rout *et al.* (2012) from North Cachar Hills district of Assam to be used in the treatment of diseases like urinary disorder, diarrhea, malaria, etc. Among the plant types, herbs species were the most frequently used. Ferns also find usage in the traditional healing system. A complete account of species, parts used, mode of preparation and dosage for curing diseases like diarrhea, malaria, jaundice, diabetes, high blood pressure, snakebite, etc. was investigated in detail.

Suthar and Kaushil(2012) in the study on "Traditional medicines for treatment of musculoskeletal problems" reported that rural women basically massage the body with warm oil of *Brassica alba*(mustard oil) and apply the paste of *Mahuwa* fruit, *Gawar* seed, *Alsi* seed, *Gwarpatha* leaves on affected part of the body. Other than this the rural women use the paste of *Arand(Ricinis communis)* , *Neem(Azadirachta)* , *Aak(Calotropis procera), Majul(Iris ensata)* leaves and *Satwari* leaves*(Asparagus racemosus).*Most of these medicinal plants are commonly found near the village in adjoining forest and agricultural areas and wastelands.

2.3.5 Indigenous Food Practices

Shah (2006) in a study on "Black soybean: An ignored nutritious and medicinal food crop from the *Kumaon* region of India" reported that Black soybean *(Glycine max)* is locally known as *bhatt* and is used in the preparation of different types of *daals*. The *Bhatt ka Dubka* is prepared by soaking Black soyabean seeds overnight with a little rice. The next morning, these are ground, in the traditional *sil-batta* or in a blender, into a fine paste, which is then mixed with water and boiled in a *karahi* for about half an hour. In case of *Bhat ka jaula*,seeds are soaked overnight in an iron *karahi*, and then coarsely ground and mixed with half the quantity of water- soaked rice. After adding water, the mixture is boiled and allowed to cook for half or more, until the seeds become well cooked and softened. Served hot, with a paste of fresh *dhaniya(coriander sativam) and kusani(chili)* leaves ground with salt. This is supposed to be the most nutritious preparation of black bean seeds and is often advised in diet management for patients recovering from jaundice.

A study by Sinha and Lakara(2006), identified 43 species of weeds that are commonly consumed by the tribal population, as per their availability. Vegetables eaten are mainly of leafy variety, which grow as wild weeds. It has become their habit and till date, these edible plants are integral part of their diet. During rainy and summer season, when the vegetables are in short supply, people collect various species of edible weeds from their agricultural and non-agricultural fields to supplement their staple food.

Kala (2007) in a study on "Prioritization of cultivated and wild edibles by local people in the Uttaranchal hills of Indian Himalaya" reported that *mandua*(*Elusine coracana)* is still preferred by most of the respondents in all studied districts because of its high nutritional values. Earlier, the local people used to prepare many dishes of *Elusine coracana* including *chapati* and *halwa*. The dishes prepared by *Elusine coracana* is easy to cook and consumed less time and firewood in cooking. Moreover, *Elusine coracana* is also recommended by the traditional herbal healers in curing pneumonia and skin diseases.

Tiwari and Mahanta (2007) reported that in Arunachal Pradesh, black rice beer, *Enong* is prepared from black rice, paddy husk, and *ipoh*(yeast). Paddy husk is allowed to burn in a metal drum over light flame till it is completely burnt. Then the hot burnt husk is mixed with boiled rice and is left to cool. The mixture is fermented and used during religious ceremonies and is often sold in local market.

Apetrei (2012) reported in a study on "Food security and millet Utilization" reported that in Suyalbari area of Almora district, farmers seem to be aware of the health benefits of *madua* – they mentioned that it is rich in calcium, high energy content and that it can be used as heart medicine – while also appreciating the grain for its palatability.

Devi and Borgohain (2012) reported that the indigenous people of Assam relish the leafy vegetable herbs in different ways. *Mandhania (Murraya foetidum)* and *Narasingha(Murraya koenigii)* are used mainly as seasoning in various food preparations. The young leaves and stalks of most of the herbs are cut finely into small pieces and cooked like green vegetables. Herbs such as *pirali paleng (Talinum triangulare), kalmow (Ipomoea aquatic), malbhog sak(Portulaca oleracea),*

bhedailata (Paederia foetida), and *doron (Leucas aspera)* are either cut into small pieces or ground to a paste and mostly prepared with fish as curry. Leaves of some herbs like *kachu(Colocasia esculunta), madhusoleng (Polygonum chinense),* and *mashundari (Houttaynia cordata)* are wrapped with banana leaves along with condiments and smoked . Herbs are often mixed with other vegetables and cooked or a mixed preparation of several herbs is also common. singhal mam c 83.

Devi and Kumar (2012) reported that *Kangshu* is a typical traditional food which is eaten by the *Manipuries*. *Centella asiatica* (Indian pennyworth) is cooked in a pressure cooker up to two whistles after washing with water for the preparation of *kangshu*. Product is cut into small pieces after draining the excess water. *Morok metpa* (mixture of *ngari*, chilli and salt) is added to it and is mixed thoroughly. To add flavour, roasted prawn or fish is added and finally coriander is spread. *Kangshu* can also be prepared by using bamboo shoots instead of *Centella asiatica*. In this case, the bamboo shoots are cut into pieces after washing with running water and kept it overnight, and then the next day it is again washed and cooked in a pressure cooker.

Rapsang and Joshi (2012) reported that preparation of *tungtap* is distinctively different from other fermented fish products such as *ngari* (*Puntius sophore*), *hentak* (*Esomus danricus*) of Manipur. Fishes (*Puntius* spp. and *Danio* spp.) are collected from local rivers from southern parts of Meghalaya like the *Dawki* and *Shella* popularly known as Brahamaputra valley and Bangladesh. These are sundried for 3-4 days and then kept in jute bags. The fishes are salted in salt: fish ratio of 1:10. The dried fish in 30-40 kg batches are supplemented with some amount of fish fats and packed in earthen pots which are sealed using fish scales, mud, oil slurry or polythene sheets to make the earthen pots airtight . The earthen pots are then kept at room temperature (18-28ºC) for 2-6 months. Once the fish fermentation process is complete, it is taken out and sold in the market.

Targais *et al*. (2012) reported that *Chhang* is one of the important and indispensable barley based alcoholic beverage prepared and consumed by the people of Ladakh for centuries. *Chhang* forms a part of socio cultural life and no social activity is completed without the beverage. It quenches thirst, gives energy and provides nutrition. *Kholak* made of *chhang* and barley flour is a preferred food of shepherds. Steps involve in *chhang* preparation includes cleaning and boiling of barley grains,

cooling, addition of starter culture, fermentation, filtration and blending. The beverage was analysed for alcohol content, pH and titrable acidity using standard analytical methods. Results showed that the fermented beverage contains 5-7% alcohol, pH 3.6 to 3.8, acidity 0.55 to 0.65 per cent.

Prasad *et al.*(2010) in a study on “Food Security and Income Generation of Rural People through the Cultivation of Finger Millet in Nepal” revealed that the grain is mainly consumed in the form of porridge and bread but a major part of the produce is utilized for preparing the beverages. Consumption of the grain is considered good for the people suffering from blood pressure, heart diseases, and type II diabetes and is also useful for the development of bone and teeth in children. Its flour was also used in the treatment of allergic conditions, measles, and *ghamaura* (skin disease). Although the crop plays a vital role in food security and also in nutritional security, being a rich source of calcium (Ca) and iron (Fe), it is still considered as a low status food in the society in Nepal. The ethnic group *Kumal* offered the millet recipes to God as an indispensable item during the religious worship in the month of *Magha* (15 January-14 February).

Khandagale and Lawande(2011), in a study on "Pawra tribe" reported that among cereals sorghum, maize, rice are favourites of Pawra tribe and in pulses *moong*, *urad*, *tur* are common in their diet. They also use flesh of goats and poultry.

2.4 Scientific Validation of Indigenous Practices

Every social system has a rich storehouse of knowledge based on its sound beliefs, norms and culture. Indigenous wisdom is unique to a given society; hence, the importance of traditional wisdom cannot be neglected. The indigenous practices if blended/integrated with scientific knowledge will be better problem solving and suitable and easily acceptable to the people. This will also provide scientific explanation to the knowledge gained through experience and prepared a base for further growth of science. Hence during the last few years’ lot of efforts had been made by various researchers to explore the scientific rationale behind the indigenous practices using by farm families in agriculture and allied field.

2.4.1 Agricultural Practices

Gupta and Rajput (2001) reported that Madhya Pradesh has a rich heritage of traditional knowledge and wisdom in agriculture. Use of farm refuses and residues, organic manures, bio-fertilisers, green manuring, mixed cropping, agro-forestry, night-soiling were common as a source of plant nutrients. Use of *Mahua* (*Madhuca letifolia*), *Karanj* (*Pongamea pinnata), Neem* (*Azadirachta indica), Sal* (*Shorea robasta)* cakes for coating of urea and conservation practices such as *Haveli* and *Bandh* cultivation, bunding, mulching for conservation of nutrients and increased nutrient use efficiency. It was further mentioned that the traditional practices adopted by farmers evolved through experiences have scientific rationale and great deal of relevance to available resources and soil and climatic conditions of a particular region.

Das *et al.* (2003) reported in a study on "Sustainable management of land and water resources through indigenous technological knowledge" that field bunding by earthen bunds is a popular method of rain water harvesting. Soil loss through erosion and water loss through runoff from the field can also be effectively checked by making bunds around the field.Further in the lower part of the contour of the sloping land, farmers make diversion channels to carry the water into suitable outlets. The catchments area above these channels is planted with vegetation to check soil erosion. About mulching, is a well-known silviculture practice and is used mainly to retain soil moisture so that the plants can take up the necessary nutrients. It is one of the important soil and water conservation techniques commonly practices by farmers. The soil around the plant is covered with grasses, crop residues, rice straw, plant litter fall, etc. Mulching also regulates soil temperature and increases organic matter of the soil.

Devakumar (2005) in a study on role of *neem* in crop protection and nitrogenous fertilizers reported that powdered *neem* kernel was mixed with wheat seeds in separate jars. Three important stored grains parts, viz. Grubs of the *khapra beetle*(*Trogoderma granarium*) and adults of the larva grain borer(*Rhizopertha dominica*) and the rice weevil (*sitophilus oryazae*) were introduced in the jars. The results showed that powdered *neem* kernel when mixed with wheat seeds at the rate of 1 to 2 parts/100 parts /(w/w) of seeds gave satisfactory protection to the seeds against *S. oryazae, R. Dominica* and *T. Granarium* for at least about 269, 321 and 379 days, respectively. Similar experiments showed that the seeds of munga bean, gram,

cowpea and pea could be effectively protected from the damage by the pulse beetle for about 8-11 months. Scientist clarified that *neem* seeds kernel products such as azadirachtinoids, n*eem* oils and bitter constituents were shown to cause multifarious effects on insect's pests. These actions include insect antifeedant, repellent, chemosterilant, fumigant, insect growth disruption and mortality.

Ayangarya (2006) in a study on "Cowper an organic fungicidal paste" reported that Surapala's Vrikshaayurveda mentions the use of cow dung and cow urine viable for treatment of many diseases of plants. Chakrapani Mishra's Vishvavallabha also mention the vast use of cowdung, cow urine, etc. in treatment of plants. Cowdung is reported to provide a cementic effect when used as a paste due to the mucus present in it. It also has antiseptic property, is rich in bacteria which compete with pathogens and is a good medium of bio control agents. Cow urine has also antiseptic properties. In Arunanchal Pradesh this is now used as an alternative to 'copper oxychloride', usually called 'copper' or 'cowper' in the tribal language.

According to Singh(2007) in low land areas where water logging is the common problem (*Dhari* soil), to avoid the impact of heavy rains during the period of July and August, farmers broadcast a variety of rice seeds possessing early to medium maturing characteristics in dry land and pulverized soil. Generally, planking is avoided using this method. After the on-set of the first monsoon, the soil receiving the first precipitation drop and the seeds get germinated. Before the logging of the water, the crop is ready for harvest (70 days after sowing). This practice is recognized as rational by the agronomist and soil scientist for reasons of energy, time and moisture conservation as well as labour saving.

Nene (2007) reported that cow dung has been used in India for treating seeds for several millennia and continues to be used by small farmers even today. Cowdung from the cattle shed is a mixture of dung and urine, generally in a ratio of 3:1. Cowdung consists of crude fiber, crude protein, and materials which can be obtained in nitrogen-free extracts and either extracts. Cellulose along with lignin makes up most of the crude fiber;hemicelluloses and pentosans are also present in cowdung. The urine portion of cowdung contains nitrogen, potash, and sulfur and only traces of phosphorus.

Kharde and Ahir (2009-10) in a study revealed that Finger millet (*Eleusine coracana* L. Gaertn) is nutritious and even superior to rice and wheat in respect of crude fiber and mineral matter like calcium. It is observed that finger millet is highly nutritious and rich in important vitamins viz., Thiamine, Riboflavin and Niacin. It is interesting to note that the lower incidence of cardiovascular diseases, duodenal ulcer and hyperglycemia (diabetes) are reported among finger millet consumer. Pregnant and lactating women use this finger millet in the form of *lapsi* for increasing milk secretion and to improve the deficiency of haemoglobin, which is lost in delivery.

Sellamuthu *et al.* (2010) reported that mulching is an effective water conservation technique in dry land cultivation. Fine particle organic mulch forms a more complete soil cover than a coarse loose material. Organic mulches decompose with time releasing small amount of nutrients and organic matter to the soil. Mulching helps conserve moisture i.e. 10 to 25 per cent reduction in soil moisture loss from evaporation. Mulches help to keep the soil well aerated by reducing soil compaction that results when rain drops hit the soil. It helps maintaining a more uniform soil temperature and promotes the growth of soil micro-organisms and earthworms.

Chadha(2012) in a study on *Vedic Krishi*: Sustainable livelihood option for small and marginal farmers reported that nutritional analysis of different traditional agricultural inputs along with farm yard manure (FYM) and cow urine was carried out by following the standard procedures. The maximum N content was observed in *Panchagavya* (2.4%) followed by *Compost tea* (1.241%) and *Matka Khad* (1.01%). The comparative N content in FYM and cow urine was 0.60 and 0.98 per cent, respectively. For most of the other nutrients, FYM showed the maximum content percentage. The liquid organic manures were analysed for the microflora present in them by following standard methodologies. Among the different tested organic manures (FYM, cow urine, *Panchgavya, Jeevamrit, Matka Khad, Vermiwash, Compost tea and Beejamrit) Panchgavya* was found to possess highest load of viable bacterial population, *Azotobacter sp. Actinomycetes* as well as phosphate solubilizers. Apart from N, these organisms are also capable of producing antibacterial and anti-fungal compounds, hormones and siderophores. *Matka Khad* promotes the plant growth. Microbial analysis indicated higher count of microbial population including *Actinomycetes, Azotobactor* and Phosphate solublizers, which gave significant higher

yield over control in different crops (knol-khol, onion, garden pea, French bean) and efficacy against different plant pathogens.

Rathore *et al.* (2012) in study reveal that the age old practice of use of common salt for weed control under acidic conditions of *jhum* paddy in north east India is not only effective in minimization of weed competition with cultivated crop (paddy) but also results in comparatively high paddy productivity without having any negative effect on growth, yield attributes of paddy. The practice of use of salt for weed management is also cost effective compare to other popular practice of weed management like hand weeding. The acidic soils of shifting cultivation have not shown any deterioration in its quality but there is need to study the long term effect of use of salt on physico-chemical properties of the soils.

Tilahun-Tadesse *et al.* (2013) in a study on "Effect of hydro-priming and pre-germinating rice seed on the yield and terminal moisture stress mitigation of rain-fed lowland rice" revealed that planting pre-germinated seeds as well as seeds soaked and dried for 24 hrs at the local (farmers') sowing time resulted in significantly earlier seedling emergence, heading, and maturity.

Majumdar *et al.(*2013) reported following indigenous practices under rainfed agriculture in Assam with scientific and experts opinion.

- Chopped pieces of *Kola Kochu(Colocasia esculenta)* and fresh cow dung are applied in standing water in rice field against *N. Depunctalis* pest as it create anaerobic poisonous condition developed in rice microclimate kills the caseworm floating on the water surface.

- Tabacoo leaf decoction is sprayed on the crop against *D. armigera* insect. The alkaline nature of tobacoo leaves helps in controlling *hispa* in rice fields.

- Branches of thorny plants, viz., *bogori(Zizyphus jajuba)* or *kotohi bengena(Solanum khasianum)* are swept over the standing crop(tillering stage) at 4-5 days interval against *D. armigera.* The grubs and pupae of *hispa* get injured and their movements are disturbed while the adults fly away from the field.

- Pulse seeds are coated with pure mustard (brassica sp.) oil at 10 ml and salt 1 tsp per Kg seeds and stored in a closed container or bamboo basket to protect from insects. Scientist remarks that mustard has insect repellent properties, acts as anti-feedant or feeding and lubricating and salt having hygroscopic and insecticidal properties, which protect the pulse seeds from insects damaging.

- Dried cowdung ash is mixed with wheat seeds. Agronomists indicate that dried cow dung ash is desiccative and insecticidal in nature.

- Garlic cloves are placed in different layer of stored rice and the containers is closed tightly. Garlic has insecticidal and antifungal properties.

Michaelraj and Shanmugam (2013) reported the same in a study that millets are grown on poor shallow and marginal soils under rainfed conditions. Some of these are still grown in the hilly areas under shifting cultivation which is one of the most primitive ways of crop production. The soils on which these crops are cultivated have low moisture retention capacity.

Mishra and Rai(2013) in a study on “Use of indigenous soil and water conservation practices among farmers in Sikkim Himalaya” reported that adoption of terrace cultivation, construction of retention walls, bunds, construction and maintenance of waterways, mixed cropping, crop rotation, mulching, agroforestry, and use of farm yard manure are found significantly higher in all ecological zones of the watershed. However, the validation study during the field visit and research findings revealed that most of them are technically effective and at the same time easily replicated by farmers.

2.4.2 Homestead practices

Carlough (1999) in a manual on “Postpartum and newborn care” reported that women should be advised not to have sexual intercourse at all for at least four weeks to two month after delivery. It is important for women not to have intercourse because the cervix is still open during this time, and it is easy for bacteria to get inside the uterus and cause infections. The perineal tissues also need time to heal and the lochia, or bleeding, should stop.

A nutritional analysis of some wild food plants was done by Maundu *et al.* (1999) and then they showed that in many cases the nutritional quality of wild plants is comparable and in some case in even superior to domesticated plants.

Verma *et al.* (2002) stated that the use of cow urine is known to Indians from pre-historic times as it has been described as a substance/secretion with innumerable therapeutic values .Cow urine has immense potential as organic manure and also has as insecticidal, fungicidal and herbicidal properties. Soaking of seeds one night into cow urine diluted with water in 1:1 ratio helps in better and faster germination of wheat. Application of mixture of cow dung, ash and cow urine in equal proportions immediately after irrigation (or at sufficient moisture level) in the field has been found to supply sufficient amount of nitrogen and potassium to wheat crop. This organic mixture should be applied at 15 days interval upto when crops attain a height of 15 inches.

According to Sharma (2003) the practice of giving *Gharlani* and *Ghee* to the lactating mothers was judged as scientific by almost all experts (83.33%). *Ayurveda* on the basis of properties of various ingredients also supports the practice of giving *gharlani* to lactating mother by *Gaddi* women.

According to the report of Ministry of Human Resource Development, Gov. of India (2004) stated that it is important to ensure exclusive breast feeding of all babies as it saves babies from diarrhoea and pneumonia. It also helps in reducing specially the ear infection and risk of attack of asthma and allergies. WHO studies estimates that death rate in babies can go down four times if they are exclusively breastfed for the first six months. Majority of the experts (80%) considered the practices of breast feeding the infants especially the new born on demand (generally 6 to 8 times in 24 hours) as scientific. The reason stated by them that the new born child should be breast fed with the gap of 1 to 2 hours as it completes the child daily requirements whereas all the experts regarding postural position had different views as 30 per cent of them were uncertain about the actual right position i.e. laying or sitting whereas 70 per cent considered sitting position as scientific as there is less chances of throat choking.

Sinha (2004) in a study on “Traditional infant health care practices” reported that for curing diarrhoea the practice of giving *mishri* dissolved in *ajwain* water was

considered scientific by 90 per cent experts as they stated that *ajwain* is antiseptic in nature and thus control the loose motion which is supposed to be due to some bacterial action. Further for curing vomiting the practice of giving powdered cardamom *(choti elaichi)* mixed with honey as they reasoned that *choti elaichi* has an anti-vomiting property, this practice considered scientific by 90 per cent experts. The practice of giving decoction of *tulsi* leaves in measeles was considered scientific by 90 per cent experts as *tulsi* leaves has antiseptic effect due to presence of special essential oils in it. In another practice that was considered scientific by majority of the experts (90%) was massaging of infant body with *jaiphal* burnt in mustard oil in cough and cold and the logic given by them was that in *Ayurveda, jaiphal* is considered as *"Khaphahagna"* meaning capturing the cough. The practice of giving *suhaga*($CaCO_3$) burnt and mixed with honey and giving powder of dried date seed was regarded uncertain by all the experts hence further research is needed.

Sinha *et al*.(2004) reported that *Tinospora cordifolia* commonly known, as "Amrita" or "Guduchi" is an important drug of Indian Systems of Medicine (ISM) and used in medicines since times immemorial. The drug is well known Indian bitter and prescribed in fevers, diabetes, dyspepsia, jaundice, urinary problems, skin diseases and chronic diarrhoea and dysentery. During last two decades, the drug has been subjected to extensive phytochemical, pharmacological and clinical investigations and many interesting findings in the areas of immunomodulation, anticancer activity, liver disorders and hypoglycaemic are reported.

Joshi and Dhawan(2005) stated that according to *Ayurvedic* pharmacology, *chirata* is described as bitter in taste (rasa). The thermal action (*virya*) of *chirata* is defined as cooling (*shita*). *Chirata* is light (*laghu*), i.e. easily digestible, and *ruksha* (dry). These characteristics drain heat from the blood and liver. Concoction of *chirata* with cardamom and turmeric and is given for gastrointestinal infections, and along with ginger it is considered good for fever. When given along with *neem, manjishta* and *gotu kola*, it serves as a cure for various skin problems.

Romano (2005) reported that newborn babies require maintenance of normal skin flora to protect them from infection. Bathing a baby immediately after birth removes the normal skin flora and exposes baby to infection. Infants should be bath after the vernix has absorbed into the skin i.e. after 24 hours as vernix have moisturizing and

hydration factors, anti-infective qualities and the antioxidant qualities which prevent the infant from infection.

Awasthi and Verma(2006) in a study on "Post-delivery care among rural women" suggested that 8-10 leaves of Jasmine *(Jasminum sambac)*, ½ teaspoon cumin *(Cuminum cyminum)* seeds and 4-5 seeds of Blackpepper are boiled in 2 glasses of water to make 1 glass. One glass of the concoction, with the addition of milk is taken daily for three days to control of excessive bleeding. *Ayurvedic* interpretation revealed that both Jasmine and milk are good for controlling bleeding because of their haemostatic, constipating and expectorant qualities. For increasing breast milk secretion 1 tsp fenugreek (*Trigonella foenum-graecum) s*eeds are soaked in sufficient water and cooked along with 1 cup rice. This is consumed with salt or sugar. Ayurveda revealed that both fenugreek and rice have sweet, unctuous, cooling, laxative, and expectorant qualities.

Kanwar and Sharma (2006) suggested that stored rice in *peru*, a dry bamboo storage structure and plaster the lid with cow dung to make it airtight. Scientist state that *peru* helps in maintaining temperature inside the container and thus reduces spoilage of stored material whereas plaster the *peru* with cow dung and dry it properly in the sun then mix 10 kg ash of cow dung cakes in 50 kg seed and cover the *peru* with a lid. The layer of ash on grains inhibits insects from egg-laying. Moreover, *peru* also reduces chances of infestation.

Karthikeyan *el al*. (2006) in a study on “Traditional Storage Structures” reported that farmers of Tamil Nadu traditionally follow a practice of storing grains along with lime powder. In this practice, farmers dusted about 10 gm of lime per kg of grains. After thorough mixing they stored them in jute gunny bags. The limes have a property of emitting irritating odour that repelled insects and prevented the grains from damage. By this way, grains could be stored for even one year. In another practice,pulses like black gram, green gram were treated with coconut oil and kept in containers made up of plastic or tin. This treatment helped the farmers in storing pulse grains for a period of 6-8 months without any pest infestation.

Dhama *et al*.(2008) in a research works carried out by Go-Vigyan Anusandhan Kendra (Cow Science Research Centre) at Nagpur revealed the beneficial properties

of cow urine in the treatment of cancers. Further extensive research on cow urine therapy against fighting cancer was carried out by scientists of Central Institute of Medicinal and Aromatic Plants (CIMAP), CSIR centre at Lucknow, along with collaboration with Go-Vigyan Anusandhan Kendra, Nagpur and confirmed this milestone achievement. Studies highlighted the role of cow urine in treating cancers and also enhance the efficacy and potency of anti-cancer drugs. Recently, this significant achievement has been validated by the grant of U.S. patent (No. 6896907) in the field of treatment of cancers (Amar Ujala, July, 19, 2005). The Indigenous cow urine contains "*Rasayan tatva"*, which is responsible to modulate immune system and act as bioenhancer. Scientists have proved that the pesticides even at very low doses cause apoptosis (cell suicide) in lymphocytes of blood and tissues through fragmentation of DNA. Cow urine helps the lymphocytes to survive and not to commit suicide. It also repairs the damaged DNA and thus is effective for the cancer therapy.

Kumar *et al.*(2008) in a study on "Anti-diabetic activity of Syzygium cumini and its isolated compound against streptozotocin-induced diabetic rats" reported the same that *Syzygium cumini* is widely used traditional system of medicine to treat diabetes in India. The compound 'Mycaminose' and ethyl acetate and methanol extracted produced significant ($p<0.05$) reduction in blood glucose level.

Bashir and Gilani(2009) in a study on 'Antiurolithic effect of *Bergenia ligulata* rhizome: An explanation of the underlying mechanisms' reported that results of the study indicating the presence of antiurolithic effect in *Bergenia ligulata* rhizome against calcium oxalate stones, mediated possibly through a combination of CaC2O4 crystal inhibitory, diuretic, antioxidant and hypermagneseuric effects, rationalize its medicinal use for urinary stone disease.

Mal *et al.*(2010) reported the same that nutritionally finger millet have high micronutrient content, particularly calcium and iron, high dietary fibre, higher amount of essential amino acids and low glycemic index and thus play an important role in the food and nutritional security of the poor.

Srinivas(2010) in a study on 'Anti-nephrolithiatic Potential of *Macrotyloma Uniflorum*' reported the same that urinary stones could be dissolved with aqueous

extract *Macrotyloma uniflorum* and without the aid of surgical intervention. The recurrence of stones could also be prevented to a great extent. Administration of aqueous extract of *Macrotyloma uniflorum* significantly reduced both calcium and oxalate deposition in the kidneys of both preventive and curative groups when compared to their respective controls. This indicates that aqueous extract of *Macrotyloma uniflorum* has beneficial effect in preventing calculi formation.

Upadhyay *et al.(*2010) in a study on "Anthelmintic Activity of the Stem Bark of *Juglans regia* Linn." reported that in traditional literature, it was found that *Juglans regia* Linn. stem bark was used as folk medicine as it has anthelmintic property. Thus, the use of bark powder of *Juglans regia* Linn. showed significant anthelminthic activity against Indian earthworm, Pheretima posthuma. Benzene, methanol and ethanol extracts exhibited significant anthelmintic activity as comparable to that of standard drug Piperazine citrate.

Verma *et al*.(2011) in a study on "Evaluation of Anticarcinogenic and Antimutagenic Effect of *Tinospora cordifolia* in Experimental Animals" reported the same that in Anticarcinogenic studies, C57BL mice which received *Tinospora cordifolia* extract at the dose of 750 mg/kg for 30 days showed increase in life span of animals and tumor size was significantly reduced in *Tinospora cordifolia* treated mice as compared to control. The study further demonstrated that the, *Tinospora cordifolia* prevents the micronucleus formation in dose dependent manner while in melanoma tumor model, *T. cordifolia* have a preventive effect on tumor volume. It also showed that the mean survival time and increased in life span have increased in test group where animals were treated with *T. cordifolia* extracts as compared to control group. In conclusion, the present result suggests anticarcinogenic and antimutagenic activity of *T. cordifolia* extract.

Bhurani(2012) in a study on "Natural benefits of urine therapy" reported that urine contains the chemical compounds which are very essential for the growth and maintenance of the health of human body. Indeed it is best natural tonic available in the world. There are some volatile salts in Urine, which are highly beneficial. These salts powerfully absorbs acids and eradicates most of the diseases in human bodies and as result many troubles of the body are cured from their very roots. Urine is the best remedy for every external and internal disease of the body. It destroys disease of

the eyes, makes body strong, improves digestion and destroys cough and colds. Urine repairs and rebuilds all the vital organs including lungs, pancreas, liver, brain, heart etc. Urine is also effective in dental and other oral troubles.

Mathanghi and Sudha (2012) in a study on "Functional and phytochemical properties of finger millet (*Eleusine coracana*) for health" reported the same that regular consumption of finger millet is known to reduce the risk of diabetes mellitus and gastrointestinal tract disorders and these properties attributed to its high polyphenols and dietary fibre contents. The beneficial effect of phenolics is due to partial inhibition of amylase and α-glycosidase during enzymatic hydrolysis of complex carbohydrates and delays the absorption of glucose, which ultimately controls the postprandial blood glucose levels.

Mehta *et al*.(2012) in a study revealed that indigenous farm practices for protection of seeds as well as grains by using various plant parts, ash, oils, etc. are very old and based on some scientific principles. The use of wooden and cow dung ash and red baked soil as seed dresser because the quantity of silica in these might have deterred the egg formation and larvae feeding. The use of ash and soil as indigenous pesticides is reported in so many literatures. The uses of various plant parts as storage pesticides, because these plant parts emit a pungent type smell. This is because of availability of essential oil in the plant parts.

Motamarri (2012) reported in a study on "Terminalia belerica Roxb.-A Phytopharmacological Review" that in *ayurveda* the drug is classified as an expectorant. It is an integral part of *ayurvedic* laxative formulation, *Triphala* used in treatment of common cold, pharyngitis and constipation.

Arya(2013) in a study on "Major wild edible fruits used by locals of Garhwal Himalaya" reported that seasonal wild edible fruits and vegetables are the additional food supplements for the locals in the Himalayan region. Among them *Myrica esculenta* was highly preferred and used because of its nutritive and antioxidant values. *Rubus ellipticus* and *R. lasiocarpus* were also mostly used after *Myrica esculenta*. Among the total reported species in this manuscript, these three species were highly used and preferred (as rank-I to III) for food substitution and health proposes by locals in both oak and pine zones of the study area.

Butola and Vashistha(2013) reported the same that *Angelica glauca* roots have been indigenously used as spice and medicine in upper Himalayan region. Roots contain valeric acid, angelic acid and angelisine resin and have stimulant, cardioactive, carminative, digestive, sudorific, expectorant and stomachic properties.

Gaidhani *et al.* (2013) study on "Evaluation of some plant extracts for standardization and anticancer activity "findings revealed that *Cedrus deodara* (Roxb.) ex Lamb. and *Berberis aristata* (Roxb.) ex DC. have maximum anticancer activity against 3 cell lines while *Withania somnifera* Dunal and showed activity against two cell lines. In addition to these, *Picrorhiza kurroa* Royle ex Benth. and *Piper longum* L. were found active against only one cell line. These results indicate the potential of Ayurvedic medicinal herbs as anti-neoplastic agents mentioned in the Ayurvedic texts. However, further studies are needed for evaluating their mechanism of action and to isolate the active anticancer compounds responsible for this activity.

Fernándezet *et al.*(2013) in a study on "The human milk microbiota: Origin and potential roles in health and disease" reported the same that human milk is a complex species-specific biological fluid adapted to satisfy the nutritional requirements of the rapidly growing infant. Culture-dependent and -independent techniques have revealed the dominance of staphylococci, streptococci, lactic acid bacteria and bifidobacteria in this biological fluid, and their role on the colonization of the infant gut. These bacteria could protect the infant against infections and contribute to the maturation of the immune system and confers a certain degree of protection against pathogens.

Parvathi (2014) in a article on "Millets- The future foods and farming of India "reported that millets are miles ahead of rice and wheat in terms of their nutritional content. Millets are good sources of minerals and dietary fibre. They are non-glutinous and no acid forming food. Hence, they are soothing and easy to digest. The nutrients in the millets have the capacity for reducing the risk of coronary heart disease, diabetes, tumour incidence, cancer risk, blood pressure and provide gastrointestinal healthy.

From the above review of literature, it is concluded that farming communities living in rural areas have basket full of indigenous knowledge in the field of agriculture and homestead areas and among them many of the indigenous technologies are scientifically validated by experts which have long term sustainability and are environmentally sound.

Chapter 3

METHODOLOGY

Research methodology describes the detail of methods and procedure used in the selection of locale and sample for the present investigation. This chapter of the study also includes the construction and standardization of research tool, methods employed in collection of research data as well as statistical analysis.

The whole study was documented in two phases:

Phase I: Survey work

Phase II: Validation and experimentation of selected indigenous practices

The various methodological details pertaining to the study are given under the following heads:

3.1 Locale of the study

3.1.1 Selection of Districts

3.1.2 Selection of Panchayat Samities

3.1.3 Selection of Villages

3.1.4 Selection of sample

3.2 Selection of ITK areas

3.3 Construction of Tool

3.4 Pretesting of Tool

3.5 Testing of Reliability and Validity of tool

3.6 Procedure of data collection

3.7 Analysis of data

Research Design

Exploratory cum descriptive research design was used to study the indigenous agriculture and homestead practices among farm families.

3.1 Locale of the study

Uttarakhand is divided into four climatic zones i.e. Zone- A (up to 1000m), Zone-B(up to 1000-1500m), Zone-C(15000-2400), and Zone-D(<2400). Agriculture covers 7.81 lakh hectares of land, out of which 4.43 lakh hectares appear to be under hill region, which is around 56.8 per cent of the total agricultural land (Kediyal *et al*.,2009). Presently, the *Kumaon* (or *Kumaun*) region is spread over an area of more than 35,000 sq. kms. and its headquarter is at Nainital (*www.wikipedia.com*). The present investigation was carried out in *Kumaon* hills of Uttarakhand because of following the reasons:

- Most of the area under Uttarakhand State comes under hilly region and farm families are totally dependent upon the indigenous practices in agriculture and allied areas as the modern improved technologies have not yet spread in the *Kumaon* hill region.

- The investigator belongs to the *Kumaon mandal* and well acquainted with the area, dialect (*Kumaouni*), culture and government offices which facilitated in effective investigation with respondents and reliable data collection.

3.1.1 Selection of districts - *Kumaon* region consists of six districts. Out of which five districts namely, Pithoragarh, Champawat, Almora, Nainital and Bageshwar come under hilly region. Out of these five hilly districts three namely; Almora, Bageshwar and Nainital were selected on random basis.

3.1.2 Selection of Panchayat Samities

Indigenous practices followed in agriculture are specific to certain area and locality and remain confined to that particular locality due to several agro-climatic and socio economic considerations.

Almora, Nainital and Bageshwar districts consists of eleven, eight and three panchayat samities, respectively. For the present study two panchayat samities from each district i.e. Takula and Tarikhet from Almora district, Kapkot and Garur from Bageshwar district, and Bhimtal and Okhlakhand from Nainital district were selected on random basis where farming had been carried out in mountains type of situations. Thus total six panchayat samities were taken for the present study (Table 3.1).

3.1.3 Selection of villages

For selection of villages, a panchayat wise list of villages was prepared with the help of block development officer, *tehsildar* and *gram pradhan.* Out of the prepared list, four villages from each panchayat samite were identified on random basis where all three major crops included under the study i.e. paddy, finger millet and whole horsegram were grown. Thus total 12 villages were included in the study.

3.1.4 Selection of sample: To select the sample, a village wise separate list of farm families was prepared with the help of *gram sewak* and *gram pradhan* who were growing all the three major crops included in the study (Paddy, Finger millet and Whole horsegram). From the prepared list 20 farm families who were the head of the family, above 40 years of age and actively engaged in agriculture were selected purposively. Thus total sample constituted 480 respondents (240 farm women and 240 farm men).

3.2 Selection of ITK areas: The selection of ITKs was done in consultation with subject matter specialists in those areas where more ITKs are performed by the farm families. As per the advice of subject matter specialists following ITKs have been identified.

Agriculture area:

The agriculture area included indigenous practices followed by the farm families in the selected crops i.e. Paddy (*Oryza sativa),* Finger millet (*Eleusine coracana)* and Whole horsegram *(Macrotyloma uniflorum)* have been documented from sowing till harvesting.

Table 3.1: Village wise selection of respondents from Almora, Bageshwar and Nainital districts

District	Panchayat Samiti	Village	Farm men and women	Major crops
Almora	Takula	• Basoli • Manan	40 40	**PADDY** 
	Tarikhet	• Naugaon • Bhadgaon	40 40	
Bageshwar	Garur	• Tilsari • Gankhet	40 40	**FINGER MILLET** 
	Kapkot	• Loharkhet • Baishani	40 40	
Nainital	Okhalkanda	• Ratighat • Garampani	40 40	**WHOLE HORSEGRAM** 
	Bhimtal	• Jyolikot • Dogaon	40 40	
TOTAL RESPONDENTS			**480**	

Homestead areas: Indigenous practices pertaining to the homestead areas have been identified in five major aspects i.e.

1. **Indigenous post harvest practices**: It includes documentation of following cereals, millets and pulses grown in the study area.

   - ❖ Cereals: Paddy and Wheat
   - ❖ Millets: Fingermillet, Whole horsegram, Barnyard millet and Foxtail millet
   - ❖ Pulses: Whole horsegram, Blacksoybean and Lentil

2. **Indigenous health care practices**: It includes indigenous health care practices followed by farm families for treatment of following diseases:

   - ❖ Respiratory diseases
   - ❖ Gastrointestinal diseases
   - ❖ Gastroenteritis
   - ❖ Liver disease
   - ❖ Skin related problem
   - ❖ Nervous system related problems
   - ❖ Different body pain
   - ❖ Gynaecology problems
   - ❖ Urinary tract infection
   - ❖ Measles, sunstroke, fracture
   - ❖ Renal calculi problem
   - ❖ Cancer and miscellaneous

3. **Indigenous postpartum practices**- It includes the practices related to mother just after delivery upto six months in the areas of effective delivery practices, indigenous food pattern, food avoided and care of mother.

4. **Indigenous child care practices** -It includes the practices related to child birth, care of new born and health care practices.

5. **Traditional food -** It includes the major traditional food pattern followed by *Kumaon* hill people.

3.3 Construction of Tool

As per the objectives of the study interview schedule was prepared in consultation with subject matter specialists from Maharana Pratap University of Agriculture and Technology, Udaipur from the discipline of Agronomy, Extension Education, Foods and Nutrition and Human Development and Family studies. Apart from that, relevant literature was also reviewed by the researcher. The developed tool consisted of following sections:-

Section -I

This part of the schedule deals with the personal characteristics of the respondents which included information about age, education, caste, family structure, family occupation, housing, land holding, livestock ownership, farm assets, farming experience, organizational membership and information sources used by the respondents.

Section- II

In this section documentation of indigenous practices related to Paddy (*Oryza sativa),* Finger millet (*Eleusine coracana)* and Whole horsegram *(Macrotyloma uniflorum)* was recorded in following components:

- Land preparation and sowing, seed treatment, nutrient management, irrigation, inter-cultural management, mixed cropping, insect-pest management and harvesting of crop.

Section III

This section dealt to indigenous practices followed by the farm families in following homestead areas:

1. **Post harvest practices**: It includes information pertaining to operations like threshing, winnowing, cleaning, drying or dehydration, storage, extraction and milling related to cereals (Paddy and wheat), millets (Finger millet, Foxtail millet and Barnyard millet) and pulses (Blacksoybean, Whole horsegram and Lentil).
2. **Health care practices**: It includes indigenous practices followed by the farm families at household level in different health problems namely: Diabetes, cough and cold, pneumonia; Gastrointestinal diseases- diarrhoea, constipation, dysentery, indigestion; Gastroenteritis- nausea and vomiting; Liver disease- jaundice; Skin related diseases- minor cuts and burn, wounds, pimples, itching by allergic reactions; nervous system related- headache, fever, malaria; Pain- joint pain, stomach pain, tooth pain, eye pain and ear pain ;Gynaecology problems-, Leucorrhea, menstrual problem and other diseases such as urine infection, fracture, foot and mouth cracks, internal parasites, bone fracture, heat stroke, body odour and cancer.
3. **Child care practices (Birth to 2 years)-** Child care practices includes indigenous practices related to child birth, care of new born child, , breast feeding practices, supplementary food and health care practices.
4. **Postpartum practices (Delivery to six months)**- It includes questions related to effective delivery, removal of placenta, first diet given to women, indigenous food preferences, food avoided after delivery, bathing, sexual abstinence and rest and relaxation
5. **Traditional food practices**- It includes the major traditional food pattern among *Kumaon* people.

All the responses were recorded in view of

- ✓ Practices being followed by farm families and
- ✓ Reason of using the indigenous practices by the farm families

Section IV: Scientific validation and contemporary relevance of indigenous practices: A separate questionnaire was constructed after recording and compiling the documented indigenous agriculture and homestead practices. The response was judged on three point

continuum i.e. Scientific, Unscientific and Uncertain. The responses pertaining to contemporary relevance of ITK were recorded from panel of experts on two point continuum i.e Yes or No.

3.4 Pretesting of tool

Prior to administering the schedule among the respondents, it was pretested by administering it among a group of non-sample respondents. Tool was pre-tested with 30 farm families so as to achieve clarity of language, coverage of subject matter and to remove the double barreled questions from the test. The tool was then revised and updated in the light of modification/suggestions received

3.5 Reliability of tool: To measure the reliability of the tool, test retest method was used. The test –retest means administering the same scale or measure to the same respondents at two separate times to test for stability. The question lists were administered to 30 farm families other than the sampled respondents. The scale was re-administered to 30 same groups of respondents after an interval of 20 days. The agreement between the score was obtained from the two applications of the same scale by means of correlation coefficient(r++), which is called coefficient of dependability. The coefficient of correlation between scores was 0.74 which was significant at 1% level of significance.

Validity of the tool

The validity of the test depends upon the fidelity with which it measures what it is expected to measure. To find out the validity of the test, content and construct validity of the test was examined. The selected statements were presented to a panel of judges to find out the validity. Only those items which secured 80- 85 per cent concurrence of expert's opinion were included in the final test.

3.6 Procedure of data collection

The data were collected in two phases

1. **Field survey:** It was conducted by three methods i.e.

    a) Interview technique

    b) Focused group discussion

c) Transect walk

a. Interview technique: Relevant data were collected from the targeted respondents with the help of a well constructed interview schedule. This technique is considered as most appropriate to collect in- depth information from rural farm families, as there was face-to-face interaction between the respondent and the researcher, which facilitated clarification of doubts, if any. The respondents contacted individually and interviewed at their homes and farm situation.

b. Focused Group discussion: The focused group discussion provides a time and cost effective means for collecting qualitative data in a situation where a one-shot collection is needed. In the present study focused group discussion was conducted among 10-15 farm families (Farm men and women) where researcher discussed the different indigenous agriculture and homestead practices being used by farm families with reasons.

c. Transect walk : A transect (transect walk) is a tool for describing and showing the location and distribution of resources, features, landscape, main land uses along a given transect. In present study different key informants were identified such as old people from village community and community representatives for accomplishing transect walk.

From transect walk, following information have been accessed by the villagers like topography, land type, soil-type, vegetation (including plants, herbs and wild species) and major crop of that particular village.

2. Scientific validation and contemporary relevance by panel of experts

Regarding the scientific validation and contemporary relevance of the indigenous agriculture and homestead practices, the questionnaire developed by the investigator was given along with a request letter to the panel of experts, to assess the validity of indigenous practices on three point continuum as scientific, unscientific and uncertain/need more research and have contemporary relevancy(YES or NO). The completed questionnaire was collected back by the investigator.

3.7 Analysis of Data:

(a) Measurement of Variables: The variables were selected on the basis of objectives set forth for the study. Operationalization of selected variables is presented below:-

i) Background information of the farm families:

For categorization of respondents on the basis of their background information i.e. age, education, caste, family structure, land holding, farming experience, family occupation, housing, livestock ownership, organizational membership and information sources, categories made under socio economic scale developed by AICRP, Home Science Extension(1997) were used with modification. The details are given as under:

Age: In the present investigation an effort was made to select only those respondents who were above 40 years of age. Hence, the minimum age observed in the study was 40 years. The responses were categories into 3 equidistant categories as under:

- 40-50
- 51-60
- Above 61 years

Education: It refers to the number of years of formal schooling completed by the respondents at the time of investigation. On the basis of their educational level, the respondents were categorized as follows.

- Illiterate(Who cannot read and write)
- Literate(can read and write)
- Primary
- Middle
- Secondary

Caste: Caste referred to the status accorded to the individual by birth. Three categories were formed.

- Lower caste(Schedule Caste/Scheduled Tribe)
- Backward caste
- Upper caste

Family structure: Considering the family composition of respondents, they were classified into two categories, viz., Nuclear family and Joint family

Land holding: Land holding was categorized on the basis of amount of land in acres possessed by the respondents at the time of investigation into the following categories:

- Marginal : (below 2.5 acres)
- Small :(2.6-5.0 acres)
- Medium : (5.1-10.0 acres)
- Large : (above 10.0 acres)

Farming experience: On the basis of farming experience, respondents were categorized into following three categories.

- Less than 10 years
- 10-20 years
- More than 20 years

Family occupation: On the basis of occupation, the respondents were categorized as under:

- Agriculture alone(main occupation)
- Agriculture +Service
- Agriculture +Business
- Agriculture +Labourers
- Agriculture +Caste occupation

Housing: On the basis of the house they are residing, the respondents were classified into three categories as under:

- Kachha house
- Pukka house
- Mixed house

Live stock ownership: On the basis of possession of livestock by the respondents, three categories were made-

- Small herd size : 1-3 milch animals
- Medium herd size : 4-6 milch animals
- Large herd size : More than 6 milch animals

Organizational membership: It refers to the involvement of respondents in any formal and informal organization as a member or as in office bearer. On the basis of this variable the respondents were categorize in following categories.

- Member of formal organization
- Office bearer of formal organization
- Member of non-formal organization
- Office bearer of non formal organization
- No membership

Information sources: On the basis of information sources used by the farm families for getting information related to farming and homestead areas. The respondents were categorized into two categories.

- Cosmopolite sources and
- Localities sources

(ii) Documentation of Indigenous practices followed by farm families

For documenting the indigenous practices followed by the farm families in area of agriculture and homestead, questions were asked in local *Kumauni* dialect from the farm families in their home and farm condition and responses were recorded in the plain sheet in view of different indigenous practices followed by farm families in selected crops, performing postharvest operations, curing common health problems, child and postpartum care and traditional food practices. The reasons/logic was also asked behind using the particular practices by the farm families.

(iii) Scientific Validation of Indigenous practices

As per the objective of the study, scientific validation of indigenous practices was performed by two ways:

- By panel of experts
- By experimentation of selected ITKs

- **By panel of experts:** For scientific validation of indigenous practices followed by farm families, was done by the panel of 30 experts from the institutes of Vivekananda Krishi Anusandhan Kendra,Almora, Uttarakhand, G.B. Pant University of Agriculture and Technology, Pantnagar, Maharana Pratap University of Agriculture and Technology, Udaipur, Scientists from Central Institute of Medicinal and Aromatic Plants(CIMAP), Bageshwar, Doctors from Patanjali Aarogya Dhaam, Haridwar and Government Ayurveda College, Dehradun.

  The health care practices including medicinal herbs, plant and home remedies for curing health problems were also validated by consulting ayurvedic literature and books i.e. *Material materica, Charak samhita and Dravayagun gyan* .

  The expert's opinion regarding indigenous practices was recorded on three point continuum i.e. scientific, unscientific and unknown. The responses pertaining to contemporary relevance of ITKs were recorded from the panel of experts on two point continuum i.e. YES or NO. Those practices which were considered by all the experts as having contemporary relevance were identified.

- **Experimentation of selected ITKs**

  In order to judge the effectiveness of the indigenous practices an effort was made to undertake experiments of those practices which were most common among the farm families and also have scientific base according to the experts opinion. Total five experiments were undertaken. The details are as under:

  1. Weed management in paddy crop by use of salt solution

  In order to know the effectiveness of the salt solution in checking weed growth in paddy crop, experiment was undertaken on 5×5 feet plot area by taking two groups i.e. experimental and control groups. In experimental group treatment was given to the crop whereas in control group no treatment was given. After completion of the experiment the results of both the groups were recorded and compared.

2. Insect- pest management in paddy by use of fenugreek seeds and cow urine

In order to know the effectiveness of the solution of fenugreek seed and cow urine in checking insect-pest in paddy crop experiment was undertaken on 5×5 feet plot area by taking two groups i.e. experimental group and control group. In experimental group treatment was given to the crop whereas in control group no treatment was given. After completion of the experiment the results of both the groups were recorded and compared.

3. Insect-pest management in wheat grain by using wallnut leaves

In order to control the insect-pest attack in stored wheat grain, experiment was undertaken in experimental group and control group. In case of experimental group wheat was stored by keeping walnut leaves and observed at 3 months interval. In case of control group no treatment was given. The results of both the group were recorded and compared.

4. Pest management in whole horsegram by using mustard oil and salt

In order to control the pest attack in stored pulse grain, experiment was undertaken in experimental group and control group. In case of experimental group 2 kg whole horsegram was stored by mixing the grain with mustard oil and table salt and observed for at 4 months interval. In case of control group no treatment was give. The results of both the group were recorded and compared.

5. Intake of boiled root water of *Silfer* (*Bergenia ciliata* (Haw.) Sternb) in Kidney stone

Effect of *Silfer* root water in kidney stone was judged by conducting the experiments on kidney stone patients. One patient was considered for control group and one for experimental group. The patient of experimental group was instructed to take *silfer* roots water twice in a day for 8 months. Ultrasound of the patient was done by the medical doctor at every two months interval for checking the size of the stone. In case of control group no treatment was given. The results of both the group were recorded and compared.

b) Statistical analysis: After collecting data it is necessary to analyze them with the help of statistics to arrive at proper and adequate conclusion. The data thus collected, coded and transferred on work tables and tally sheets. It was processed, tabulated and analyzed. Following statistical measures were used to analyze the data:

Frequency and percentage: Frequency and percentages were used to categories the respondents for their background characteristics and assess the initial knowledge and practices of farm families.

Chapter 4

RESULTS AND DISCUSSION

This chapter is the most crucial and significant part of the research work. It deals with the findings of the present investigation, which have been arrived at, after subjecting the data to statistical analysis and interpretation. The results so obtained are presented under the following major sections:

4.1 Background Information of Farm Families

4.2 Indigenous Agriculture Practices Followed by Farm Families

- 4.2.1 Indigenous Paddy Cultivation Practices
- 4.2.2 Indigenous Fingermillet Cultivation Practices
- 4.2.3 Indigenous Whole Horsegram Cultivation Practices

4.3 Indigenous Homestead Practices Followed by Farm Families

- 4.3.1 Indigenous Post Harvest Practices in Paddy Crop
- 4.3.2 Indigenous Post Harvest Practices in Wheat Crop
- 4.3.3 Indigenous Post Harvest Practices in Selected Millet Crops
- 4.3.4 Indigenous Post Harvest Practices in Selected Pulse Crops
- 4.3.5 Indigenous Child Care Practices
- 4.3.6 Indigenous Postpartum Practices
- 4.3.7 Indigenous Health Care Practices
- 4.3.8 Indigenous Food Practices of Farm Families

4.4 Scientific Validation of Indigenous Agriculture Practices in Selected Crops

- 4.4.1 Paddy
- 4.4.2 Finger millet
- 4.4.3 Whole horsegram

4.5 Scientific Validation of Indigenous Homestead Practices

- 4.5.1 Scientific Validation of Indigenous Post Harvest Practices
- 4.5.2 Scientific Validation of Storage Practices
- 4.5.3 Scientific Validation of Indigenous Child Care Practices
- 4.5.4 Scientific Validation of Indigenous Postpartum Practices
- 4.5.5 Scientific Validation of Indigenous Health Care Practices
- 4.5.6 Scientific Validation of Indigenous Food Practices
- 4.5.7 Experimentation of Selected Indigenous Practices
- 4.5.8 Contemporary Relevance of Indigenous Practices in Agriculture and Homestead Areas

4.1 Background Information of Farm Families

The sample for the present study consisted of 480 respondents (240 farm men and 240 farm women) who were following the indigenous agriculture and homestead practices. Hence, information pertaining to their background information like age, education, caste, family occupation, family structure, land holding, farming experience, housing, livestock ownership, organizational membership and information sources used by the farm families has been presented in combined manner.

Age: Table 4.1 reveals that nearly half of the farm men belonged to the age group of 51-60 years whereas, 34.5 per cent of the male farmers were above 61 years of age. Regarding age of the farm women, more than half of the respondents (52.08%) belonged to the age group of 51-60 years whereas, 38.33 per cent were in the age group of 40-50 years.

Education: It is evident from the data presented in Table 4.1 that more than half of the male respondents(51.6%) were educated upto middle standard whereas, 30.83 per cent respondents could read and write only. Close observation of the data further indicate that 8.33 and 5.83 per cent male respondents had education upto primary and secondary level, respectively. Regarding education of female respondents' majority (71.66%) was illiterate. Only 17.9 per cent female respondents could read and write only. Data further reveal that only 2.08 per cent female respondents were educated upto secondary level.

Caste: A perusal of data included in Table 4.2 explicate that majority of the farm families (80.20%) belonged to upper caste whereas, 12.5 and 5 per cent of them were from lower (SC/ST) and other backward caste categories, respectively.

Family structure: A perusal of data in Table 4.2 corroborates that majority of the respondents (70.83%) belongrd to joint family and rest of them (29.16%) belonged to nuclear family.

Land holding: Data in Table 4.2 show that majority of the respondents (60.83%) were marginal farmers who possessed the land upto 2.5 acres, 29.79 per cent farm families were in the category of small farmers who possessed the land holding from 2.6-5.0 acres and rest of the respondents (9.37%) had above 5.0 acres of land (medium) and none of the respondents had the land holding above 10.0 acres.

Table 4.1: Distribution of farm families according to their personal characteristics

N=480

S.No.	Variables	Farm Families	
		Farm men n=240 f(%)	**Farm women n=240 f(%)**
1.	**Age(years)**		
	40-50	39(16.25)	92(38.33)
	51-60	118(49.16)	125(52.08)
	Above 61 years	83(34.5)	23(9.58)
2.	**Education**		
	a. Illiterate(Who cannot read and write)	22(9.16)	172(71.66)
	b. Literate(can read and write)	74(30.83)	40(17.9)
	c. Primary	20(8.33)	13(5.41)
	c. Middle	110(51.6)	10(4.16)
	d. Secondary	14(5.83)	5(2.08)

Farming experience: Majority (94.79%) of the respondents had more than 20 years of farming experience whereas, rest 5 per cent had 10-20 years of farming experience.

Family occupation: As far as the occupational status was concerned data in Table 4.2 reveal that majority of the respondents (65.20%) had agriculture as their main occupation with no subsidiary occupation whereas, 15.62 per cent respondents had business along with agriculture as their main occupation. In an informal discussion respondents reported they use to sell milk, vegetables, had small grocery shops and had mills for grinding wheat and pulses.

A close observation of data further indicates that 9.16 per cent respondents were landless labourers in the field of others. Besides this some of the respondents (7.5%) had caste occupation along with agriculture like craftsmanship and blacksmith.A very few respondents (5%) had service in government departments along with agriculture.

Table 4.2: Background information of the respondents

N=480

S.No.	Variables	f (%)
1.	**Caste**	
	a. Upper caste	385(80.20)
	b. Backward caste	35(7.29)
	c. Lower caste(SC/ST)	60(12.5)
2.	**Family structure**	
	a. Nuclear	140(29.16)
	b. Joint	340(70.83)
3.	**Land holding(in acres)**	
	a. Marginal (below 2.5 acres)	292(60.83)
	b. Small (2.6-5.0 acres)	143(29.79)
	c. Medium(5.1-10.0 acres)	45(9.37)
	d. Large(Above 10.0 acres)	0
4.	**Farming experience(in years)**	
	a. Less than 10	0
	b. 10-20	25(5.21)
	c. More than 20	455(94.79)
5.	**Family occupation**	
	a. Agriculture alone	313(65.20)
	b. Agriculture +Business	75(15.62)
	c. Agriculture +Labourers	44(9.16)
	d. Agriculture +Caste occupation	36(7.5)
	e. Agriculture +Service	12(5)
6.	**Housing**	
	a. Kachha	82(17.08)
	b. Pukka	128(26.66)
	c. Mixed	270(56.25)
7.	**Live stock ownership**	
	a. 1-3 milch animals(Small)	445(92.70)
	b. 4-6 milch animals(Medium)	35(7.29)
	c. More than 6 milch animals(Large)	0
8.	**Farm assets**	
	a. Country plough	480(100)
	b. Sickle	480(100)
	c. Axe	480(100)
	d. Hand Hoe	480(100)
	e. Spade	480(100)
	f. Harrow	480(100)
	g. Leveler	480(100)

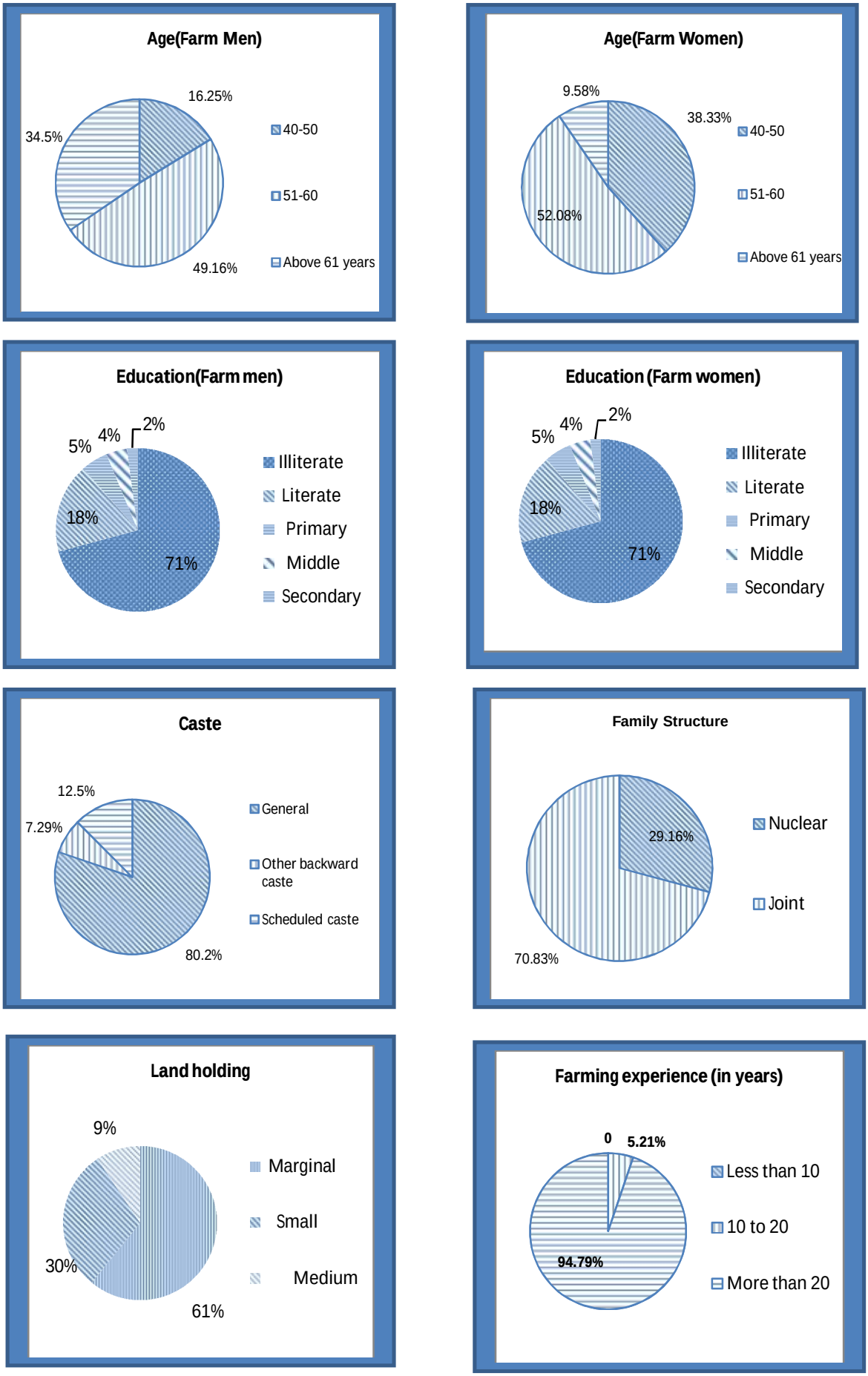


Fig 3a: Background information of the respondents

Housing: Regarding housing it was found that more than half of the respondents (56.4%) had mixed houses followed by 26.66 per cent respondents had *pukka* houses. Similarly 17.08 per cent respondents had *kachha* houses made up of stone and plastered with mud and cow dung (Table 4.2).

Livestock ownership: Majority of the farm families (92.70%) possessed 1-3 milch animals i.e. cow, buffalo and goat whereas few respondents (7.29) possessed 4-6 milch animals and none of the respondents had large size of livestock ownership.

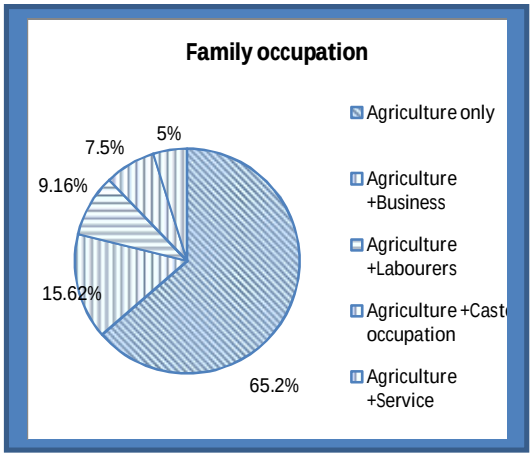
Farm assets: Regarding farm assets it was found that cent per cent respondents (100%) possessed all type of farm implements like country plough, sickle, axe, hand hoe, spade, harrow and leveler.

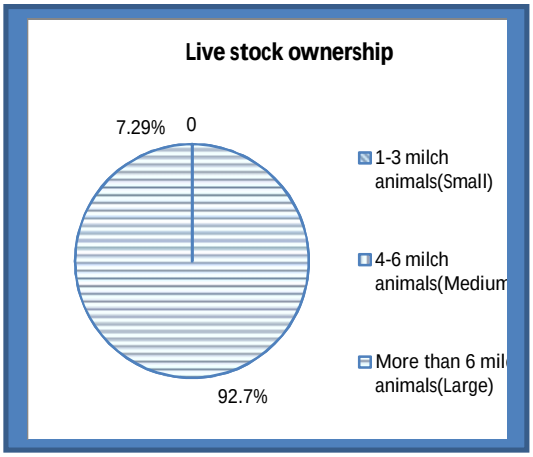
Organizational membership: Table 4.3 reflects that 32.08 and 21.66 per cent farm men and women have membership of formal organization, respectively whereas some of the male respondents(6.25%) were member of non formal organization and majority of the male and female respondents (61 and 62 per cent) had no membership in any organization respectively. Table further shows that 15.41 per cent female respondents had membership of non formal organization.

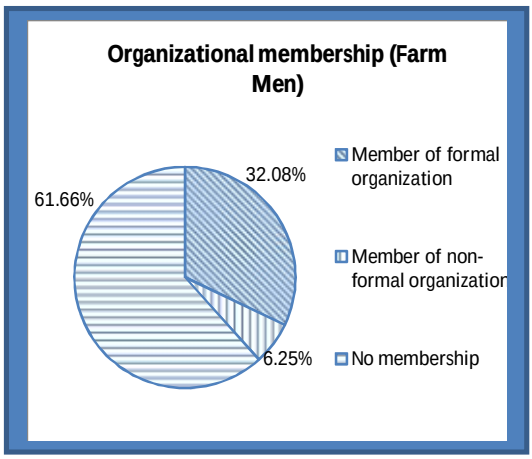
Utilization of information sources by farm families in agriculture: Information sources utilized by the farm families for getting agricultural information was recorded in two categories i.e. localite and cosmopolite.

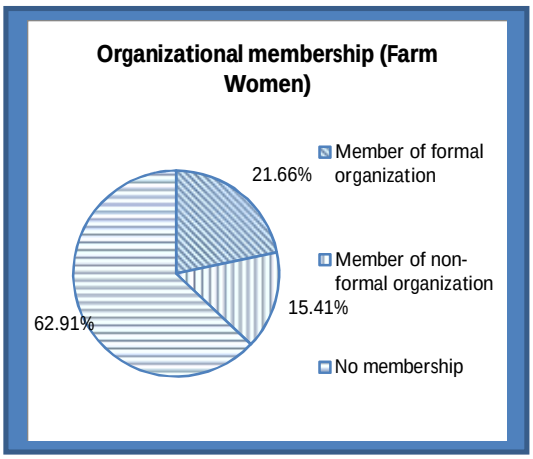
Data in Table 4.4 show that 59 and 25 per cent of male and female respondents depended on local / opinion leaders for getting agricultural information respectively, besides this more than one fourth of the farm families(men and women) (29.16%) took advice of veteran or old aged persons for sharing agricultural problems as they are experienced and possess good wisdom of knowledge related to agriculture and allied areas, 16.66 per cent of the male respondents listen the advice of *gram pradhan* for clarification of their doubts.

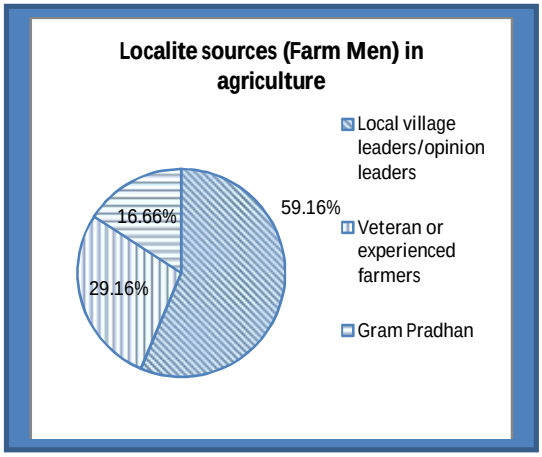
Further Data clearly reveal that cosmopolite sources of information were utilized by very few farm families. For solving their agricultural problems critical examination of data reveal that 18.75 and 4.16 per cent male and female respondents used to contact personnel from agriculture department respectively whereas 3.33-6.66 per cent male respondents contacted either KVK personnel or NGO workers in case of agricultural problems.

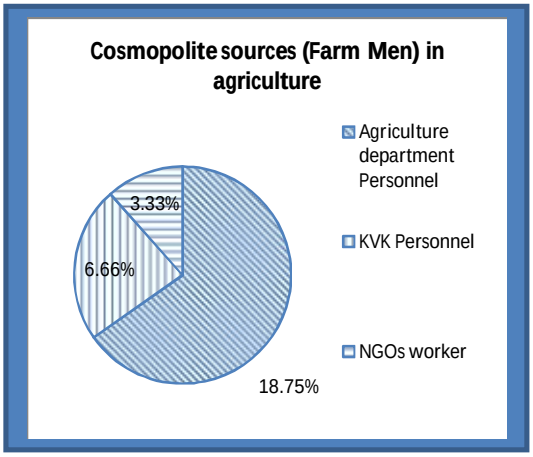

Family occupation
Agriculture only
Agriculture +Business
Agriculture +Labourers
Agriculture +Cast occupation
Agriculture +Service
5%
7.5%
9.16%
15.62%
65.2%

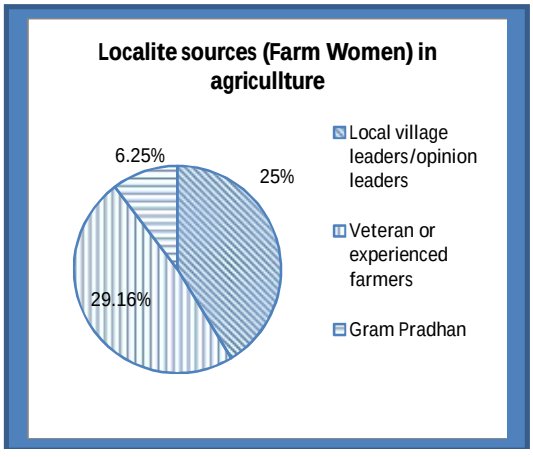

Live stock ownership
1-3 milch animals(Small)
4-6 milch animals(Medium
More than 6 mil animals(Large)
7.29%
0
92.7%


Organizational membership (Farm Men)
Member of formal organization
Member of non-formal organizatior
No membership
32.08%
61.66%
6.25%


Organizational membership (Farm Women)
Member of formal organization
Member of non-formal organization
No membership
21.66%
15.41%
62.91%


Localite sources (Farm Men) in agriculture
Local village leaders/opinion leaders
Veteran or experienced farmers
Gram Pradhan
59.16%
16.66%
29.16%


Cosmopolite sources (Farm Men) in agriculture
Agriculture department Personnel
KVK Personnel
NGOs worker
3.33%
6.66%
18.75%


Localite sources (Farm Women) in agricullture
Local village leaders/opinion leaders
Veteran or experienced farmers
Gram Pradhan
6.25%
25%
29.16%

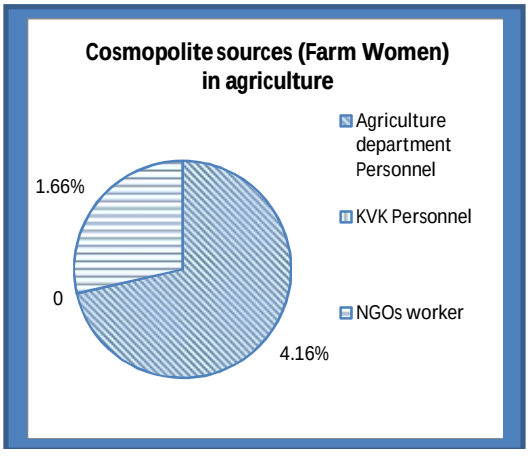

Cosmopolite sources (Farm Women) in agriculture
Agriculture department Personnel
KVK Personnel
NGOs worker
1.66%
0
4.16%

Table 4.3: Organizational membership of the respondents

S.No.	Organizational membership	Farm men n=240	Farm women n=240
1.	Member of formal organization	77(32.08)	52(21.66)
2.	Office bearer of formal organization	0	0
3.	Member of non-formal organization	15(6.25)	37(15.41)
4.	Office bearer of non formal organization	0	0
5.	No membership	148(61.66)	151(62.91)

Utilization of information sources by farm families in health care: It is observed that majority of the farm families (398 in total) relied on localite sources for solving their health related issues. Data in Table 4.4 show that majority(80%) of the female respondents took advice of old aged person as they have good knowledge and 43.33 percent male respondents used to contact old aged persons whereas 31.66 per cent male respondents had faith on traditional healers as they have extensive knowledge of local medicinal plant species and their use. Data further show that very few farm families contacted cosmopolite sources for getting information related to health,11.66 and 4.16 per cent farm families used to contact extension workers for solving their health related problems, respectively whereas 1.66-3.33 and 3.33-10.00 per cent farm men and women took advice from PHCs and NGO workers, respectively.

Utilization of information sources by farm women in postpartum and child care: Here information is asked only from rural women as they possess more knowledge and perform all activities related to women and child care.

More than half of the farm women (50.83%) took advice from old aged women regarding child and postpartum care as they were well experienced and knowledgeable whereas more than 15 per cent rural women took advice from traditional *daies*(*Choie*) who perform delivery and rest of the women(25 %) took information from extension workers, primary health centres and NGOs who work in nearby villages with 11.66,9.16 and 5.00 per cent, respectively.

Table 4.4: Utilization of information sources by the respondents

N=480

SN	Variables		Farm men f(%)* n=240	Farm women f(%)* n=240
1.	**Information sources in agriculture areas**			
	Localite sources	• Local village leaders/opinion leaders	142(59.16)	60(25)
		• Veteran or experienced farmers	70(29.16)	70(29.16)
		• Gram *Pradhan*	40(16.66)	15(6.25)
	Cosmopolite sources	• Agriculture department Personnel	45(18.75)	10(4.16)
		• KVK Personnel	16(6.66)	0
		• NGOs worker	8(3.33)	4(1.66)
2.	**Information sources in Health care areas**			
	Localite sources	• Veteran or experienced persons	104(43.33)	192(80)
		• Traditional healers	76(31.66)	26(10.83)
	Cosmopolite sources	• Extension workers	10(4.16)	28(11.66)
		• Primary health centers(PHCs)	8(3.33)	24(10)
		• NGOs worker	4(1.66)	8(3.33)
3.	**Information sources in Postpartum and child care areas**			
	Localite sources	• Old aged women	0	122(50.83)
		• Traditional *Daies* (*Choie*)	0	42(17.5)
		• *Gram savika*	0	14(5.8)
	Cosmopolite sources	• Extension workers	0	28(11.66)
		• Primary health centers(PHCs)	0	22(9.16)
		• NGOs worker	0	12(5)

***Multiple Responses**

4.2 Indigenous Agriculture Practices Followed by Farm Families

Agriculture in Uttarakhand is broadly defined to cover all land based activities such as cropping, animal husbandry, horticulture, forestry which are prime source of sustenance for the most mountain communities.In Uttarakhand, about 65 per cent of the working population is directly engaged in agriculture (Mehta *et al*, 2012).The practice of cultivating twelve types of food grains as a mixed crop or variations on that pattern is common among the mountain farmers. The cultivation of mixed crops is believed to enhance the fertility of the soil, maintain its essential nutrients and reduce the chances of pest infestation. The people practicing farming in hilly areas are mainly dependent on ITKs which are location specific. The major crops of the area

includes paddy, wheat, finger millet, foxtail millet, barnyard millet, amaranth, buckwheat, sorghum, corn, whole horsegram, lentil and black soybean. As per the objective of the study, an attempt was made to document the indigenous agriculture practices followed by the farm families in selected crops i.e. paddy, finger millet and whole horsegram.

4.2.1 Indigenous Paddy Cultivation Practices

Rice (*Oryza sativa* L.) is the most important cereal crop in the world, of which 90 per cent is grown and consumed in Asia (Chandola *et.al*, 2005). It is one of the major crops of *kharif* season in Uttarakhand. Farming communities in Himalaya are completely dependent on local cultivars and seed system, which are suitable for their environmental, socio-economic and ethnic requirements. These local varieties are managed by the local farmers in different agro eco-niches and the cropping system is broadly mono cropping type in nature. Rice is the most important crop for livelihood security of the farm families.A lot of indigenous cultivation practices are being followed by the farming community right from land preparation till harvesting. Hence, in the present investigation an effort was made to document the indigenous cultivation practices followed by the farm families in different components i.e. land preparation and sowing, seed treatment, nursery preparation, nutrient management, irrigation, inter-cultural management, mixed cropping, insect-pest management and harvesting.

a. Land preparation and sowing

In *Kumaon* region paddy is grown mainly on two types of land areas i.e. upland and lowland. The crop cultivation practices of upland and low land are different in nature due to situation of land, type of soil, irrigation sources, intensity and distribution of rainfall.

I. Land preparation and sowing in upland paddy cultivation (*Uproan dhaan* cultivation): The upland paddy cultivation is rain fed in nature and is highly risky because of undulating nature of the terrain. The upland cultivation is followed on the upland slopes which are permanently terraced. These fields are at relatively higher levels without any means of irrigation. Farm families of three selected districts generally follow three different types of land preparation and sowing methods depending upon the time of sowing:

- Land preparation of *Chetuar dhaan* sowing

- ❖ Land preparation of *Saie dhaan* sowing
- ❖ Land preparation of *Khaagi dhaan* sowing

Table 4.5: Indigenous land preparation and sowing methods in paddy followed by farm families N=480

S.No.	Cultivation method	f (%)
1.Upland land cultivation		
a.	*Chetuar dhaan* sowing	448(93.33)
b.	*Sai dhaan* sowing	250(50)
c.	*Khagi dhaan* sowing	195(40.62)
2.	Low land cultivation	395(82.29)

- ❖ **Land preparation of *Chetuar dhaan* sowing:** In *chetuar dhaan* sowing, the paddy is cultivated in the month of March in hill slopes where water is not sufficient to grow seedlings. The most prevalent method of sowing under upland cultivation is the direct sowing. Table 4.5 reflects that majority of the farm families (93%) followed *chetuar dhaan* sowing in paddy crop. In an informal discussion respondents reasoned that the practice is followed by them in order to capture the winter moisture present in the fallow field after wheat harvesting. Farmers further reported that in *chetuar* or *chetu dhaan* sowing, field is kept fallow in the month of December (*Huen*) and January (*Posh*) after that in February month (*Fagun*) land is cleaned, bushed and pebbles are displaced with the help of spade. It is followed by broadcasting of organic manure (*moe*) manually all over the field. Thereafter, the field is levelled with the help of a hand hoe (*kudal).* Ploughing is performed in the field with pairs of bullock in straight direction and field is levelled with proper demarcation of bunds. After ploughing the field is left as such for one month so that field regained the moisture of spring season (Figure 4).

In next month (March) paddy seed are sown in that field. Farmers reasoned that in order to maintain uniformity of seed distribution in the field and to protect the seed from flying away, the seeds are mixed with cow dung before being broadcasted. After sowing, tillage practices are performed i.e. ploughing, converting soil into the fine texture with the help of hand harrow (*Kutla*) and levelling the soil by using leveller (*moie*). Respondents reported that by ploughing, seeds completely dispersed

in the soil. Some farmers of study area responded that under rainfed conditions farmers in hill areas plough their land several times before the onset of monsoon to conserve moisture and increase water retention capacity of soil.

The findings are in conformity with Kediyal *et al.*(2009) who reported that in Uttarakhand hills spring rice is cultivated to capture the winter moisture. The seed is sown by direct sowing method through broadcasting. Partially decomposed farmyard manure (FYM) is dumped at farm site for complete decomposition and 18-20/ha compost is applied at the time of ploughing.

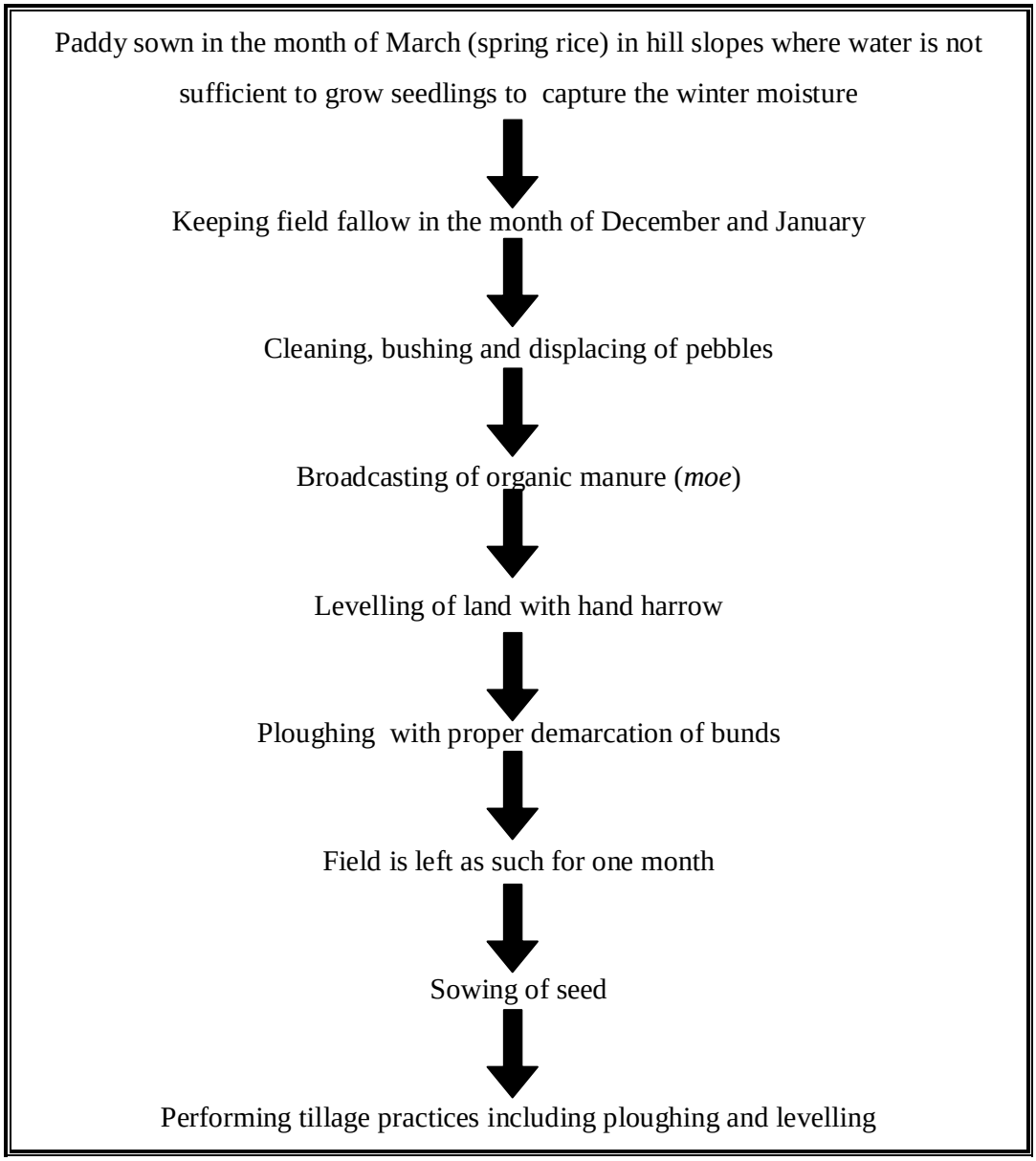


Fig 4: Indigenous land preparation and sowing method in *Chetuar dhaan* followed by farm families

- **Land preparation of *Saie dhaan* sowing**: In *saie dhaan* sowing the paddy is cultivated in the month of May. Table 1 depicts that half of the respondents sown paddy in their field by *saie* method of sowing. Farm families reasoned that *saie* method of paddy cultivation produces good crop. In this method, firstly ploughing is done followed by formation of bunds of 10-12 inches along all the sides of the field. After ploughing, field is cleaned in order to remove weeds, wild bushes and pebbles and is flooded with water. After that puddling is performed in flooded field with the help of leveller (*Sana*) to break the clods of mud and mix the soil in water properly so that the field becomes plain. After that pre-soaked paddy seeds (2-3 days) are sown in the levelled field by broadcasting method. Farmers explained that the purpose of pre soaked seed is to reduce the germination time and improve percentage of germination. This is followed by application of organic manure (*moe*) all over the field (Figure 5).

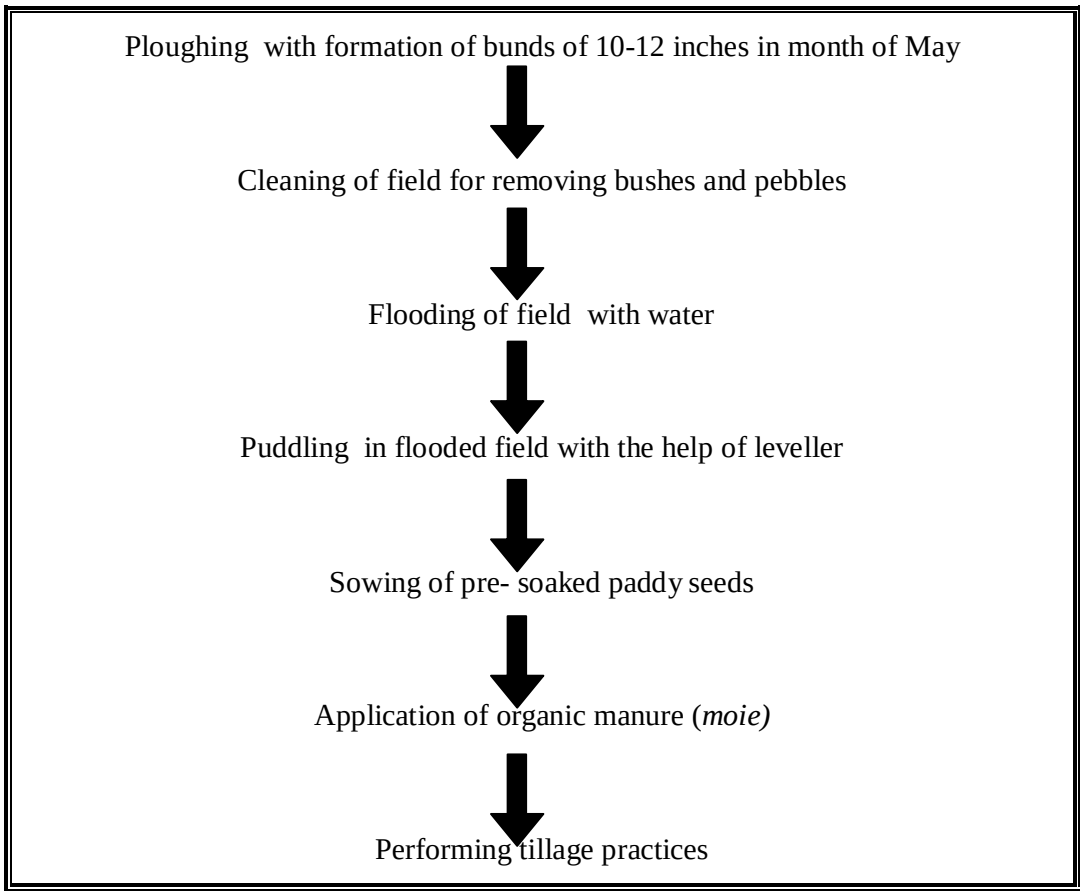


Fig 5: Indigenous land preparation and sowing method in *Saie dhaan* followed by farm families

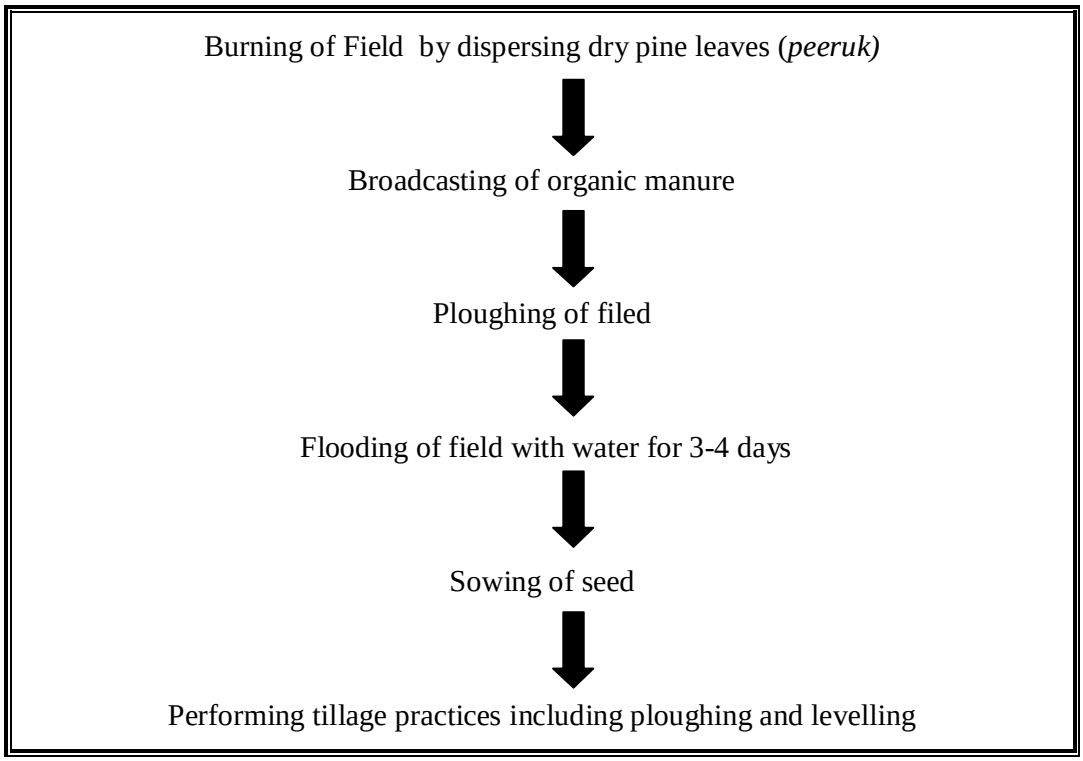


Fig 6: Indigenous land preparation and sowing method in *Khaagi dhaan* followed by farm families

❖**Land preparation of *Khaagi Dhaan* sowing**

Khaagi dhaan which is commonly known as *jethu dhaan* is sown in the month of June in hilly terrain located in small slope with sandy loam soil having marginal water holding capacity and higher infiltration rate. Table 4.5 reveals that 40 per cent of the farm families sown paddy in their field by *Khaagi* method of sowing. In *Khaagi* sowing, after harvesting of wheat crop, field is fired by dispersing dry pine leaves (*peeruk*) all over the field so that all the left over residue of wheat crop is burnt and it also kills all the harmful insects -pests resides in the field. Ash obtained after burning of residue acts as a manure which fertile the land as reported by the respondents. After cleaning of field, the organic manure (*moe*) is broadcasted in the field before ploughing so that the manure (*moe*) gets mixed with the soil. After that field is flooded with water for 3-4 days and after that seed is sown by broadcasting method followed by ploughing and levelling off the field (Fig 6).

II. Land preparation and sowing in low land paddy cultivation

Low land paddy cultivation is done where there is an assured and adequate supply of water and soil having high clay content, higher water holding capacity, with low

infiltration. In this method, sprouted seeds are directly sown in puddled field or the crop may be transplanted with seedlings raised in a nursery bed.

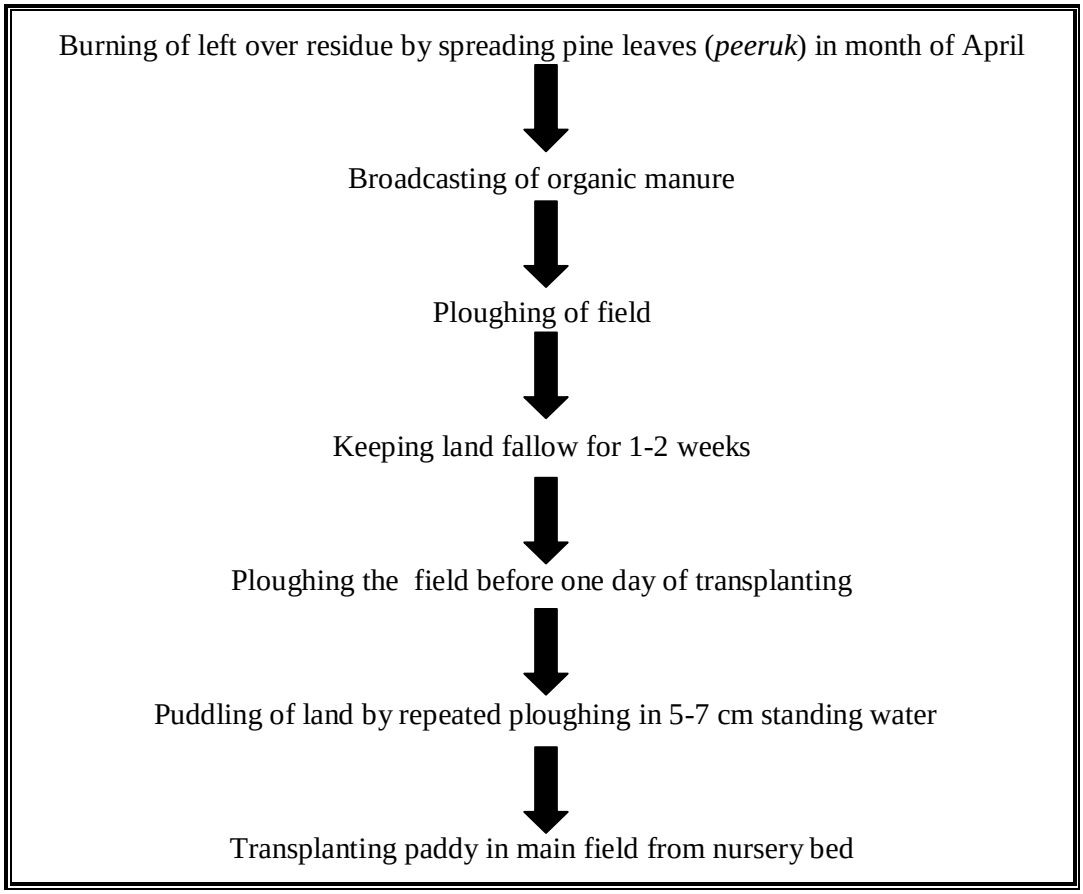


Fig 7: Indigenous land preparation and sowing method in low land paddy cultivation

Perusal of the Table 4.5 reveals that more than 80 per cent of the farm families cultivated the paddy in low land by using transplanting method (Fig 7).In this method seedling are prepared in nursery and then planted in the field flooded with water. The peculiarity of this method is that paddy is grown in standing water throughout the growth cycle. The farm families reasoned that in standing water there are less chances of appearance of weeds. Further they also reported that there is no need of hoeing and harrowing operations.

For preparation of land, the farm families reported that after harvesting of *rabi* crop (in month of April) the residue left over in the field are burnt by spreading pine leaves (*peeruk*) in the field. After this, FYM is broadcasted all over the field, and ploughing is done to mix the ash and manure properly in the soil. Depth of ploughing is kept around 30 cm. After deep ploughing, land is left fallow for 1-2 weeks so that

sunlight can reach at the deepest layer possible. The farmers reasoned that this practice is helpful to control weeds and improve the water holding capacity of the soil. Before transplanting of seedlings from nursery to the main field, ploughing is done one day prior to transplanting and bunds are formed in order to check drainage of water. On the day of transplanting, farmers used to soft puddle the land by repeated ploughings in 5-7 cm standing water. Farm families reasoned that ploughing and puddling destroy the hibernating stage of white grubs (*Kurmu*) which may cause harm to the root of seedlings.

The findings of the study get decisive support by the study of Singh and Tulachan (2002) who reported that wet ploughing loosens and softens the soil there by improves nutrient uptake, water retention, aeration and also improves root growth.

(b) Seed treatment

The practice of seed treatment before sowing was followed by almost all the farm families. Some of the indigenous seed treatment followed by farm families as follows:

- Data in Table 4.6 show that majority of the farm families (90%) used to soak the seed in a container, stir it properly and then kept it for 2-3 minutes, after that the excess water is drained by discarding the seed which floats on upper surface. The seeds are then dried in shade followed by sown in the nursery bed. Farm families reasoned that this helps in discarding the unwanted seeds and results in good germination of paddy seedlings.
- In another seed treatment practice 1 kg paddy seeds are mixed with 200 gm cow dung+100 ml cow urine as reported by 86.25 per cent of the respondents. Farm families believe that this helps in enhancing productivity and minimizing damage to the seed by the pests.
- For *saie* and *ropaie dhaan* cultivation 80.20 per cent of the respondents soak the seeds in water for 2-3 days then seeds is sown in nursery/ or directly in field as per requirement. Farmers reported that it helps in quick germination of seed in the field.
- Further it has been observed that 65 per cent farm families kept the paddy seeds in jute bags for 4-5 days. In between water is sprinkled on the jute bags to keep it moist. Then the germinated seeds are sown in the main field. Farm families stated that it helps in quick germination of seedlings in the field.

Table 4.6: Indigenous seed treatment methods followed by farm families

N=480

SN	Indigenous practices	Reason	f (%)
1.	Soaking of seed in water for 2-3 minutes	Helps in discarding the unwanted seeds	432(90)
2.	Treatment of seed with cowdung ash+ cow's urine	Minimizing damage to the seed by the pests	414(86.25)
3.	Soaking seed in water for 2 to 3 days	Quick germination of seeds	385(80.20)
4.	Germination of seed in moist jute bag	Helps the seed to grow faster	312(65)

(c) Nursery preparation and transplanting techniques:

In low land paddy cultivation, farm families used to prepare the nursery beds by following methods i.e. dry bed method and wet bed method.

Dry bed method: This method is practiced in areas where water is not sufficient to grow seedlings in wet nurseries. The nursery beds are preferably located in partially shaded areas. Figure 8 reflects that 86 per cent of the respondents used to prepare nursery bed by dry method technique in the month of May after wheat harvesting. Farmers stated that in dry bed method the land is cleaned (burning pine leaves) and thereafter FYM is applied all over the nursery bed. Then nursery beds are raised by repeated ploughing so that soil get toiled, pulverised and clots are broken down.Then with a hand harrow (*Kutla)* and spade (*Faddu*), the nursery is tilled and levelled so that the ash and the FYM are mixed with the soil. Seed at the rate of 3-4 kg/*nali*($1/20^{th}$ part of 1 acre) either pre-soaked or treated with cow urine are spread uniformly all over the nursery. The farm families reasoned that high seed rate results in dense plant population growth which helps to check the weed growth. After sowing, ploughing is done in order to embedded the seeds in to the soil for germination. Then the mulching is done in which nursery bed is covered either with paddy straw or cowdung layer or

grass to protect the seed from birds and to conserve soil moisture. When the seedlings attained the height of one or two inches the nursery is watered. In this way, the nursery is kept moist by sprinkling water at the interval of 10-15 days as and when needed. Finally after 1 or 1 ½ month the seedlings are ready for transplantation (Figure 8).

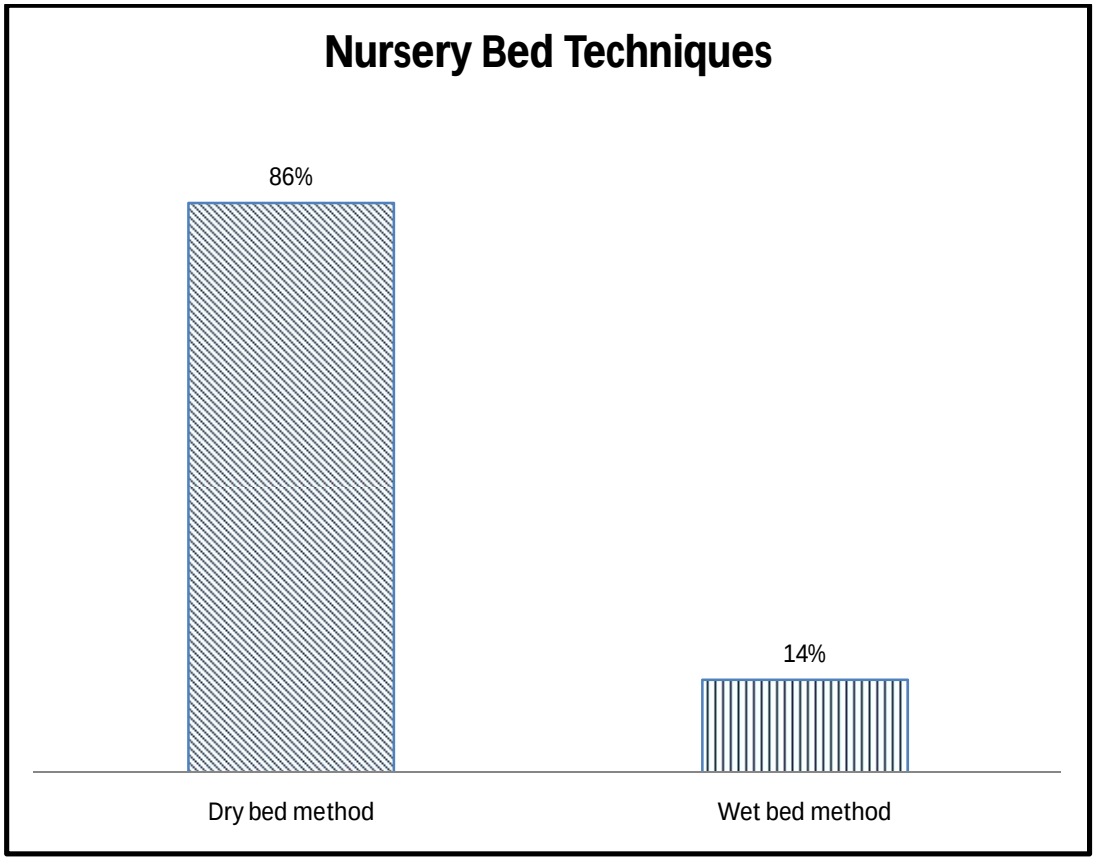


Fig 8: Percentage distribution of farm families in indigenous nursery bed technique

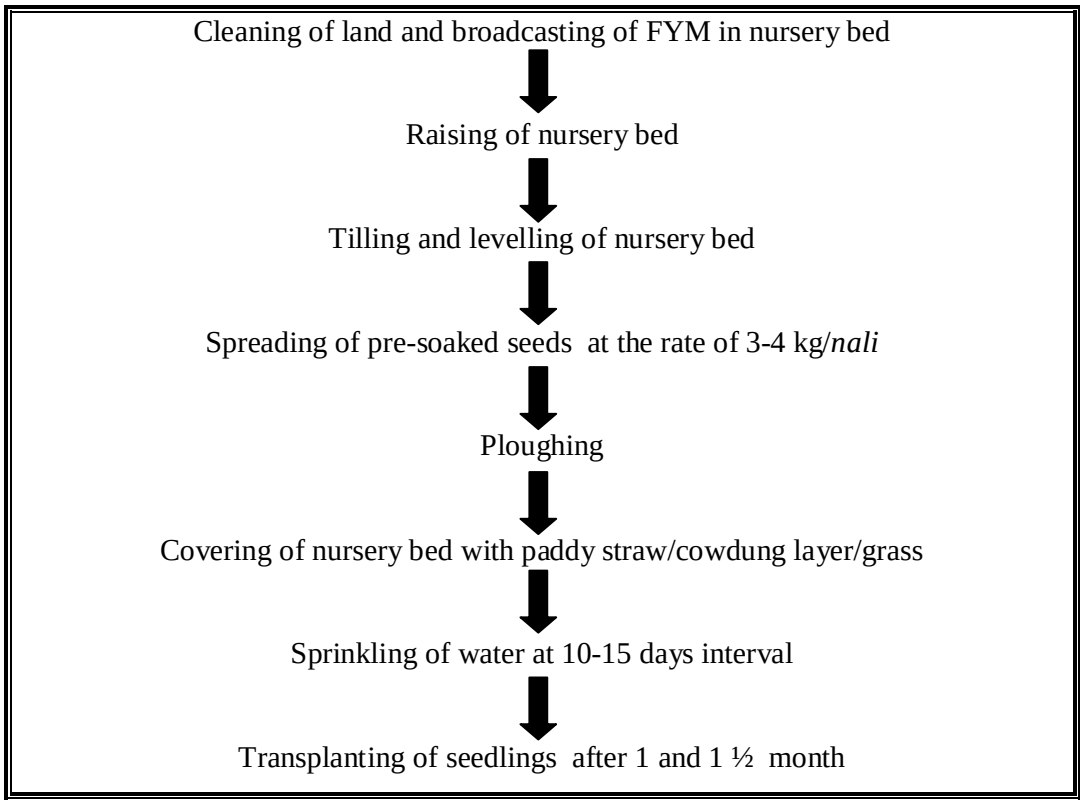


Fig 9: Nursery bed preparation by dry bed method followed by farm families

Wet Bed method

In areas where the adequate irrigation facilities are available seedling are grown in a nursery by wed bed method. Figure 8 presents that 14 per cent of the farm families use to make wet bed nursery for preparing seedling. In this method, land is first cleaned and then ploughing is performed two times in a dry condition. After that puddling is performed in 5-6 cm standing water and farm yard manure *(moe)* is applied in puddled field. The field is levelled after final puddling and seeds are sown. After sowing, the beds are kept saturated with water for 4-5 days and then gradually the level of water is increased as the seedlings grow. Finally within a month, the seedlings are ready for transplantation (Fig 9).

Transplanting: Transplanting is done when seedlings are ready for plantation in the field. The seedlings are uprooted from the nursery at the optimum age. In transplanting, seedlings are pulled and tied in bundles by banana fibres in a convenient size of handling. Then the bundles are transported to the main field keeping in bamboo basket (*daliya)* and then the seedlings are planted in the field. Transplanting in either first or second week of July gives best output of paddy yield

(55.20%) and also checks the weed growth. The respondents further reported that during transplanting the depth of plant should be kept only two inches under the soil. The reason is that if depth is more paddy, will take more time to grow (Table 4.7).

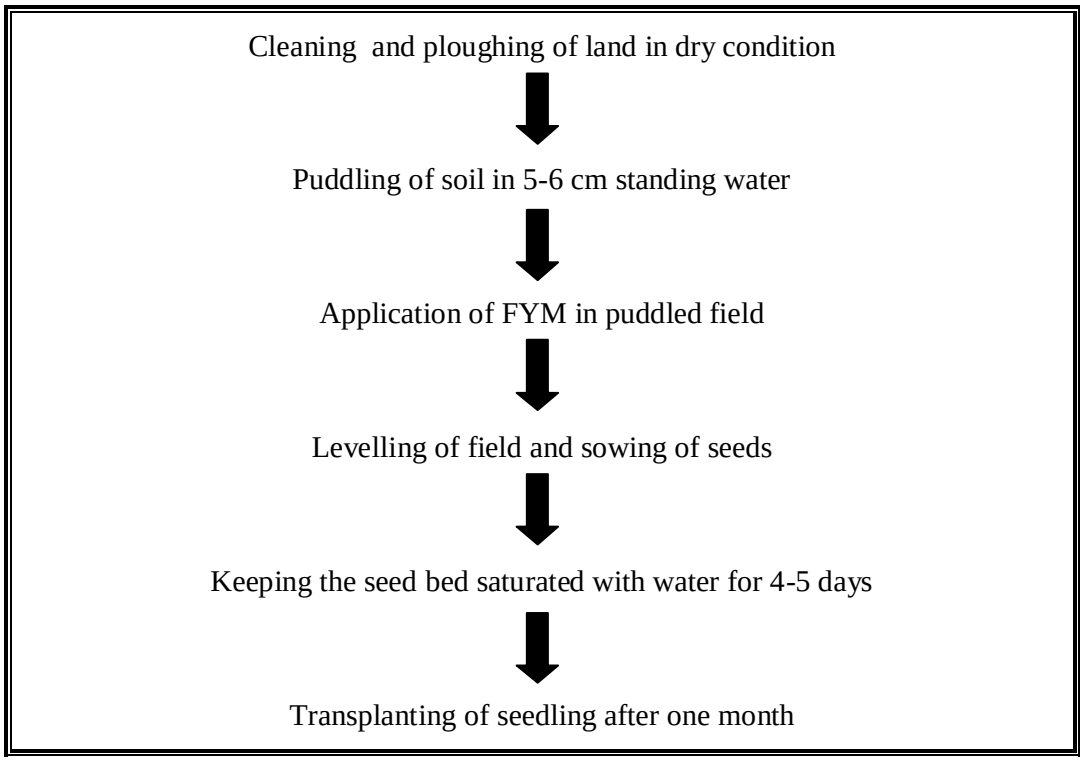


Fig 10: Nursery bed preparation by wet bed method followed by farm families

(d) Nutrient management

In nutrient management, organic manure occupies a significant place in hill agriculture due to the poor, shallow and stony texture of the soil. In *Kumaon* region cow, buffalo and goat dung is usually used for manuring. For preparing organic manure leaves (*baaj paat, peeruk, akhorat paat, kawaral hang,timul paat,farsul* and *phayat*) and livestock dung is mixed and kept in open place in heaps for decomposition. After that manure is broadcasted in the field.

Data in Table 4.7 depict that all the respondents applied Farm Yard Manure (FYM) locally known as *moe,* which was one of the most useful and significant indigenous method of nutrient management found to be practiced almost in all the villages of the study area. Respondents stated that application of FYM is an excellent source of nutrient for crop field and enhances productivity and checks attack of white grub. Besides that one fourth of the farm families (25.62%) reported that after application of

farm yard manure they also use to introduce earthworm in their cropland. Introducing earthworm in paddy field increased the soil fertility.

Table 4.7: Indigenous practices regarding transplanting and nutrient management in paddy

N=480

Indigenous practices	**Reason**	**f(%)**
Transplanting time		
Second week of July	Gives best output and checks weed growth	265(55.20)
Nutrient management		
Fully decomposed organic manure of livestock dung and leaves are used	Enhances productivity and check white grub attacks	480(100)
Introduction of earthworm in the main crop land	Increases soil fertility	123(25.62)

(e) Irrigation

Water resources regime in *Kumaon* Himalaya is a product of its specific environmental conditions. Major river systems, lakes along with a plethora of streams and springs are the main sources of water in this region. Irrigation is necessary for all the crops sown in cold desert of hilly areas for increased and sustainable crop production. It was observed that there was not such a specific water management system in *Kumaon* hills of study area, farmers basically depended upon their locally made *guls*, canals and *diggi*(water storage body).

In hilly region of Uttarakhand participatory management is employed for distribution of water. Farmers reported that in *chetuar dhaan* (sown in the month of March-April in hilly slopes) availability of water is totally dependent on rain as there was no facility of irrigation due to height of terrain (90.62%). Further in *Khaagi*(sown in month of June) crop, field is irrigated two times as reported by half of the farm families whereas in transplanted paddy, field is flooded throughout the growth period

with the help of indigenous water storage systems as reported by all farm families of the study area (Table 4.8).

Rawat and Sah (2009) in a study on "Traditional knowledge of water management in *Kumaon* Himalayan" reported that the main systems of water harvesting are *gulls, naulas, dharas, lakes, kund, khal,simar or gazar and water mills or gharat. Guls* are for drinking water and for running *gharats. Naulas* are designed to collect water from subterranean springs. *Simar* is a marshy tract of land in an agricultural field which is created by the ground water and it is aptly suited for paddy cultivation.

(f) Inter-cultural management practices

The inter-cultural management practices in upland and low land cultivation includes hoeing and harrowing operations. The weeds are major menace in successful cultivation of paddy crop in *kharif* season. However, it is characterized by low productivity due to invasion of weeds.

(i) Upland paddy cultivation

Hoeing and Harrowing: Farm families of study area reported that the main practice of weed control was hand weeding with the help of hand hoe (*kutaw*) for 3-4 times during crop growth period which involves more labour input. Farm families stated that weeds namely, *Oxalis latifolia* (tuber propagated), *Cyprus rotundus* (sedge, tuber propagated), *Echinochloa colona,Elusine indica, Brachiara ramose* and *Digitaria songuinalis* are a few species found in abundance in rice fields and if the fields were not periodically weeded, the weeds compete with the paddy plants and hampered their growth, thus affecting production. For controlling them harrowing operation is performed after 15 days of sowing (*Danau halan*)(emergence of 4–5 leaves on the plant) with locally made harrow *(danau)*. Farmers reported that harrowing loosen and aerate the soil and removes weed plant and again after 15days of harrowing, hoeing (*Gudaii karna*) is performed by hand hoe to remove the weed.

Farm families further reported that by hoeing and harrowing operations paddy seed which remain dormant get germinated. After 15 days interval again second hoeing operation is performed and finally the third weeding is completed by hand only before the flowering of the plants so that the flower does not fall during the process.

All the farm families reported that to protect the crop from weeds, the field is weeded 3-4 times during the crop season and the practices of hoeing and harrowing were performed in order to aerate the soil and the weeded out plants are left in the field itself to dry up in the heat of the sun. They act as cover for the plants, and subsequently transform into manure.

Table 4.8: Indigenous practices regarding irrigation and inter-cultural management of paddy

N=480

SNo.	Indigenous practices	Reason	f(%)
1.Irrigation			
a.	In *chetuar dhaan* water availability is totally dependent on rain water	Due to high terrain water management is difficult	435(90.62)
b.	In *Khaagi dhaan* cultivated field is irrigated two times	For good production of crop	240(50)
c.	In transplanted paddy, field is flooded with water through out the growth period	Standing water restricted the growth of weed plant	480(100)
2. Inter-cultural management practices **In upland paddy cultivation**			
a.	Hoeing is performed 3-4 times during the growth period	For eradication of weed as it hampered the growth of plant	480(100)
b.	Harrowing after 15 days of hoeing	Loosen and aerate the soil and removes weed	480(100)
c.	Final weeding is performed before flowering stage	flower does not fall during the process	480(100)
In low land paddy cultivation			
a.	No hoeing operation is needed	Standing water restricts the growth of weed plant	480(100)
b.	Application of common salt at the time of land preparation stage	It minimizes the weed to grow	210(43.75)

(ii) Low land cultivation

In transplanted paddy field no hoeing and harrowing practices are required as reported by all the respondents as standing water restricts the growth of weeds.

In the month of August (*Asadha*) if weeds germinated it is removed by hand only. This process is called *neun*(removing of weed) in local dialect. Farm families further reported that the main advantage of low land paddy cultivation is that

- ✓ In irrigated paddy field, weeding is controlled and there is no need of hoeing and harrowing practices.
- ✓ Helps in killing of white grurb (*Holotrichia consanguinea/Kurmu)*, harmed the roots of paddy plant. Due to irrigation the white grub (*Kurmu*) floats on the upper surface of the water which can be killed or removed easily.
- ✓ Helps in removing of dense paddy plants by loosening their root with the help of *kutla*(*Kutau*) and can be shifted to other place where there is less population of paddy plants. This operation of hoeing in irrigated field is called *Padkutauv* in local dialect.

Application of common salt: Farm families (43.75%) of Bageshwar and Almora district were sprinkling the solution of common salt in their crop for weed control. They reasoned that it is not only effective in minimization of weed competition with cultivated paddy crop but also results in comparatively high paddy productivity without having any effect on growth and is also cost effective.

(g)Mixed cropping: As per the package of practices, the mixed cropping is not recommended by the experts though farm families follow their own indigenous method. Data in Table 4.9 represent that majority of the farm families (97.08%) reported that they generally used to grow different pulses namely, Black gram(*Mans),* Black soybean *(Bhatt*), Whole horsegram (*Gahat*) and Red kidney beans(*Rajma*) in between the crop field in upland rice cultivation for enhancing the productivity whereas 90 per cent of the respondents stated that they used to grow millets namely Brayanyard millet (*Jangora*), Foxtail millet (*Koni*) and Sesame(*Til*) in paddy field for fodder purpose. Although, farmers were not aware of the scientific reasons of growing legume crops, yet they were well aware that legume crops are good for enhancing and maintaining the fertility of soil.

Table 4.9: Indigenous practices regarding mixed cropping and soil erosion in paddy N=480

SN	Indigenous practices	Reason	f (%)
Mixed cropping			
	Paddy +Black gram(*Mans*) Paddy +Black soyabean(*Bhatt*) Paddy + Wholehorse gram (*Gahat*) Paddy +Brayanyard millet (*Jangora*) Paddy + Foxtail millet (*Koni*) Paddy +Sesame(*Til*)	It enhance productivity For fodder purpose	466(97.08) 435(90.62)
Soil erosion			
	Planting fodder and fuel wood yielding trees on the bunds of crop fields	It checks soil erosion	480(100)

The above findings are supported by the study conducted by Das *et al.* (2003) who reported that in mixed cropping system; more than one crop is cultivated at the same time on the same piece of land. It is considered as a soil conservation and fertility management practice. Some farmers grow traditionally mixed crops or intercrops such as groundnut (*Arachis hypogaea* L.) and pigeonpea (*Cajanus cajan* L.) during *kharif* season to increase the rain water use efficiency and productivity of the land.

Soil erosion: Data in Table 4.9 show that all the respondents planted the fodder and fuel yielding trees (*Celtis australis, Grewia optiva (Bhemal), Sapindus mukorossi(reetha), Ficus neriifolia (Thelak),Boehmeria species, Bhikku, Kawral, timul*) on the bunds of crop fields. Farmers reasoned that it checks soil to wash out by rain water and also provide fodder for the animals.

(h)Insect- Pest management

Pest and insects are the main havoc to the growing crop which results in low productivity and poor quality yield. Farm families have no exposure of chemicals so they are dependent on their local indigenous knowledge regarding insect- pest management.

- **White grub** (*Kurmu*)- White grub constitutes a major pest of field crops in Himalayas. Earlier, their damage was restricted to only few pockets but over the years, it has assumed the status of a serious pest in the entire hilly region causing damage to upland rice. For controlling the white grub the farm families used their own methods. Data in Table 4.10 reflect that more than half of the respondents (57.29%) broadcasted common salt(100 gm) mixed with wood ash(100 gm) at the rate of 1 kg/*nali* in the paddy field. This mixture is broadcasted in the field during field preparation stage after first ploughing. Broadcasting is generally done in the morning hours. Farmers reported that if the severity of insect is more than just after broadcasting the field needs to be irrigated.

- ***Bhatul* (*Holotrichia longipennis*)-** *Bhatul* is an insect which suck paddy plant and absorb all the nutrients. For killing of the insects, 90 per cent farm families performed hand hoeing with the help of hand hoe.

- **Rice leaf folder-** Data in Table 4.10 reflect that 40 per cent of the farm families used to sprinkle the solution of cow urine and fenugreek seeds in a ratio of 3:1 at the rate of one litre per *nali* at the time of infestation of rice leaf folder in the paddy crop.

- **Red spot-** For minimizing red spot in paddy crop, majority of the respondents (80.20%) use to sprinkle buttermilk in the field (3 litres /*nali*).More than half of the respondents (52.08%) reported that they use to sprinkle solution of common salt (250 gm) @ 2 litres per *nali* to control red spot.

- **Rodent**

  Rodents are the major cause of loss in the paddy crop before as well as after harvesting. It was observed that farmers were not aware of the scientific method of rodent control however they have evolved their own indigenous method for controlling the rodents by following methods.

Table 4.10: Indigenous practices regarding insect-pest management and harvesting of paddy **N=480**

SN	Insect and pest management	Reason	f(%)
1.	**White grub** Broadcasting common salt +ash after first ploughing @ 1 kg/*Nali*	To reduce the white grub attack	275(57.29)
	Bhatul-Hand hoeing is performed	To kill insect	435(90.62)
2.	Rice leaf folder- Sprinkling the mixture of cow urine +fenugreek seed paste in 3:1 ratio	It removed/kills leaf folder by 2-3 application	195(40.62)
3.	Red spot- Spraying butter milk in field (3 liters/*nali*) liters field	Help in reducing red spot	385(80.20)
4.	Sprinkling solution of common salt(250g) @ 2 liters/*nali* in the field	Helps in reducing red spot	250(52.08)
5.	Rodents (Bait method) ❖ Mixture of wheat flour +ground glass kept near the rodent hole ❖ Stinging nettle and Barberry thorns are kept near the rodent hole	It kills the rodents Rodents get physical injury	240(50) 170(35.41)
Harvesting			
Judgement of harvesting			
	In the month of mid September paddy spikes will get yellow	Sign of ripening of Paddy	465(96.87)
	Pressing the grains with fingers	Sign of ripening of Paddy	370(77)

1. **Baiting:** Data in Table 4.10 show that half of the respondents used to make bait for killing the rodents. The bait is prepared by kneading 1 kg wheat flour and ½ kg ground glass with little water. Small balls are prepared from the mixture and the balls are kept near the hole in the field during the night. Killing rodents by baiting has been the most preferred and popular method among the farmers.

2. Some farm families (35.41%) use Stinging nettle *(Bichhu)* leaves and thorny bushes of Barberry (*Kilmora*) for rodent control. Respondents reported that the plant is placed at the mouth of the mouse hole. The Stinging nettle causes irritation on touching whereas the thorny bushes of *Kilmora* cause physical injury on the body of the rodent.

(i) Harvesting

Harvesting is the process of cutting and gathering of the crop. When the crop comes to maturity level then harvesting job is performed. To judge the harvesting time of paddy crop, respondents used various indigenous practices illustrated in Table 4.10. Majority of the respondents (96.87%) reported that in month of September (*Asooj*) paddy spikes get yellow to golden in colour which was the sign of ripening of paddy crop. Apart that farm families (77%) reported in an informal group discussion that by simply seeing and pressing the grains with fingers, if grain becomes hard it indicate that the crop is ready for harvesting.

4.22. Indigenous Finger millet cultivation practices

Finger (*Mandua* or *ragi*) millet is important *kharif* season minor millet of *Kumaon* region as it occupies third position (10.63%) in area after Karnataka (57.83%) and Maharashtra (11.05%) (Gowda *et al.*2010*).*It is a staple food in many hill regions and consumed mostly in the form of chapattis and porridge. It is a cheap and widely accessible source of food for the poor rural farm families, dwelling in remote hilly regions of the country and a good income generation crop for the extremely poor farmers. Finger millet can be grown on a wide variety of soils ranging from very poor to very fertile soils and is grown in different seasons in different parts of the country, as a rainfed crop. As compared to paddy, finger millet requires minimum care as it grows in harsh and draught conditions. Both the cultivation and postharvest practices of finger millet are easy to operate. The indigenous practices followed by the farm families in finger millet cultivation are given as under:

(a) Land preparation and sowing

The land preparation and sowing followed by the farm families (100%) in finger millet cultivation is given in figure 11.The respondents reported that after harvesting of *rabi* crop field is cleaned with the help of hand hoe as it removes the residue of previous crop. After that farm yard manure is broadcasted in the field followed by ploughing by proper bund demarcation so that soil erosion could not take place in monsoon season.

After ploughing, seeds are broadcasted in the field in the month of May/June followed by planking or tapping of soil with the help of leveller or wooden log. The farm families reasoned that planking and tapping of soil helps in inserting the seed into the soil to prevent it from bird's damage.

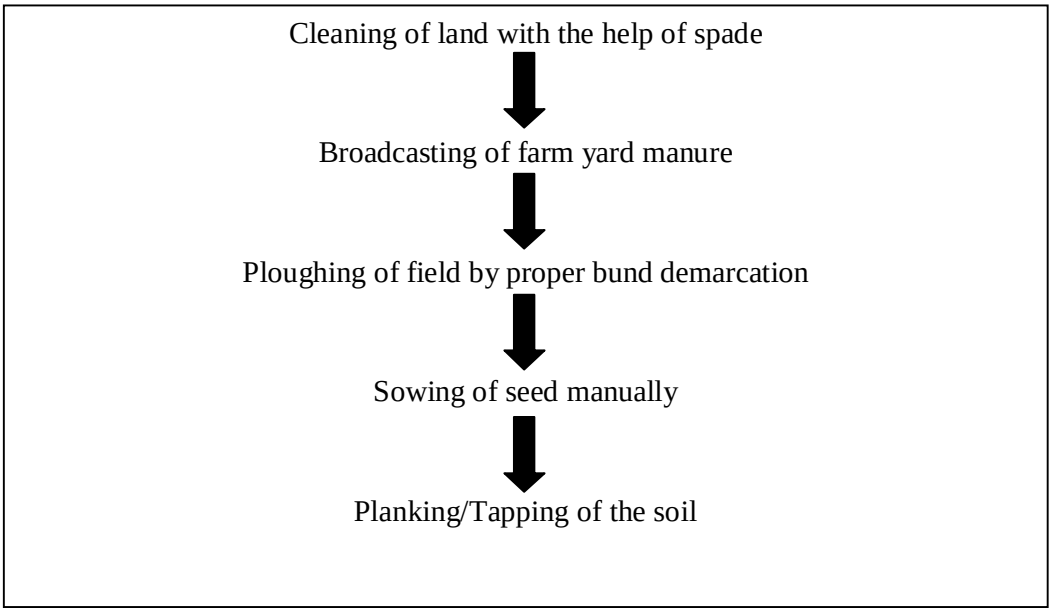


Figure 11: Indigenous land preparation and sowing in finger millet cultivation

(b)Seed treatment

Regarding seed treatment in finger millet as such no seed treatment technique was followed by the respondents. However, 80.20 per cent of the farm families reported that before sowing, seed are slightly milled in the *okhali* for removing the outer hard cover of the seed to facilitate germination process.

(c) Nutrient management

In the finger millet cultivation none of the respondents were using chemical fertilizers instead all were applying farm yard manure before ploughing. Farm families reasoned that FYM easily get mixed with the soil and helps in better yield.

Table 4.11: Indigenous practices regarding finger millet cultivation

N=480

SNo.	Indigenous Practices	Reason	f(%)
1.Seed treatment			
	Milling of seed in *okhali*	Milling removes the outer cover, so easy to germinate	385(80.20)
2.Nutrient management			
	Broadcasting of organic manure(*moe*)	Manure well mixed with the soil during ploughing of field	480(100)
3.Inter-cultural practices			
	Hoeing and harrowing after one month of sowing	Aerate the soil	480(100)
	Second hoeing after one month interval	Check weed growth	480(100)
4.Mixed cropping			
	Fingermillet+Cow pea(*Vigna sinensis*) Fingermillet+Blacksoybean(*Bhatt*) Fingermillet +Whole horse gram(*Gahat*)	Increases productivity and provide additional crop	410(85.41)
5.Harvesting			
	Ear heads get dried or turn brown	Symptoms of ripening of millet	410(85.41)

(d) Irrigation

Finger millet is a hard crop grown in harsh climatic conditions and does not need any irrigation as reported by the respondents. If rains stop for a long spell, the respondents use to give irrigation. Sixty per cent respondents reported that in case of excessive

rain fall if water logging conditions occurs in the field, they used to drain excess water from the field as standing water rotten the crop.

(e) Inter-cultural management practices

All the farm families performed hoeing and harrowing at the initial stage of plant growth. Respondents reported that after of one month of sowing hoeing and harrowing are practiced by hand hoe and harrow (*danau)* respectively. Farm families reasoned that by this way soil become light and aerate followed by second hoeing is performed after one month of interval for checking weed growth.

(f) Mixed cropping

Table 4.11 shows that more than 85 per cent farm families grow cow pea (*Vigna sinensis*), black soybean and whole horse gram (*Macrotyloma uniflorum)* in between finger millet crop. They stated that mixed cropping increases the productivity and also provides additional crop.

The findings of the study get decisive support by the study of Tofiga (2003) who reported that mixed cropping is the growing two or more crops simultaneously on the same piece of land with or without distinct row management. Mixed cropping systems create favourable condition for the soil, water, nutrients and provide excellent environmental conservation and sustainability.

(g) Insect- pest management

It was observe that farm families of *Kumaon* region did not follow any indigenous practices for insect pest management in finger millet crop. In an informal discussion, respondents reported that since finger millet is a hard crop hence there are little chances of insect- pest infestation.

(h) Harvesting- Perusal of Table 4.11 reveals that majority (85.41) of the respondents judge the harvesting time in finger millet by observing symptoms like earheads become dried or turned brown. Respondents reported that no other crop can be grown on the same field for at least 2-3 months due to unavailability of required moisture in the soil. By this time the soil regains the moisture. After collecting the ear heads in bamboo basket (*doke* or *dall*) it is sun dried for 2-3 days before threshing.

4.2.3 Indigenous Whole Horsegram Cultivation Practices

Pulses are the most important crops in northern part of India. They play an important role in Indian dietary. Whole horsegram (*Macrotyloma uniflorum)* is the indigenous pulse crop of *Kumaon* region and is basically grown in *kharif* season in May and June. Whole Horse gram is a leguminous crop which is grows under a wide range of soil and climatic conditions. It is a dual purpose crop i.e. along with grains it also provides nutritious fodder for milch animals. Farm families consume this pulse crop in winter season as it gives warmness to the body and also have medicinal properties. The production of whole horse gram is limited in parts of *Kumaon* region and largely grown in villages of Bageshwar and Almora district. Cultivation activities in this section have been dealt with respect to indigenous practices followed in preparation of land to harvesting of whole horse gram.

(a) Land Preparation

Whole horsegram being a hard crop does not require efficient preparatory tillage practices and one or two ploughings followed by harrowing are considered enough. Land is prepared in such a way that it absorbs enough rain water and allows aeration in the soil.

The farmers reported that field is cleared first from weeds and pebbles with the help of spade *(Fadu)* and *kudali*. After that the left over weeds are burnt in the field. Farm families sown the seeds after land cleaning followed by ploughing of land and then organic manure is broadcasted (Fig 13).

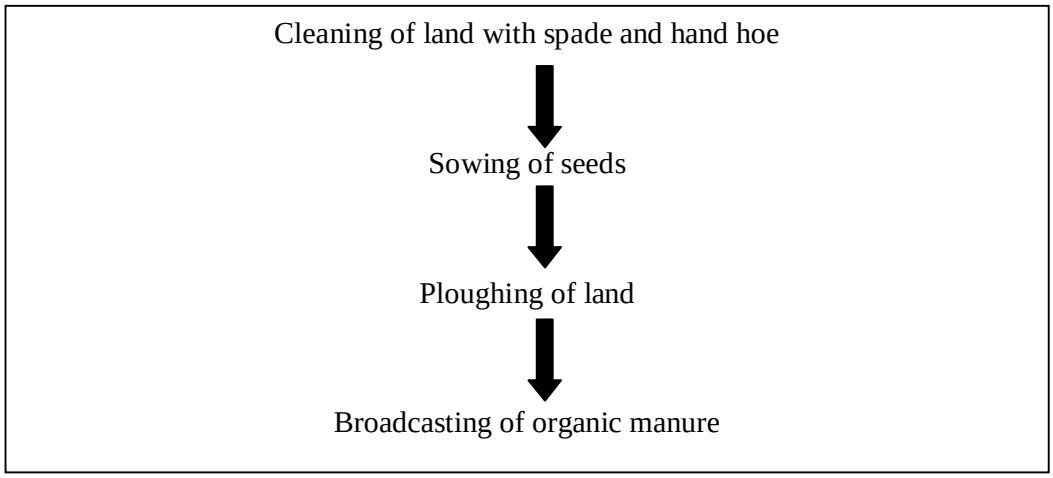


Fig 13: Indigenous land preparation and sowing method in whole horsegram cultivation

(b) Seed treatment

Farm families were using cow dung and cow urine as an indigenous method of seed treatment (66.66%).For this 1 kg of seed is mixed with 50 ml cow urine and 100 gm cow dung. According to the farm families it protects the crop from all those diseases which spread by spore resting on the seed coat.

(c) Time of sowing-The time of sowing depends upon the local climatic conditions. Whole horse gram is predominantly sown as a *kharif* crop in *Kumaon* region. The farmers reported that if rains appear in time it is grown in the mid of May to June.

Table 4.12: Indigenous practices regarding seed treatment and sowing of whole horsegram N=480

S.No.	Indigenous practices	Reason	f(%)
1.Seed treatment			
	Coating of seed with cow dung +cow urine	Protect the crop from diseases spread by spores resting on the seed coat	320(66.66)
2.Time of sowing			
	Mid of May to June	Time of sowing depends upon the local climatic conditions	480(100)

(d) Nutrient management

Table 4.13 depicts that all the respondents applied organic manure, made of animal and plant waste called *moe* in local parlance (as discussed in paddy cultivation) just after ploughing of field. The main reason of manure application as given by farm families was for better crop yield.

(e) Irrigation

Data in Table 4.13 reflect that whole horsegram is a rainfed crop, not require any irrigation as reported by cent per cent of the respondents. The farm families reported that in case of heavy rain there is a problem of water logging which cause damage to the crop in such conditions immediate drainage system is required to prevent the crop from spoilage.

(f) Inter-cultural management practices

Farm families of *Kumaon* region were not following any specific method for weed control as majority of them (96.87%) use to remove the weed either by hand hoe (*Kutav*) or by hand picking. Further 88.54 per cent respondents stated that a thorough

harrowing is performed with the help of harrow (*danau)* during the early growth period, and after one month of harrowing, hoeing is performed as it increases aeration in the soil which results in vigorous plant growth and high yield.

(g) Mixed cropping

Whole horsegram is sown in *Kumaon* region with a mixed crop of amaranth (*chulai*) and Brayanyard millet *(jhangora*). Data in Table 4.13 reflect that 89.58 per cent respondents reported that mixed cropping of amaranth with whole horsegram always ensures grain return under un-favourable weather conditions and increases soil fertility. Few farmers (19.79%) also reported that as barnyard millet provides support to the climbing whole horsegram crop so that it stands properly. The respondents reported that the farm produce of both the crop is used as a fodder for milch animals.

Table 4.13: Indigenous nutrient management, irrigation, inter-cultural management, mixed cropping, insect- pest management and harvesting practices N=480

SN	Indigenous practices	Reason	f(%)
1.Nutrient management			
	Application of FYM in the field	For better yield of pulse crop	480(100)
2.Irrigation			
	Not required	Water logging can damage the crop	480(100)
3.Intercultural management practices			
	Removal of weeds by manual picking or use of hand hoe	To remove weeds	465(96.87)
	Hoeing and harrowing during early plant growth period	Ensures aeration in soil	425(88.54)
4. Mixed cropping			
	Wholehorse gram+ Amaranth(*Chulai*)	Amaranth provides additional crop	430(89.58)
	Whole horsegram +Branyard millet *(Jhangora)*	Brayardmillet provides support to the climbing pulse crop, to stand it properly	95(19.79)
5.Insect-pest management			
	Formation of ditches around the crop field	Insects cannot enter in their field from nearby field	160(33.33)
	Burning of fire and smoking during night time	Smoke acts as repellent for insects	90(18.75)
6.Harvesting			
	Uprooting of plants and allowed to pre-dry in the sun for few days	Drying removes the moisture	480(100)

(h) Insect-pest management

It has been observed from the study area that none of the respondents were using chemical method for controlling insect –pest. Information presented in Table 4.13 reveals that insect -pest in whole horsegram were controlled traditionally by their peculiar method of forming ditches around the field as reported by one third of the farm families. Nearly 19 per cent respondents reported burning of fire and smoking during night time as a method of insect - pest control. According to them smoke and fire act as a repellent.

(i) Harvesting: In case of harvesting of whole horsegram all the respondents reported to harvest the crop manually by uprooting of plants. Then the uprooted plants are allowed to pre –dry in sun for 4-5 days.

Conclusion: Based on the findings it could be concluded that the farm families were using many age-old practices in all three major crops and respondents have their own rationale for their use .Farmers perhaps do not know the scientific reasoning of using indigenous practices as they have learnt these from their ancestors as well as from their own experience over a period of years. Hence, there is a need for scientific validation of these indigenous practices for their wider applicability.

4.3 Indigenous Homestead Practices Followed by Farm Families

Indigenous homestead practices followed by farm families include postharvest practices in selected crops along with health care practices, child care and postpartum practices. In the present section effort has been made to identify indigenous food practices followed by farm families and the results of homestead practices are as under:

Post harvest practices in cereal, pulses and millets

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 cereal and pulse crops are 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 harvesting, it may lead to a

considerable loss to the producers. Hence, in this section efforts have been made to document the indigenous post harvest practices i.e. threshing, winnowing, drying, dehusking/milling and storage in the following cereals, millets and pulses as reported by farm families.

- Cereals: Paddy and Wheat
- Millets: Fingermillet, Foxtail millet and Barnyard millet
- Pulses: Whole horse gram, Black soyabean and Lentil

4.3.1 Indigenous Post Harvest Practices in Paddy Crop

(a) Threshing

Threshing is one of the post harvest operations that are absolutely necessary to bring the food grains into edible form. It is an act where, after harvesting, the kernel of the grains is separated from the stalk. After harvesting and before threshing the bundles of paddy are stacked at one place and allowed to remain in the field for few days so that moisture content from the grain can be removed and the stalks become ready for threshing.

The most common method of threshing observed in the study area was rubbing of paddy stalks with bare human feet. Majority of the respondents (81.25%) reported that after sun drying for a few days in field, they use to rub paddy with their bare feet and seeds are collected in the basket (*dall* or *doka*).Farm families reasoned that it separates the panicle from paddy stalk. Another method of threshing which was practice by 18 per cent of the farm families was beating of paddy stalk with wooden log or iron stick for separation of panicle from the stalk (Table 4.14).

(b) Winnowing

Winnowing is the process of separating the unwanted foreign material from the cereal crop. The farmers have their own peculiar method of winnowing where paddy is placed in shallow bamboo basket and allow falling from a height of about 4-5 feet in a thin vertical layer. Simultaneously two people hold the folded cloth sheet and allow the sheet to blow in the direction of wind (called *fatau* in local parlance).The cloth sheet acts as a blower which creates wind so that light dirt and external particles removes easily from the paddy. Rest half of the respondent kept the threshed paddy in the shallow basket (*soop),* is allowed to fall from a height of 4-5 ft in a thin vertical

flow in the path of a cross wind. By doing this way the lighter dirt particles is blown away and the heavier grain are separated as it falls straight to the ground.

Table 4.14: Indigenous post harvest practices followed by farm families in paddy

N=480

SN	Indigenous practices	Reason	f (%)
Threshing			
1.	Keeping harvested crop in the field for 3-4 days	Helps to remove moisture in sunlight	480(100)
2.	Rubbing of paddy stalk with bare human feet in field	Separate the panicle from paddy stalk	390(81.25)
	Beating with wooden log or iron stick	Separate the panicle from paddy stalk	90(18.75)
Winnowing			
1.	Falling of paddy from shallow bamboo basket (4-5 feet) in the direction of wind by folded cloth sheet	Lighter dirt or external particles remove easily	250(50)
	Paddy is kept in shallow basket and allow to fall from a height of about 4-5 ft in a thin vertical flow	Lighter dirt or external particles remove easily	250(50)
Sun drying			
1.	Sun drying for a week in the courtyard	Removes excessive moisture and reduces chances of insect-pest attack	480(100)
Dehusking			
1.	Use of stone made mortar and pestle(wooden 6 feet log have metal round plate at the edges)	Removes the husk from the paddy	480(100)

(c) Sun drying

For sun drying, grains are exposed to sun by evenly distributed it on the *soop, mahut* (mat) and *bisau* in the courtyard. The farm families reasoned that drying of produce is pre-requisite for safe storage (100%) as it removes excessive moisture and hence chances insect-pest infestation are meagre.

The study is line with Sanadhya *et al.* (2002) on "Indigenous post-harvest management in tribal and non-tribal areas of Rajasthan" who reported that to protect food grains from insect infestation, it is essential to dry the produce properly. It was found that 100 per cent respondents of both the areas (tribal and non tribal) were using sun-drying method, which is a traditional practice and has a scientific rationality. Sun drying has been found effective in protecting grain from insect infestation.

(d) Dehusking

Farm families use to dehusk the paddy for daily consumption purpose in a stone mortar (*Okhali*) with the help of wooden pestle (*musau)*(a 6 feet log have metal round plate at the edges) for paddy dehusking. Paddy is poured in the stone made mortar and pounded continuously with wooden pestle for removing the outer cover. After dehusking the husk (*boos*) is removed from the rice with the help of bamboo shallow basket.

Use of paddy waste (Husk and Paddy straw)

Paddy husk and straw is a waste which is widely used by farm families in different ways (Table 4.15).

- All the respondents feed the rice husk to the drought animals. It is mixed with finger millet, common salt and kneaded properly by adding water. It is then made into small balls and used for feeding of drought animals.
- More than 70 per cent (73.95%) of the respondents use husk for cleaning of utensils as it removes the oiliness and stickiness in the utensils.
- All the respondents prepare the hay by stalks of paddy and feed the hay to the animals in winter season when there is shortage of green fodder.

Table 4.15: Indigenous practices regarding use of paddy waste

N=480

SN	Indigenous practices	Reason	f(%)
1.	Rice husk (*Boos*) –Used as a cattle feed	It provide strength to animals	480(100)
2.	Rubbing dirty utensils by using rice husk	Removes oiliness and stickiness utensils	355(73.95)
3.	Haymaking(*Lut*) of paddy stalks	It is used to feed the animal in winter season	480(100)

Singh and Tyagi (2014) in a study on "Popular ITK Practices in *Kumaon* Region of Uttarakhand" reported the same that rice stalks are the major source of fodder during winter. After manual threshing, small bundles of the rice stalks are prepared. In the lean months, i.e., winter, when there is acute shortage of fodder, the rice stalk bundles are taken out, chopped, and fed to cattle.

4.3.2 Indigenous Post Harvest Practices in Wheat Crop

(a) Threshing by bullock trampling

Regarding threshing it was found that none of the respondents were using thresher for threshing of wheat inspite, all of them were using the bullocks for the same. Farm families reported that for bullock trampling sun dried wheat stalks are dispersed on thrashing floor in a circular heap. Then bullocks are made to walk over the heap in a circular manner. After this, the heap is turned over for complete threshing (Table 4.16).

(b) Winnowing

The respondents followed the same method as recorded in the paddy crop.

Meena and Dangi (2009-10) in a study on "Traditional wisdom of farmers in the post-harvest technology of food grains" revealed that majority of the farmers used to thresh the wheat crop by means of bullocks. In doing so, animals are required to take hundreds of revolutions around the wooden pole. Regarding winnowing of the food grains, it was found that out of total 150 respondents, 111(74%) preferred the natural wind for separating the grains from the straw. It was also observed that the

farmers, who used to thresh the wheat crop with the help of thresher, also need to go for winnowing of food grains with the help of wind. To prevent food grains from insect infestation it is essential that the produce should be dried properly and for this, cent per cent respondents preferred sunlight for drying.

Table 4.16: Indigenous post harvest practices followed by farm families in wheat

N=480

SN	Indigenous practices	Reason	f(%)
1.Threshing			
	Threshing by bullocks trampling	It separate the panicle from paddy stalk	480(100)
2.Winnowing			
	Wheat is placed in shallow basket, and allow to fall from a height of about 4-5 ft in a thin vertical flow	Light weight dirt and external partices	250(50)
	Falling of wheat from shallow basket(4-5 feet) in the direction of wind by folded cloth sheet	Straw, chaff, immature grains, stones, and other substances are separated	250(50)
3.Milling of wheat grain			
	Water mill (*gharat)* commonly used for grinding of wheat grain	Locally made and feasible	285(59.37)

(c) Milling of wheat

It was observed that traditional water mills for grinding wheat is widely used in the Himalayan regions mainly in Bageshwar and Almora districts as there is abundant water availability in the area. Water mill (*Gharat)* is basically situated near the river area or where water is flows continuously. Nearly 60 per cent respondents reported to use water mills for milling of wheat which was owned either individual or shared on a community basis

Use of waste

After threshing of wheat husk and straw were used by the respondents for feeding the animals.

4.3.3 Indigenous Post Harvest Practices in Selected Millets Crops

In *Kumaon* region basically three types of millets i.e. finger millet, foxtail millet and barnyard millet are grown mainly for consumption purpose and no extra postharvest maintenance is required in millets as they remain safe without any kind of storage practices. However the indigenous practices followed by farm families in threshing and winnowing of millets have been identified and presented as under.

Table 4.17: Indigenous post harvest practices followed by farm families in millets

N=480

SN	Indigenous practices	Reason	f(%)
1. Threshing			
	Rubbing either with hands or legs	Seeds get separated from spikelets	290(60.41)
	Beating with wooden log	Seeds get separated from spikelets	190(39.58)
2.Winnowing			
	Millet is kept in shallow basket and allow to fall from a height of about 4-5 ft in a thin vertical flow	Separation of the outer layer	480(100)

(a) Threshing- Table 4.17 reflects that 60 per cent of the respondents reported after harvesting of harvested produce is threshed either by rubbing with hands or with bare human foot whereas, 39.58 per cent farm families were beating ear heads with wooden log for separation of seeds from the spikelet.

(b) Winnowing-The threshed ear heads are kept in a bamboo basket and allow to fall from a height of 4-5 feet in thin vertical layer in the direction of wind.

4.3.4 Indigenous Post Harvest Practices in Selected Pulse Crop

The postharvest practices in followed by farm families are presented as under.

(a) Threshing

For threshing of pulses, all the respondents reported that bundles of harvested produce are spread over threshing floor and beaten with the help of wooden log or iron rod for separating grains from the pod. Farm families further stated that the threshing floor must have a hard and clean surface and threshing should be done with great care to avoid breakage of grains.

(b) Winnowing

Data in Table 4.18 show that all the respondents reported that after threshing, the dry threshed grain are placed in a shallow basket and allow to fall from a height of about 4-5 ft in a thin vertical flow in the path of a cross wind. They reasoned that the lighter dirt particles and husk is blown away and the heavier grain is thus separated as it falls straight to the ground.

Table 4.18: Indigenous post harvest practices followed by farm families in pulses

N=480

S.No.	Indigenous practices	Reason given by farm families	f(%)
1.Threshing			
	Beating pulses with wooden log or iron rod	For separation of pods from the grains	480(100)
2.Winnowing			
	Placing in shallow basket is allow to fall from a height of about 4-5 ft in cross wind direction	It leads to separation of dirt and husk from the grain	480(100)
3.Sun drying			
	Drying for a week in sunlight	Reduces excessive moisture which leads pest attack	480(100)
4.Milling			
	By stone mill(hand *chakki*) By slight grinding in granite stone(*seel batta)*	Dehusk the pulses Dehusk the pulses	365(76.04) 115(23.95)

(c) Sun drying

For a longer shelf life pulses are dried in sunlight for one week as it removes excessive moisture which leads to pest attack. After proper drying the pulses are stored in the air tight containers.

(d) Milling

Pulses are mostly consumed in the form of dehusked splits, commonly known as *dal.* In case of Whole horsegram and Black soybean milling is not required as it is consumed as such. However in case of Lentil (*Lens esculenta*) milling is performed. This involves grinding of grains by using a stone mill (hand *chakki*) (76.04%) and by granite *seel-batta*(23.95%).

4.3.5 Indigenous Storage Practices in Cereal, Pulses and Millets

Storage is the process of keeping grains to protect them from changing weather and pests for a short or long period. The basic requirement of a good storage practice is a healthy, clean and uniformly dried grain. The indigenous practices follow by the respondents for storage of cereals, pulses and millets are described as under.

I. Sun drying structures used by the farm families

(a) ***Mauhat*****-** It is similar to mat made of bamboo stripes interwoven by hand. Basically farm families used to dry wheat and paddy grains in large amount on *mauhat.*

(b) ***Bisau*****-** It is a flat and oval shaped structure made up of bamboo stripes which is plastered with mixture of cowdung, cowurine and black ash of *chula* from outside and inside. Respondents reported that *bisau* is commonly used to dry cereal and pulses (Plate 3).

II. Indigenous Storage Structures

It is estimated that sixty to seventy per cent of food grains produced in India is stored at household level in indigenously fabricated storage structures and containers. The indigenous fabrication is governed by availability of eco friendly materials such as straw, cereal stalks, reed, bamboo, mud, wood, etc.(Verma *et al,* 2005). In *Kumaon* region farm families use various kinds of storage structures for keeping the grains for their long shelf life.

(a) *Bhakaar* (Wooden box) - *Bhakar* is a huge wooden rectangular box used to keep wheat and paddy for longer time period. It is generally made up of pine or deodar wood. The wooden box is plastered with a mixture of mud, cow urine and cow dung on the inner as well as outside. The respondents reported that the plastered box has to be sun dried properly otherwise it may cause insect-pest infestation in the stored produce.

(b) *Doke*- *Doke* is a cylindrical or oval bamboo (*nigal)* basket plastered inside and outside with a mixture of cow dung and mud then dried in sunlight. The capacity of *doke* ranges from 50 to 100 kg. Plastering of structure with cow dung and mud protects the grain from the spoilage and infestation from the insect and pests as reported by the farm families.

The findings of the study get decisive support by the study of Verma *et al.* (2005) on "Eco friendly grain storage structure in India" reported that *hak* is a cone shaped indoor storage basket that is commonly used in the hill zone of Assam. The bamboo basket is made by using half inch wide bamboo strips that are interwoven. The storage capacity varies from 50 to 200 kg. The grains can be stored for 4 to 6 months only without quality degeneration.

(c) *Tumri*- Farmers reported that *tumri is* constructed with a round or oval shaped dried bottle gourd (*Tumri*) which is abundantly cultivated in the *Kumaon* region and lid is generally made of either wood or dried grasses. Usually 10-15 kg grains can be stored in a standard size *tumri* and it is basically used to store seeds for the next season crop.

(d) Storage bags-Farm families used to keep their grain especially wheat, paddy and millets in storage bags. The respondents reported that various types of bags are used such as jute and polythene- lined jute bags for storage purpose.

(e) Metal bins: Metals bins made up of steel, copper and tin are used to store the pulses and millets especially in Himalayan region. The name of the common bins is *Kantar, Taul, Gaghar and Kasra.*

(f) *Theki*- *Theki* is a wooden container traditionally used for storage of millets and pulses.

It is evident from the Table 4.19 that for storage of paddy grains, majority of the farm families used *Bhakar, Doke* and Gunny bags with 90, 86 and 67 per cent, respectively.

A very few respondents (7.29%) used metal bins for keeping paddy grains. In case of wheat, majority of the respondents (90.20%) stored the grain in a wooden made *Bhakar*, along with that the respondents also stored in Gunny bags (51%), *Doke* (23%) and in metal bins (3%).

For storage of millets majority of the respondents kept in metal bins (84%) whereas, 45.83 and 30.20 per cent stored in *Tumri* and *Doke* respectively. For storage of pulses majority (66.87%) of the farm families used *Tumri*.

Table 4.19: Indigenous grain storage structures used by the farm families for keeping cereals, pulses and millets

Food grains	**Indigenous storage structures used by farm families***					
	Bhakar	***Doke***	***Tumri***	**Gunny bags**	**Metal bins**	***Theki***
Paddy (N=480)	433(90.20)	414(86.25)	0	325(67.70)	35(7.29)	0
Wheat (N=480)	433(90.20)	115(23.29)	0	245(51.04)	15(3.12)	0
Millets (N=480)	66(13.75)	145(30.20)	220(45.83)	110(22.9)	405(84.37)	55(11.45)
Pulses (N=480)	0	0	321(66.87)	0	96(20)	63(13.12)

*Multiple responses

III Storage practices

In indigenous storage practices a number of locally available plant leaves, oil, and ash have been used by the farm families to store the paddy, wheat, millets and pulses. Their insecticidal action is not as quick as those of synthetic insecticides, yet these have certain advantages, being least toxic in nature, possess long time surface persistence, without any adverse effect on germiniability of seed, cooking or milling. The indigenous storage practices followed by the respondents are given as under.

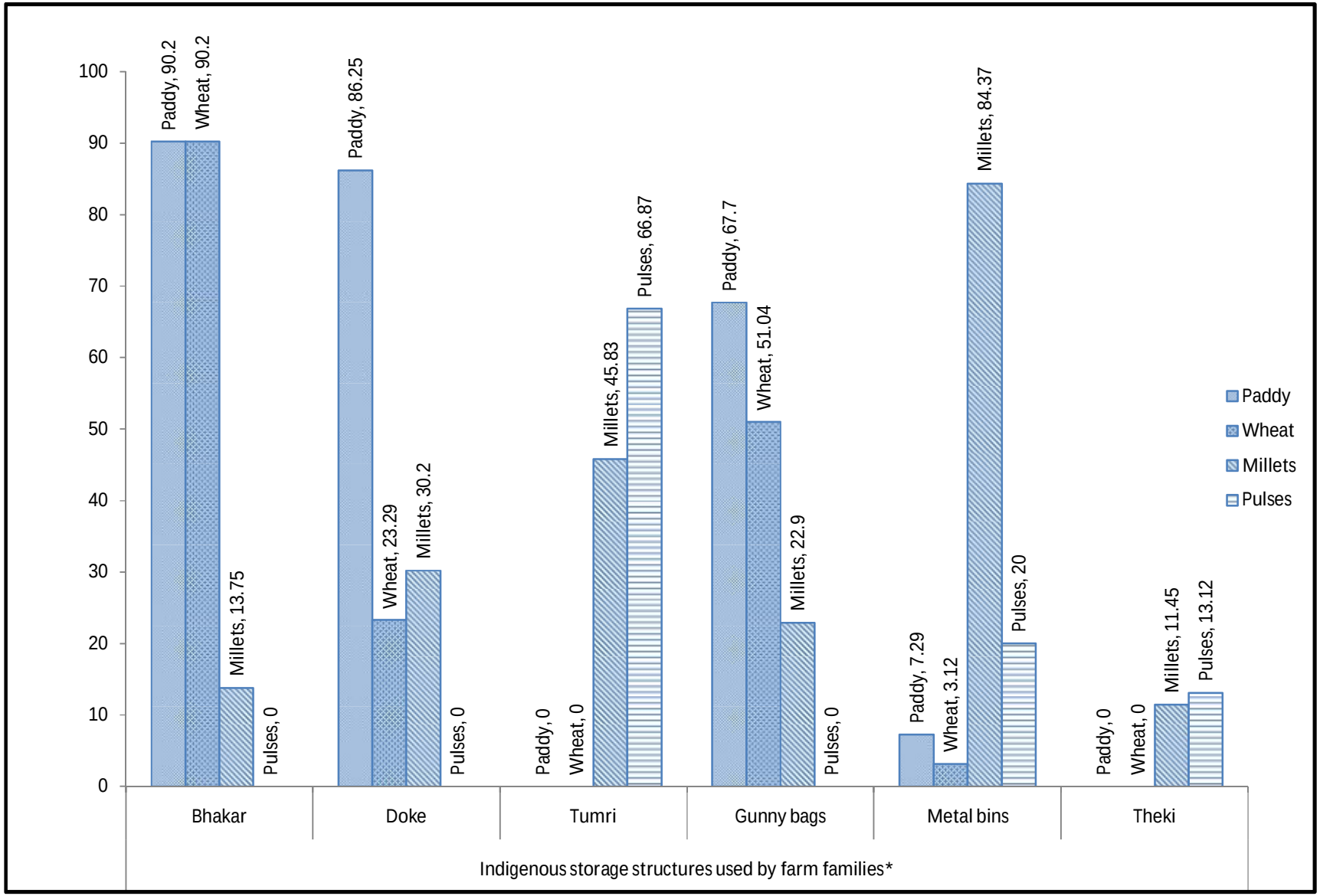


Fig 13: Indigenous grain storage structures used by the farm families for keeping cereals, pulses and millets

1. **Using dried leaves of food grains-** A perusal of data given in Table 4.20 reveal that all the respondents of the study area use leaves of walnut (*Juglans regia* Linn.) in storage structures. In an informal group discussion farm families reported that the plants leaves are dried in sun for a day. Then the dried leaves are kept in the food grains at bottom, middle and top layer. Respondents reasoned that these leaves give pungent smell, which do not allow the attack of insect pests and protect grains from insect infestation for six to eight months.

2. **Using cow dung ash in wheat**- Table 4.20 show that three fourth farm families mixed the ash of cowdung (*Khar* in local dialect) with grains before storing in storage structures. Respondents roughly estimated that use to mix 10 kg ash of cow dung in 60-70 kg grains and cover the storage structure with a lid. This will preserve the wheat from insects - pest infestation till one year.

Das *et al.*(1999) have proved the efficacy of ash against wheat(*Triticum aestivum* L.) grain insect pests. Similarly Singh, 2003 reported that tribal farmers use dry leaves of *neem* @ 2.5/100/kg seed of wheat for controlling storage pests.

3. **Use of common salt**- Due to problem of storage, respondents use to store paddy instead of rice grains, as rice grains are more susceptible to the grain pests. About 2 kg of the salt is mixed with 50 kg of the grains as it controls moth and weevil infestation in paddy for six months.
4. **Use of rhizomes of turmeric or onion-** Data in Table 4.20 reflect that 44.79 per cent of the farm families use 2-3 rhizomes of turmeric or onion for storage of 50 kg rice as it provide protection against insects and can save upto period of 6 months.

Kanwar and Sharma(2006) in a study on “Indigenous crop storage practices”, reported that majority of the respondents(93.33%) stated that rice can be stored for 6-7 months by mixing 2-3 bulbs of onion or turmeric in 50 kg of rice or mixing mint(*Mentha longifolia)* leaves.

5. **Using Lime (*Chuna)* and wood ash -** Farmers of Almora and Bageshwar districts (21.87%) were using lime *(chuna)* along with wood ash for storing grains. In the month of May-June wheat grains are dried in sun and then lime @ 2kg and wood ash @ 10 kg per quintal is rub by hand for about half an

hour. By using this practice the grain can be store for two to three years without any spoilage.

6. **Polishing of pulses with mustard oil and common salt-** It was found that majority of the farm families (90.62%) mixed about 10 ml mustard oil and 10 gm common salt salt/ kg of pulse and rubbing them properly, before storing in the bins. Respondents reasoned that by this the chances of insect-pest infestation can be minimized till one year.

7. **Polishing of pulses with mustard oil -** Data in Table 4.20 show that more than 80 per cent of the farm families used only mustard oil for storage of pulses@ 10 ml/ kg of seed. The coating of mustard oil helps to check insect-pest infestation.

Gogoi and Majumder (2001) in a study reported the same that pulses are treated with pure mustard (*Brassica sp.)* oil @ 10 ml/kg seed and stored in a close container or bamboo. This will keep free from damage caused by storage insects.

8. **Use of garlic splits for storage of pulses** –More than three fourth of the farm families use garlic splits @ 20 gm /kg of seed for prevention of pulse beetle *(Callosob ruchus sp.)* and pulse can be stored up to one year without any infestation.

9. **Use of turmeric powder and mustard oil-**Data further show that 47.91 per cent of the farm families used turmeric powder and mustard oil for storing of pulses especially lentil. The respondents reported that the turmeric powder (20gm) and mustard oil (10 ml) are mixed thoroughly with the seeds and stored in an air tight container.

10. **Soaking of pulses in cow urine** – A very peculiar method of storage of pulses was recorded where the farm families used to soak the pulses in cow urine for about half an hour followed by sun drying. Before consumption, the pulses are washed thoroughly in order to avoid pungent smell of cow urine. The respondents reported that pulses can be stored safely for 6-7 months by following practice.

Table 4.20: Indigenous storage practices followed by farm families for keeping cereals, pulses and millets N=480

SN	Indigenous grain storages practices	Grain	Reason	Shelf life	f (%)
1.	Using dried leaves of walnut	Wheat	Pungent smell of leaves saves grain from insect/pests	1 to 1 ½ year	480(100)
2.	Mixing 10 kg cowdung ash in 60-70 Kg of wheat grain	Wheat	Preserve from insects and pest infestation	1 year	365(76.04)
3.	Adding 300 gm of common salt in 100kg bag	Paddy	It controls moth and weevil infestation	6 Months	235(48.95)
4.	Adding 2-3 rhizomes of turmeric or onion in 50 kg bag	Paddy	Provide protection against insects	6 Months	215(44.79)
5.	Using of Lime and wood ash	Paddy	Save from spoilage	2-3 Years	105(21.87)
6.	Mixing of 8-10 ml mustard oil and 10 gm common salt in pulses	*Gahat* & *Masoor*	Save from spoilage of insects	Upto1 year	435(90.62)
7.	Using of mustard oil for storage of pulses	*GahatMasoor* & *Bhatt*	Helps to check insect infestation	Upto 1 year	410(85.41)
8.	100 gm Garlic splits *(Allium sativum)* in 5kg pulses	*Gahat Masoor* & *Bhatt*	To avoid the attack of pulse beetle *(Callosob ruchus sp.)*	Upto 1 year	370(77.08)
9.	Mixing of turmeric powder and mustard oil	*Masoor*	It protects from pest infestation	1 year	230(47.91)
10.	Soaking cow urine followed by sun drying	*Gahat* & *Masoor*	Protect the pulse from spoilage and pests	6-7 months	190(39.58)

Conclusion

Information depicted that rural farm families use indigenous knowledge for constructing eco-friendly grain storage structures and also uses indigenous storage practices at household level which protects the cereal and pulse crops from insect-pest infestation during storage. The rationality behind this is the easy availability of user-friendly and cost –effective materials.

4.3.6 Indigenous Child Care Practices

Child birth is a time of transition and social celebration in many societies, signalling an adjustment of cultural responsibilities. Indigenous practices related to child health care are an important aspect as infants are the valuable resources of the nation. Child care is the major responsibility of women and they are the reservoirs of many of the indigenous practices which they have been transmitted to them from generation to generation. There is an urgent need to identify and document indigenous. Technical knowhow and make efforts to trace this valuable knowledge otherwise it will be lost soon and not to be regained in future at any cost. Hence in this section an effort has made to identify and document indigenous child care practices of the rural farm women with special reference to child birth, child care, breast feeding, supplementary feeding practices and common child health problems.

CHILD BIRTH

Regarding child birth practices, data presented in Table 4.21 indicate that majority of the rural women (88%) delivered child at home. The respondents reported that traditional *choie* (midwife) use to assist in child birth as they are well experienced and it is their caste occupation. In an informal discussion women revealed that there were no hospitals and maternity centre in their village premises from where they can get help. Regarding preparation for delivery all the respondents reported that before onset of delivery clean bowl, clean cloth and new blades are kept ready to maintain proper hygienic conditions during delivery.

All the women reported that, they rested in separate room which is coated with cow dung after delivery of baby. The reason was that new born baby after birth enters in a new environment so there are chances of spreading of infection to mother and baby. The mother and new born baby are not allowed to move outside the room.

Further Table 4.21 shows that all the respondents followed the practice of keeping the mother and newborn in the same room where delivery occurs for 11 days as moving out is not considered auspicious before the *pooja* ceremony take place and after on the eleventh day, the baby is exposed to sun. Sixty seven per cent of the respondents stated that most interior room with minimum ventilation and light is preferred in rural areas for keeping the new born and mother till 2 months. Farm women reported that low light was used to maintain required warmth and newborn can sleep well with low light and air which is considered good for the health of the newborn whereas, 33 per cent of the farm women reflected that a room with maximum ventilation may affect the newborn health adversely.

Sinha (2004) in a study on "Traditional infant health care practices prevalent in the tribal areas of Hazaribag District" reported that new born sleep well in a room with minimum ventilation and light.

Table 4.21: Indigenous practices followed by farm women related to child birth

N=480

SN	Indigenous Practices	Reasons	f (%)
1.	Delivery at home	Traditional midwives (*Choi*) assisted in child birth	420(87.5)
2.	Arrangement of clean bowl, clean clothes and new blade for delivery	To maintain hygiene for prevention of infection	480(100)
3.	Women and new born rested in a separate room coated with cow dung	Cow dung prevents the child and mother from infection	480(100)
4.	Mother and new born is not allow to move outside for 11 days	Not considered auspicious before the *pooja* ceremony	480(100)
5.	The resting room with minimum of ventilation and light is preferred	The new born child sleep well in room with low light and air	320(66.66)
		A room with maximum ventilation may affect the newborn health adversely	160(33.33)

CHILD CARE

Child care includes various aspects i.e. bathing, clothing, massaging and sleeping pattern, presented under this section:

Bathing

It is a common practice to give bath to the new born baby after half hour of birth with luke warm water. Similarly the new born baby is fed with 4-5 drops of honey (*gutti)* immediately after the birth. The respondents reasoned that honey provide warmness to the body (92%). Nagnur *et al.* (2010) reported that *Ghutti* feeding is a traditional child rearing practice widely prevalent in most parts of India. *Ghutti* is a polyherbal combination of spices, dry fruits, nuts, roots and leaves of medicinal plants.

Nearly 80 per cent respondents reported that bath should be given on alternate days and women reasoned that daily bath may affect child's health and there is a chance of cold and pneumonia (Table 4.22).

The findings of the study gets decisive support by the study of Gurung (2008) that there are cultural beliefs associated with newborn bathing. In Nepal, bathing a baby soon after birth was widely prevalent because the baby's body is coated with vernix, which is considered dirty. Therefore, bathing a baby soon after birth is a custom. People also fear that if the baby's skin is not cleaned soon, the baby will get skin infections. Usually, babies are bathed with lukewarm water after cord cutting of umbilical cord.

MASSAGING

Data in Table 4.22 depict the indigenous massaging practices prevalent among rural women. All the respondents reported that massaging is done with hot mustard oil after bathing thrice a day for about a year in early sunlight. The logic was that till one year child's bone is delicate so it considered good for strengthening the baby's bones. In order to remove excess hair from the baby's body massaging with kneaded wheat dough dipped in mustard oil is done from birth to 3 months. Besides that some of the respondents (13%) use *Bhangjeera* oil (*Perilla frutescens)* for massaging the new born body.

The research findings can be very well supported by the study of Salvi (n.d.) on "Traditional Beliefs and Practices Regarding Newborn Care among Postnatal Mothers

Residing in Selected Rural Areas of Pune District, Maharashtra" who suggested that 97 per cent respondents use to massage infant body with sesame seed oil. They also apply oil to baby's skull as they believed that massaging is useful for baby's skin, keeps the body clean, helps in gaining weight and prevents baby from becoming handicapped, strengthens baby's bones and prevents common cold to baby.

Table 4.22: Indigenous practices followed by farm families related to bathing, massaging and sleeping pattern of infants N=480

SN	Indigenous practices	Reason	f (%)
BATHING PRACTICES			
1.	Bath is given to newborn with luke warm water after delivery and fed *gutti* of honey	Cold water may affect the health of newborn and honey provides warmness in body	440(91.66)
2.	Bath the new born baby on alternate days	Traditional custom	380(79.16)
MASSAGING			
1.	Massing is done with mustard oil thrice a day in early sunlight till one year	Considered good for strengthening of bones	480(100)
2.	Massaging is done for 3 months with wheat dough dipped in mustard oil	For removing excess hair	480(100)
3.	Massage the body with 20 ml *Bhangjeera(Perilla frutescens)*oil	Give strength to bones of new born baby	60(13)
SLEEPING PATTERN			
1.	Make child sleep straight i.e. on back always	a. Comfortable and sleep well b. Traditional belief that head enlarges when sleep on side c. To breathe properly	360(75) 290(60.41) 156(32.5)

SLEEPING PATTERN

Regarding sleeping pattern, 75 per cent rural farm women follow the practice of making child sleep straight on back till the infant turns on himself or herself. The respondents reasoned that infant feel comfortable, sleep well and also maintain a good body posture in this position. More than 60 per cent respondents also reasoned that head of the baby enlarges when he sleeps on side whereas, 32.5 per cent respondents reasoned that in straight direction child can breathe properly (Table 4.22).

The above finding can be supported by the findings of Jain (2000) who reported that child was made to sleep straight on the back as reported by almost all the respondents. The reason put forth by the majority (81.7%) was that the child is very comfortable and sleeps well in straight position (on the back).Further baby may be unable to breathe if made to sleep on stomach (44.7%). It was also a traditional belief that the head of the baby enlarges when he sleeps on side (54.7%).

Table 4.23: Indigenous practices followed by farm women related to breast feeding N=480

SN	Indigenous practices	Reason	f(%)
1.	New born is breast fed after 8-10 hours of delivery	To avoid intake off colostrum	480(100)
2.	New born is breast feed as per demand of child(8-10 times in a day)	Throat of newborn should not get dried and child sleeps well	360(75)
3.	Mother breast fed the new born in sitting position	Mother feel comfortable	400(83.33)
4.	Breast fed the infant till 2 years	Painful for mother as child's teeth emerged	330(68.75)
		The milk production normally stopped at this time	150(31.25)
5.	When mother's milk is insufficient cow's milk is given along with breast feeding(1:1 and 1:1.5)	Cow's milk is easy in digestion	420(87.5)

BREAST FEEDING

Information related to indigenous practices of breast feeding is presented in Table 4.23. In order to avoid first milk (colostrum), all the respondents started breast feeding

after 8-10 hours of birth. Respondents reasoned that the first milk is heavy and difficult to digest. Besides this it is thick so difficult to swallow by the infant.

With regards to duration of breast feeding, data in Table 4.23 indicate that 75 per cent respondents breast fed the new born baby as per the demand (Approximately 8-10 times in a day). The reason is that throat of the newly born child should not get dried so that child can sleep well. About the position of breast feeding ,more than 80 per cent rural women breast fed the child in sitting position as they feel comfortable in sitting position. Breast feeding is given up to 2 years of age (68.75%). The respondents stated that after two years it is painful as child teeth emerged. Besides that 31.25 per cent respondents reasoned that the milk production normally stopped after two years.

Further data in Table 4.23 indicate that cow's milk is given along with breast feeding whenever mother's milk is not sufficient (86%).Cow milk is considered light in consistency hence easily digested and milk is diluted with equal amount of water(1:1 or 1:1.5) for feeding the baby.

The above findings regarding duration of breast feeding is quite similar to the findings of NIN Hyderabad (2002) who reports that majority of the women breast fed their children up to 18-24 months in rural areas of India as according to them it is a traditional practice.

Similar results was reported by Sinha (2004) that when milk of mother was not sufficient then cow/goat milk was given by majority of the respondents (81%) and cow/goat milk was diluted with equal proportion of water and milk (1:1) as it helps in easy digestion.

SUPPLEMENTRY FEEDING PRACTICES

Child rearing practices particularly the weaning foods given to the child determine to a large extent the health of the child in the first year of his/her life. A ritual ceremony called *Annaprashan* is celebrated by the farm families in which cereals and other solid foods are introduced to the child first time after birth. Data in Table 4.24 show that first food is introduced to girls after 5 months and after 7 month to boys (81.25%). The respondents reasoned that boys are weaker biologically and should be breast fed one or two months longer than the baby girl.

The various supplementary foods given by the respondents to the infant after 5-7 months are semi liquid foods like *lapsi* (91.66%), *dal* soup (89.58%), *khichdi* (87.5%), cooked rice water (74.16%), mashed chapatti in *dal* (72.9%) and mashed rice and banana (58.33%).Respondents reasoned that these semi liquid foods are easy to digest. After 1 year, respondents use to serve all cooked meal to the child (89.58%) as by this time the child teeth emerges and his/her digestion improves. Respondents introduced non-vegetarian foods like *desi* boiled egg, soft chicken, mutton and fish in the child's after one year in the diet as it provides strength to the growing baby (38.33%).

Table 4.24: Indigenous practices followed by farm women related to supplementary feeding **N=480**

SN	Indigenous practices	Reason	f(%)
	Annaprashan (Introducing cereals and other solid foods)		
1.	Supplementary feeding after 5 months for baby girl and after 7 months to baby boy	Boys are seems to be weaker biologically as compared to girls	390(81.25)
2.	**First supplementary feed**	These semi solid food are easy to digest	430(89.58)
	Dal soup		
	Cooked rice water		356(74.16)
	Mashed rice and banana		280(58.33)
	Mashed chapatti in *dal*		350(72.9)
	Khichdi		420(87.5)
	Lapsi		440(91.66)
3.	**After 1 year**	Child teeth emerges and his digestion improves	430(89.58)
	All type of cooked food		
	Introduction of non vegetarian food in diet	For increasing the body strength	184(38.33)
4.	**Frequency of Supplement feeding**	For growth and development of child	
	Two times		130(27.08)
	Three times		90(60.41)
	More than three times		60(12.5)

With regards to frequency of supplementary feeding, respondents reported that initially the feed is given in small amount and slowly the amount is increased. It was found that food was given two times, three times and more than three times in a day by 27.08, 60.41 and 12.5 per cent respondents, respectively. The respondents reasoned that for growth and development of child, time to time feeding is necessary (Table 4.24).

COMMON CHILD HEALTH PROBLEMS

Rural mothers follow several indigenous practices for treatment of common health problems in child. In the present investigation an effort has been made to identify and document indigenous practices followed by the respondents for treatment common health problems in child i.e. vomiting, stomachache, cold and cough, fever, diarrhoea, measles and jaundice.

Vomiting

- **Honey with mother's milk-** 1 drop honey is mixed with 4 drops of mother's milk and is given thrice a day to the child (60%).

Stomach pain and cramps

- *Hisalu* (*Rubus ellipticus* Sm.): 20 gm *Hisalu* roots are grinded and made into a fine paste by adding water. This paste is given twice a day to the child in morning and evening time (75%).
- *Kaphlya* (*Geranium wallichianum* D.Don): 20 gm roots of *Kaphlya* are grinded and made into a fine paste by adding water.This paste is given twice a day to the child in morning and evening time during stomach cramps (60.41%).
- Cumin seeds (*Trachyspermum ammi*): 10 gm cumin seeds are boiled in 200 ml water for 5-10 minutes then the solution is kept for cooling. This solution is given to child during stomach cramps (57.5%).
- Apricot (*Prunus armeniacal* L.): Seeds of apricot are dried in sun and then make a fine paste by adding water. This paste is given to child during stomach pain (47.91%).

- *Babansi* (*Valeriana jatamansi*): Leaves of *Babansi* are cooked in water to make a decoction. 1 tsp of decoction is mixed in a glass of milk and given twice a day to the child during stomach pain (39.58%).
- *Harad* (*Terminalia chebula*): A small piece of *Harad* is given to child with luke warm water for reducing stomach cramps (27.08%).

Fever

Data in Table 4.25 present the indigenous practices prevalent among rural women for curing fever.

- *Tulsi (Ocimum sanctum):* Aerial parts of *Tulsi* and carom seeds are cooked and made into a decoction. This preparation is given to child in every 5 hours intervals. According to respondents it helps in reducing fever (75%).
- Cold water sponging: Take a bowl of cold water and sponge the body with the cotton cloth as it helps in bringing down the body temperature (62.5%).

Eczmea/red eruptions

- Peach (*Prunus persica):* 5-6 leaves of Peach and *Paatee* (*Artemisia nilagirica*) are grinded and made into a fine paste then 20 ml cow's urine is added in it. Rub the fine paste on the affected parts of the body (54.16%).

Diarrhoea

- Salt and sugar solution: Make a solution of salt (1 gm) and sugar (1 tsp) in one glass of water and it is given to the child 3-4 times a day to cure dehydration and diarrhoea (87.5%).
- Intake of boiled water: Always given boiled water to the child as it prevents diarrhoea and other water born diseases (81.5%).

Cough and cold

- Garland of garlic: In a peculiar practice garland of garlic is wrapped around the child's neck as it has lot of healing qualities against cough and pertussis (50%).
- *Tulsi* (*Ocimum Sanctum)* carom seeds and ginger: 5-6 leaves of *Tulsi*, 5 gm carom (*Carum copticum*) seeds and one small split of ginger are grinded and made into a thin paste by adding water. This mixture is then mixed with honey and is given to the child 2-3 times a day with warm water in cough and cold condition (47.91%).

Table 4.25: Indigenous practices followed by farm women related to common child health problems N=480

S No.	Health problems	Indigenous practices	f(%)
1.	Vomiting and loose motion	Mixing 1 drop honey with 4 drop mother' breast milk	290(60.41)
2.	Stomach pain and cramps	Making paste of 20 gm of *Hisalu (Rubus ellipticus* Sm.) roots	360(75)
		Making paste of *Kaphlya* (*Geranium wallichianum* D.Don) roots	290(60.41)
		Boiling carom seeds (*Trachyspermum ammi*) in water	276(57.5)
		Making paste of 10 -15 seeds of ripen apricot (*Prunus armeniacal* L.) by adding water	230(47.91)
		Making decoction of *Babansi(Valeriana jatamansi* Jones*)* leaves, mixed with milk	190(39.58)
		Consume half piece of *Harad*(*Terminalia chebula*) with luke warm water	130(27.08)
3.	Fever	Making decoction of aerial parts of *Tulsi* (*Ocimum sanctum*) and carom seeds	180(75)
		Cold water sponging	150(62.5)
4.	Eczema	Grinding 5-6 leaves of *Paatee* (*Artemisia nilagirica*) and Peach (*Prunus persica*) and mixing in 20 ml cow's urine	130(54.16)
5.	Diarrhoea	Making one glass salt and sugar solution to	420(87.5)
		Giving boiled water	390(81.25)
6.	Cough and cold	Making garland of garlic and put it around child neck	240(50)
		Grinding 5-6 leaves of *Tulsi*(*Ocimum Sanctum)* with 5 gm carom seeds	230(47.91)
		10 gm bark of Pomegranate is grinded *(Punica granatum)* and boiled in 20 ml mother's milk and make a paste	150(31.25)
		Mothers milk is given to the child	480(100)
7.	Measles	Spread Foxtail millet(*Koni*) seeds over the child's bed	440(91.6)
		Give the porridge and mashed rice of *Koni*(Foxtail millet) to the child	400(83.33)
		Avoidance of fried food	380(79.16)
		Avoidance of daily bath during measles	356(74.16)
8.	Jaundice	Intake of mashed banana, buttermilk, redish, redish leaves and *Bhatt ka jaula* (Black Soybean)	230(95.8)

- Pomegranate (*Punica granatum*): 10gm bark of pomegranate is grinded and boiled in 20 ml mother's milk. This paste is given to the child during cough (31.25%).
- Mothers's milk: All the respondents give mothers' milk when the child is suffering from cough and cold. The respondents stated that mother's milk is the best remedy for curing all problems of child.

Measles

- Foxtail millet: Foxtail millet seeds are spreaded over the child's bed for recovery from measles (91.6%). More than 80 per cent of the respondents fed foxtail millet porridge to the child in measles.
- Avoidance of fried food: fried food is not given to child (79.16%) during measles.
- Avoid bath: Daily bath of the child during measles is avoided as it may aggravate the problem. The respondents stated that during measles child is given bath only after 22 days from his suffering (74.16%).

Jaundice

- In case of child suffering from jaundice, majority of the respondents reported that they use to give mashed banana, buttermilk, redish, redish leaves and *Bhatt ka jaula* (Black Soybean) to the child (95.8%)**.**

4.3.7 Indigenous Postpartum Practices

The postpartum period is a very special phase in the life of a woman and her newborn. For women experiencing childbirth for the first time, it marks probably the most significant and life-changing event they have yet lived where women marked by strong emotions, dramatic physical changes and altered into a new relationship. The first six weeks of postpartum care have great importance in mother's life where she is rejuvenated mentally and physically, with simple techniques in order to combat depression, indigestion and insomnia. In hilly rural areas of *Kumaon* region, women's and her newborn's health after delivery is neglected which results high mother and infant mortality rates. Improper care and insufficient diet leads to malnutrition. Hence, present investigation is carried out to explore the indigenous postpartum practices being followed by the rural farm women.

For effective delivery

With the completion of all the three trimesters of pregnancy women have to face the challenging stage i.e. the time to deliver a child. A woman requires lot of energy to deliver a child and tolerate the pain. Although it is found that the pregnant women in *Kumaon* hill region are not given due attention during whole pregnancy period but after onset of labour pains special indigenous foods are served to have faster and easier delivery.

Information presented in Table 4.26 revealed the various foods given to women for effective delivery

- **Clove, Nutmeg and *Ghee***: ¼ tea spoon of cloves and nutmeg (*jaiphal*) are grinded and made into a thin paste then add in one glass of milk along with two tsp of *ghee*. This preparation is given to women before on set of delivery (52.08%). The respondents believe this preparation increases the contractions during delivery period.

- **Warm milk**: Warm milk is given with *gur* as it helps in increasing contractions (56.25%).

- **Carom seeds**: 10 gm carom seeds are boiled in water for 5 minutes and this solution is given to women (50%).

- **Fenugreek seeds**: 10 gm fenugreek seeds are boiled in water for 5 minutes and this solution is given to women (43.75%) as it increases labour contractions.

- ***Bhimal* (*Grewia optiva*):** Bark of *bhimal* is grinded and make a thin paste. For smooth delivery it is given to pregnant women (54.1%).

- ***Tulsi*, cow's urine and cow's dung**: Leaves of *tulsi* is grinded and made into a thin paste then mix 20 ml cow's urine and little amount of cow dung Respondents reasoned that the child slips downwards easily by taking this mixture and facilitates normal delivery (33.33%).

- **Boil milk and *ghee*:** Boil milk is given by adding one tsp *ghee* as it provides strength in facing labour pain (47.91%).

In support of the above findings, Sharma (2003) clearly reveal that at the onset of labour pain, the *Gaddi* tribal women in Himachal Pradesh use to give strong *kadha* of cloves, *jaiphal, mullathi, sonth* and *gur* to women. The respondents believed *kadha* as a type of homely injection used to facilitate easiest and quickest delivery. Out of these 37 per cent respondents used to give *kadha* by adding 3 to 4 tsp of *ghee* in it so that child moves downward easily. Few respondents (i.e. only 8%) also reported to give boiled milk with 2-3 tsp of *ghee*, to bear the labour pains by the pregnant women.

Removal of placenta

In rural *Kumaon* Himalayas placenta is not thrown as such after delivery and it has a great significance in the life of mother. It is reported by majority of the respondents (81.25%) that after delivery, placenta is wrapped in a cloth then buried under the milk secreting tree (*dudila* tree) as mother will always have milk for the baby and the baby will remain healthy (Table 4.26).

First diet after delivery

Different food items are given to the lactating mother till 11 days after delivery as presented in Table 4.26.

- ❖ **Thin *Suji halwa*:** Lactating women are given thin *suji halwa* during starting days. Farm women revealed that eating of grain/wheat chapatti during initial days after delivery would create unrest in the mother's stomach (70.83%).
- ❖ **Hot milk and brandy**: One glass hot milk and one cap brandy is given during initial days as it provides strength and removes problem of backache and stomach ache (60.41%).
- ❖ **Crushed fenugreek seeds and *ghee***: 1 tsp fenugreek seeds are crushed by adding ½ tea spoon *ghee* in it. This mixture is given to women during initial days after delivery for providing strength and warmness to mother (33.33%).
- ✓ It is very important to consider that all these foods are served to the lactating mother only in a standing position so that the food reaches to each and every part of the body.

Table 4.26: Indigenous practices regarding effective delivery and first diet of lactating women N=480

SN	Indigenous practices	Reason	f(%)
For effective delivery			
1.	¼ tea spoon grinded clove, nutmeg and one tsp *ghee* with a glass of milk	To increase the contractions	250(52.08)
2.	• Warm milk with *gur* (brown sugar) • Boiled carom seed water and • Boiled fenugreek seeds decoction	All these help in increasing contractions	270(56.25) 240(50) 210(43.75)
3.	Grinded bark of *Bhimal*(*Grewia optiva*) is given at the time of delivery	For smooth delivery	260(54.1)
4.	Mixing 8-10 leaves of grinded *Tulsi* paste with 20 ml cow's urine and little amount of cow dung	It facilitates normal delivery	160(33.33)
5.	Boiled milk and *ghee*(as per desire)	To provide strength to face labour pains	230(47.91)
Removal of placenta			
1.	Placenta is buried under the milk secreting tree	The mother will always have milk for the baby and the baby will be healthy	310(64.58)
First diet(Till 11 days)			
1.	Thin *Suji halwa*	Good for health and provide warmness	340(70.83)
2.	Only *roti* (Chapatti) and *Halwa* for the first 11 days	To protect the child from cold	310(64.5)
3.	One glass hot milk and one cap full of brandy is given during initial days	Provide strength, removes the problem of backache and stomach ache	290(60.41)
4.	1 tsp crushed fenugreek seeds with tsp *ghee*	It provides strength and warmness to mother after delivery	160(33.33)

Indigenous food preferences during postpartum period

- **Wheat flour *halwa*:** For preparing one bowl *halwa*, 100 gm of wheat flour is roasted in pure *ghee* until light brown colour appeared. Then 5 gm black pepper, 25 gm almonds, 10 gm fig, 10 gm graded coconut are added in roasted wheat flour and one cup water is added. Then it is stirred properly and

sugar is added as per the taste. It is taken daily by lactating mother till 11 days for speedy recovery of poor health (87.5%).

❖ ***Bhutti Bhaat* (fried rice)** : To prepare *Bhutii Bhaat*, 200 gm rice are roasted in 1o gm *ghee* for 10-15 minutes and then 200 ml of water is added. Then cooked for 15 minutes and consumed daily. Respondents reported that it is light food and good for mother's stomach (81.25%).

Table 4.27: Indigenous food preferences of farm women during postpartum period **N=480**

Indigenous food preferences				
S.No.	**Food**	**Method of preparation**	**Reason**	**f(%)**
1.	Hot wheat Flour' *Halwa*	Roasting 100gm wheat flour in pure *ghee.* Adding 5 gm black pepper, 25gm almonds, 10g fig and 10gm graded coconut. After 10 minutes one cup water is added. Add sugar as per taste	It recovers poor health	420(87.5)
2.	*Bhutii Bhaat* (Fried rice)	Roasting 200gm rice in *ghee* for 10-15 minutes and 200 ml water is added then cook it for 15 minutes	Light food and good for stomach	390(81.25)
3.	Coconut) with *gur* (Jaggery)	Take each of these 30 gm per day daily till 11 days	It cleans the uterus	410(85.41)
	Sonth(dried ginger)			396(82.5)
	Ajwain(Carom)			360(75)
4.	Turmeric	5gm turmeric, 10gm *gur* (Jaggery) and 5ml mustard oil mixed well. Take it morning and evening daily till 11 days	It cleans the uterus	400(83.33)
5.	Carom seeds	Grinding 50 gm of carom seeds with 50 gm dry coconut and 5gm almonds. Add 2 tsp pure *ghee* and 10 gm jaggery in it. Mix well all these and consume 50 gm daily in the morning empty stomach	Gives strength to mother's body	320(66.66)
		Mixing 5gm of carom seeds in one glass cow's milk. Take daily in morning time	Reduce indigestion and gastric trouble	240(50)
6.	Simple vegetable, *dal* chapatti and rice (after 11 days)	Cooked with only light use of spices and served with ghee	To adjust in normal routine	460(95.8)

- **Coconut with jaggery**: Coconut is given to lactating women with jaggery till 11 days as it cleans the uterus (85.41%).

- Turmeric: 5gm turmeric, 10gm jaggery and 5ml mustard oil are mixed well and consume daily by women in morning and evening till 11 days. According to respondents this also helps to clean uterus (83.33%).

- **Carom seeds:** 50 gm carom seeds are grinded coarsely and 50 gm dry coconut, 5gm almonds, 2-3 tsp pure *ghee* and 10gm jaggery are added in it. 50 gm of this mixture is consumed daily in the morning and evening empty stomach till 7-10 days which provide strength to mother's body (66.66%). Half of the respondents reported that 5gm carom seeds are mixed in one glass cow's milk and is taken daily to removes indigestion and gastric trouble.

- **Simple vegetables, chapatti and rice**: After completing 11 days women are given normal diet as consumed by everyone in the family i.e. vegetable, *dal*, chapatti and rice which is cooked with minimum spices and serve with *ghee* as reported by 95.8 per cent of the respondents. The reason given by rural women was to adjust the women for normal routine.

Foods avoided after delivery

Whatever food a mother takes has a direct influence on the child's health. It is also believed that if the women do not have any control over the tongue for some period after delivery then it will create problems for the self and the infant.

Scrutiny of Table 4.28 clearly reveals the food avoided during lactation phase by the women.

- Wheat and Finger millet chapattis: Majority of the respondents (93.75%) reported that avoidance of wheat and finger millet chapatti for initial first five day's as it create unrest in the stomach of lactating women.

- Rice: Similarly rice is not consumed till one month (91.66%) after delivery. The reason behind this was, fear of pus formation in the uterus of women.

- Consumption of pulses: Among the pulses namely, cow pea (*Vigna mungo*), red kidney beans (*rajmaha*) and black Soybean (*Bhatt*) are to be avoided as reported by 86.66 per cent respondents. Respondents reasoned that it can cause stomach ache and flatulence to either child/mother.

- Chilli and spices: Majority (85.41%) of the respondents reported that chilli and spices are not given or added in the lactating mother's diet. Respondents reported that chilli and spices make the breast milk indigestible and could create burning sensation in mother and infant's body.

Table 4.28: Food avoided by farm women during postpartum period

N=480

Food Avoided after delivery			
S.No.	**Food**	**Reason**	**f(%)**
1.	Wheat and Finger millet chapatti are not given for first five days	It causes unrest in the stomach	450(93.75)
2.	Rice is not consumed till one month	For fear of pus formation in the uterus	440(91.66)
3.	Consumption of pulses like Black gram(*Mash*) and Black Soybean(*Bhatt*)	Causes flatulence and stomach ache in infants/mother	416(86.66)
4.	Chillies and spices	It makes the breast milk indigestible and burning sensation in mother and infant's body	410(85.41)
5.	Restriction of too much water water till six month	The body temperature of mother's reduces after drinking water and child pneumonia	340(70.83)
7.	Fried food	The baby can get pneumonia or boils may erupt on the tender skin	320(66.66)
8.	Cauliflower, potato and pumpkin	It causes flatulence and may lead to stomachache in mother	310(64.58)

- **Restriction of too much water**: Restriction of too much cold water till six months by the lactating women was reported by 70.83 per cent of the respondents. They reasoned that drinking lot of water reduces the mother's body temperature and child may get pneumonia (*habba dabba)*.

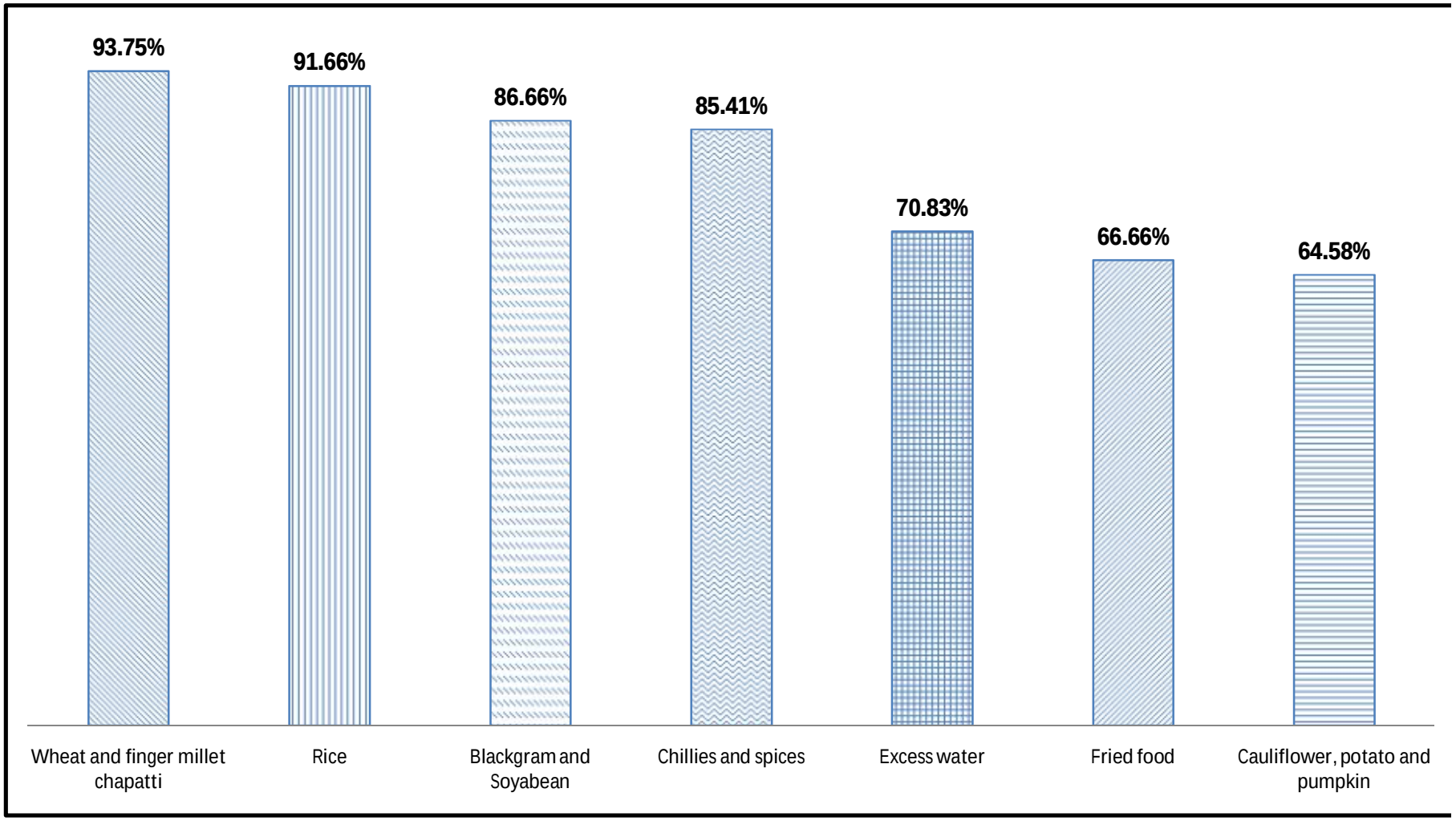


Fig 14: Food avoided by farm women during postpartum period

- **Fried food:** More than half of the respondents (66.66%) reported that fried foods are avoided during lactation period. The respondents reasoned that the baby can get pneumonia or boils might erupt on the tender skin of the baby.

- **Avoidance of gas producing vegetables:** Respondents reported avoidance of vegetables like potato, brinjal and pumpkin. The consumption of these vegetables by lactating mother could create flatulence and may lead to stomachache either to mother or child due to gas producing of the vegetable (64.58%).

In relation to the above findings, the study conducted by Sharma (2003) was found quite suitable. In lactation period, majority of the respondents (87%) reported that chillies were not given or added in the diet of lactating mother. Among pulses, namely *rajma* and *mash* were reported to be avoided by 83 and 80 per cent respondents, respectively. Similarly the avoidance of vegetables like potato, brinjal, cauliflower and pumpkin was reported by 77, 70, 68 and 63 per cent respondents, respectively. More than half of the respondents reported that cold foods like curd/*las*si/cold water/ sour foods were not given to the lactating mother as it may causes cold and cough to mother and in turn to the child.

Place of rest

Data in Table 4.29 depict that all the farm women rested in a separate room after delivery of child which is coated with cow dung and mud. Respondents reasoned that cow dung prevents the child and mother from infection. After delivery women are considered impure (a*chut*) and are not allowed to do any household chores till eleven days whereas, 87.5 per cent of the respondents reported that women take rest for eleven days after delivery. The respondents reasoned that eleven days seems to be an appropriate and enough time to regain energy.

Sharma and Verma (2007) reported in a study on “Indigenous postpartum practices among folk women in Himachal Pradesh” that during the first eleven days, the mother is confined to her room and spends most of her time in bed. She is relieved of all chores and is not allowed to do any activity which strains her body like viewing

television, reading magazines, stitching, etc. The 11th day is marked by certain ceremonies after which the mother may start doing household chores and is allowed outside her house but not outside the family compound till 21st day.

Sexual abstinence

Some of the respondents (22.91%) reported that at least 3-4 month sexual abstinence is mandatory for women who delivered a child. They explained that rest and healing of genital parts after delivery is required and earlier sexual intercourse might be harmful and painful. Women further stated that if possible, the duration of abstinence should be up to six month.

Table 4.29: Indigenous practices followed by farm women regarding rest and relaxation and sexual abstinence N=480

SN	Indigenous practice	Reason	f (%)
1.**Place of rest**			
	Women rested in a separate room coated with cow dung and Mud	Cow dung prevents the child and mother from infection	480(100)
2.**Rest and relaxation**			
	Rest for eleven days after delivery	Eleven days seems to be an appropriate and enough time	420(87.5)
3. **Sexual Abstinence**			
	Women resume sexual intercourse after 3 to 4 month of delivery	Earlier sexual intercourse is harmful and painful as wound not healed properly	110(22.91)

Raven *et al.* (2007) in a study on "Traditional beliefs and practices in the postpartum period in Fujian Province, China" reported that sexual activity should be forbidden during the postpartum period. There were several reasons for this restriction: the woman is weak; she has no energy and is concentrating on looking after the baby; she needs to rest; the scar has not healed; she is still bleeding; and it can cause an infection. Health workers and traditional medicine practitioners supported this restriction. All families followed this restriction for a period ranging from one to three months.

Bathing, cleaning of reproductive parts and massaging practices

Bathing

Regarding bathing practice, majority of the respondents (85.41%) reported that the mother can take bath on 2nd, 3rd, 5th, 7th, 9th and 11th day of the delivery. The respondents reasoned that if bath is given daily to the woman she could catch cold and sometimes water enters into the genital organs of the mother.

Cleaning of reproductive parts

Regarding cleaning of reproductive parts, majority of the farm women cleaned their genital parts with water very rarely (85.41%). The farm women did not consider it very important and only 14.58 per cent farm women washed their genital parts with soap. They reasoned that cleaning of genital part is very important as it prevents infection and also removes foul smell (Table 4.30).

Massage

About massage, majority of the respondents (91.66%) reported that massage is done with the help of hot mustard oil on all over the body as it provides strength to the mother's body whereas,35.41 per cent of the respondents use apricot (*Prunus armeniacal*) oil to massage the body after delivery as it reliefs the body pain.

Table 4.30: Indigenous practices followed by farm women regarding personal care N=480

SN	Indigenous practices	Reason	f(%)
1.	The mother take bathe on 2nd , 3rd, 5th, 7th, 9th and 11th day of delivery	Mother could catch cold and sometimes water enters into the genital organs of the mother	410(85.41)
2.	Women clean the genital organs with water very rarely	Not important to clean it	410(85.41)
	To clean with soap and water rarely	To maintain hygiene and fear of infection	70(14.58%)
3.	Massaged the body of women with hot mustard oil	It provides strength to body	440(91.66)
	Take 50 ml Apricot (Chuwar) oil	It reliefs the body pain	170(35.41)

From the above results it can be concluded that farm women possess lot of indigenous knowledge regarding postpartum practices which they are using still today without any doubt and these farm women are not dependent on modern health care practices. Hence need of the hour is to validate these practices so that it could be promulgate to other parts of country.

4.3.8 Indigenous Health Care Practices

Every culture irrespective of its simplicity and complexity has its own belief and practices concerning diseases. The primitive people acquire knowledge of economic and medicinal properties of many plants by trial and error methods and have extensive knowledge of the properties and use of plant resources prevalent in the nature. Consequently, they became the store house of knowledge of many useful plants. This knowledge was accumulated and enriched and passed on from one generation to another without any written documents. Medicinal plants and home remedies have played a pivotal role in providing health care to man since the dawn of civilization. Generally herbal products such as resin, bark, root, leaves, shoots, fruits and seeds are used by the local inhabitants. According to an estimate of the World Health organization, approximately 80 per cent of the people in developing countries depend on indigenous medicine for primary health care needs; a major portion of these involves the use of medicinal plants (Kumar and Singh, 2001).Hence an attempt was made to document the indigenous health care practices followed by farm families of *Kumaon* region in different problems given as under:

Jaundice: Data in Table 4.31 show the various use of medicinal plants used by the farm families for curing jaundice.

- Black Soybean (*Glycine max*): The black soybean is soaked overnight in water and fine paste is made by grinding it on s*ilbatta*. This paste is cooked in an iron pan for 20-30 minutes by adding water. The prepared food is called *jaula* in local dialect which is advised to be taken once in a day (97.8%).
- Raddish (*Raphanus sativus*): Consumption of leaves and roots of raddish are taken in raw form orally in a good amount for continuous 7-8 days by the patient for speedy recovery (96.8%).

- *Geloi* (*Tinospora cordifolia*): The stem of *Geloi* is boiled in the water for 15-20 minutes and boiled water is sieved and strained properly. This preparation is taken twice a day daily in morning and evening (65%).
- Aonla (*Phyllanthus emblica*): 50 gm *Aonla* are boiled in water till it becomes soft. Seeds are removed then boiled fruits are again cook for at least 10-15 minutes to make a thick paste. After cooling 5ml honey is mixed in a paste and consumed twice a day in morning and evening (45.8%).

Table 4.31: Indigenous practices followed by farm families regarding Jaundice and Stone **N=480**

Health Problem	Name of the plant	Indigenous method of preparation	f (%)
Jaundice	Blacksoybean(*Glycene max)*	Soaking and cooking for 20-30 minutes by adding water	470(97.8)
	Raddish *(Raphanus sativus* Linn.)	Roots and leaves are taken in raw form	465(96.8)
	Geloi(Tinospora cordifolia)	Boiling tender stems in water for 15-20 minutes	320(66.6)
	Aonla (Phyllanthus emblica)	Grinding, cooking and adding 5ml of honey in it till a thick paste is formed	220(45.8)
	Sugarcane(*Saccharum officinarum)*	Regular intake of sugarcane slices in morning and Evening	120(25)
	Makrujhaar(Thalictrum foliolosum DC.*)*	Grinded root paste is taken orally	100(20.8)
Stone Problem	*Silfer (Bergenia ciliate)*	Boiling roots in water for 10 minutes	475(98.9)
	Whole horsegram(*Macrotyloma uniflorum)*	*Dal* is boiled by adding spices and cooked it for 30 minutes	460(95.8)
	Gokharu (Tribulus terrestis Linn.)	Whole plant is used to remove kidney stone	350(72.9)

- Sugarcane (*Saccharum officinarum*): Consumption of pealed sugarcane slices in morning and evening time by the patient for quick recovery from the jaundice (25%).
- *Makrujhaar (Thalictrum foliolosum)*: The roots are grinded and converted into a thick paste and taken daily in morning and evening (20.8%).

The findings of the study get decisive support by the study of Pant and Arya (2009) on "Diversity and indigenous household remedies of the inhabitants surrounding *Mornaula* reserve forest in West Himalaya" that *Kala bhatt dal*(*Glycine max* L.) cures jaundice, for which seeds are soaked in water for overnight and grinded paste is cooked in the iron vessel (*Karahi*), called *Bhatt ka Dubka.*

Kidney Stone

To cure stone problem various indigenous practices prevalent among rural farm families are presented in Table 4.31.

- *Silfer*(*Bergenia ciliate*): Roots are grinded properly and boiled in water for 10 minutes and this solution is taken twice a day in morning and evening to remove kidney stone(98.9%).
- Whole horsegarm(*Macrotyloma uniflorum*): Whole horsegram is boiled and spices are added like ginger, garlic, turmeric, coriander, chilli powder and salt. Now the *dal* is tempered with cumin powder, asafoetida, *gandharein*(*Angelica glauca* Edgew).This preparation is taken thrice in a week. The respondents reasoned that by consuming *Gahat dal* the kidney stone is dissolved and is never formed again (95.8%).
- *Gokharu(Tribulus terrestis)*:Parts of plant i.e. root, stem and leaves are grinded and made into a fine paste. This paste is taken with water daily at morning time (72.9%).

The results are in conformity with the findings of Singh (2008) reported that *Bergenia ciliata* (*Seel-phoda* and *Pasan-bhed*) roots are used in the treatment of stone in kidney or urinary tract. The plant usually grows on crakes of stones and rocky places.

Blood pressure

- Rhododendron *(Rhododendron arboreum)***:** Intake of strained flower juice of Rhododendron. The reason given by the respondents that it is a good heart tonic and good for health (83.3%).

Asthma

- *Gethi (Dioscorea deltodea):* Consuming roasted *Gethi* bulbs in the form of vegetable which is helpful in relieving cough and asthma((87.5%).
- Pomegranate (*Punica granatum*): Bark and stem of Pomegranate is cooked with jaggery for 10-15 minutes. This thick paste is consumed daily two times in morning and evening (45.8%).

Diabetes

- *Jamun* (*Syzygium Cumini*): Bark of *Jamun* is grinded into a thin powder. This powder is mixed in water then strained it. Respondents advised to drink one glass of strained water of *Jamun* daily in morning time (60%).

The findings are in conformity with Singh and Singh (2009) who reported that fermented and filtered juice of *Jamun* (*Syzygium cuminii* Linn.) fruits is given twice a day to the people suffering from acute diabetes.

Table 4.32: Indigenous practices followed by farm families regarding diabetes, blood pressure and asthma N=480

Health problem	Name of the plant	Method of preparation	f (%)
Diabetes	*Jamun* (*Syzygium Cumini)*	Grinding the bark and make into a fine powder	320(66.6)
	Kilmora (Berberis asisatica)	Grinding the roots and boil in water	225(46.8)
	Geloi (Tinospora cordifolia)	Extract the leave juice of *Geloi* stem	180(37.5)
	Chirat(Swertia chirayita)	Leaves are grinded and make a fine paste by adding water	115(23.9)
Blood Pressure	Rhododendron(*Rhododendron arboreum)*	Grinding the fresh flowers and extract the juice	400(83.3)
Asthma	*Gethi (Dioscorea deltodea)*	Bulbs are roasted and taken in the	420(87.5)

		form of vegetable	
	Pomegranate *(Punica granatum* Linn*.)*	Fruit and stem bark are cooked with jaggery	220(45.8)

- *Kilmora* (*Berberis asisatica*)**:** Roots of *Kilmora* are grinded and boiled in water for 10 minutes. This solution is taken daily in morning and evening by the diabetic patient. Respondents reasoned that *Kilmora* roots are very effective in regulating the blood sugar (46.8%) level.

Uniyal *et al*. (2006) reported the same about the *Kilmora* (*Berberis asiatica* Roxb.ex D.C) roots are used for curing diabetes and jaundice.

- *Geloi* (*Tinospora cordifolia*)**:** Intake of concentrated *Geloi* stem juice (10 ml) twice a day in morning and evening controls blood glucose level in the body (37.5%).

The findings are supported by Antwal *et al*. (2009) who reported that stalks of *Tinospora cordifolia (Geloi)* acts as a anti-diabetic and purifies blood and improves peripheral glucose uptake by drinking one cup juice daily.

- *Chirat* (*Swertia chirayita*): Leaves of *Chirat* is grinded into a thin paste and paste is taken with water in morning and evening daily (23.9%).

Pneumonia fever

- Garlic and mustard oil: Massage the chest area with garlic paste (1 tsp), mixed in hot mustard oil (5 ml) as it is helpful to cure pneumonia fever (41.6%).

Fever: Information related to indigenous practices prevalent among rural farm families to cure fever is presented as under:

- *Chirat (Swertia chirayita):* Fresh flower of *Swertia chirayita* is grinded properly by adding three pieces of black pepper (*Piper nigrum),* three pieces of clove (*Syzygium aromaticum)* and 1 spoon carom seeds (*Trachyspermum ammi*) and made into *churan*. About 1 tsp *churan* is taken with water in morning and evening daily (72.9%).

- *Tulsi (Ocimum tenuiflorum*): Crush 10-12 fresh leaves of *Tulsi* to extract juice then add small pinch of black pepper powder and ½ tsp spoon honey in it.

Finally the prepared mixture is taken twice a day continuously for 4-5 days to cure fever (68.7%).

- Alovera (*Aloe barbadensis*): 5 gm of dried alovera powder is mixed in water by adding little amount of rock salt. This mixture is taken once in a day for three continuous days (68.7%).

Table 4.33: Indigenous practices followed by farm families regarding fever, cough and cold N=480

Health Problem	Name of the Plant	Indigenous method of preparation	f (%)
Pneumonia Fever	Garlic(*Allium sativum)*	Massaging the chest area with garlic paste and mustard oil	200(41.6)
Fever	*Chirat (Swertia chirayita)*	Grinding one fresh flower of *Swertia chirayita* with black pepper ,clove and carom seeds and make *churan*	350(72.9)
	Tulsi (Ocimum tenuiflorum)	Grinding 10-12 fresh leaves to extract juice. Add small pinch of pepper powder and ½ spoon honey in it	330(68.7)
	Patvari (Aloe barbadensis	Grinding dry leaves of alo vera and make a powder. Mix 5gm powder with little amount of rock salt	300(62.5)
	Coriander *(Coriandrum sativum)*	Soaking, grinding and cooking 10 gm of coriander seed and 40 gm of rice for 15 minutes	280(58.3)
	Fenugreek seeds *(Trigonella foenum*)	Make a decoction of 500gm of fresh fenugreek leaves and 5-6 *Harad* pods	110(22.9)
Cough and Cold	*Baheda (Terminalia bellirica)*	Two-three ripen pods is taken with half glass of warm water	445(92.7)
	Turmeric *(Curcuma domestica)*	Grinding raw turmeric and mix with one table spoon honey in it	440(91.6)
	Tulsi*(Ocimum tenuiflorum)*	Crushing 10-12 fresh leaves and juice is extracted	390(81.2)

	Carom seeds (*Cuminum cyminum*)	Heating 200- 250 gm of carom seeds and put it in a muslin cloth and tie the knot. Inhale the fumes coming out from hot muslin bag twice a day	350(72.9)

- Coriander (*Coriandrum sativum*): 10gm seeds of coriander (10gm) and 30-40 gm rice are soaked in water overnight. Then it is grinded and cooked for 15 minutes. 30 ml of this decoction is taken in morning and evening daily in fever (58.3%).
- Fenugreek (*Trigonella foenum*): 500 gm of fresh fenugreek leaves (*Methi*) and 5-6 *harad* pods are cooked for 15-20 minutes. One tsp of this decoction (*kada)* is taken thrice a day (22.9%).

Cough and cold

- *Baheda (Terminalia bellirica):* Consumption of 2-3 ripened *Baheda* pods with half glass of warm water in morning and evening. It gives relief from cough and cold.
- Turmeric (*Curcuma domestica*): 10 gm of raw turmeric is grinded by mixing one tsp honey. This mixture is taken with one glass of water thrice a day.
- *Tulsi* (*Ocimum tenuiflorum*): Leaves of *Tulsi* are crushed and juice is extracted then juice is taken with warm water for 4-5 days continuously (81.2%).
- Carom seeds (*Trachyspermum ammi*): Heat the carom (200-250 gm) seeds and put it in a muslin cloth and tied, after that muslin bag is heated on a hot plate. Fumes are inhaled by person coming out from hot muslin bag twice a day in morning and evening. Respondents reasoned that it causes repeated sneezing, which helps in reducing the intensity of cold and cough.

Indigestion and Constipation

- *Gandrayani (Angelica glauca)***:** 20-30 gm of *Gandrayani* is used as a spice in *dal* and vegetable preparation and consumed twice a day during problem. The respondents reasoned that it helps in flatulence and relief gas problem (90%).

Rawar and Jalal (2013) reported the same that roots are used in gastric disorder and constipation.

- Carom seeds (*Trachyspermum ammi*): Roast the carom seeds by adding little amount of black salt in it. The roasted carom seeds is taken with luke warm water and helps to calm down the indigestion and gastric problem (85%).
- *Bathuwa* (*Chenopodium album*): Boil 250 gm of *Bathuwa* leaves by adding one tsp of lemon juice and this preparation is taken for 2-3 days daily for curing constipation(87%).

Pant and Arya (2009) reported the same that *Chenopodium album* leaves are widely used to cure old constipation. Fresh leaves of the plant are boiled and mixed with curd and *rai* powder; the product (*Raita*) is given regularly for 2-3 days.

- Ginger (*Zingiber officinable*): Extract 50g of ginger juice and add 1 tsp honey in it as it relieves gastric trouble that causes gas formation and acidity in the stomach (80%).
- Guava (Psidium *guajava*): Consume one guava with black pepper and rock salt during breakfast time daily. The respondents reasoned that it cures indigestion, acidity and swelling of stomach (79%).
- *Harad (Terminalia chebula*): Intake of 2-3 ripen *Harad* pods with warm water during sleeping time for curing old constipation (72.9%).

The findings are in conformity with Sidhu and Kaur (2007) who reported that *Harad* in Punjab is known to all the respondents for its effectiveness in cleaning bowel. More than 99.0 % were aware that it controls constipation and promotes digestion (93.1%). Its use in controlling weight, reducing fatness and preventing infection was known to nearly seventy percent of the women.

- Fenugreek (*Trigonella foenum*): Roast 10 gm fenugreek and carom seeds on hot pan for 2-3 minutes and is taken with luke warm water in constipation condition (18.7%) during night time.

The study conducted by Verma *et al*.(2010) reported alike that intake of *Harad* with water is useful (18%) for treating constipation as it helps in easy digestion of food, reduce formation of gas and avoid constipation and half teaspoon of *Harad* powder and one tsp of *Ajwain* if taken with water after meals helps in curing constipation.

Diarrhoea: Farm families have their own indigenous practices to cure diarrhoea problem presented in Table no. 4.34.

- Rice *jaula* (*Oryza sativa*): For rice's jaula preparation, first rice is cooked for 15-20 minutes. Then one cup (250 ml) curd is added to the cooked rice which

is re-cooked for 10-15 minutes. Consume twice a day in morning and afternoon. Respondents reported that it binds the stomach and stops diarrhoea (100%).

Table 4.34: Indigenous practices followed by farm families regarding indigestion/ constipation and diarrhoea N=480

Health problem	Name of the Plant	Indigenous method of preparation	f (%)
Indigestion/ Constipation	*Gandrayani (Angelica glauca)*	Add as a spice in *dal* and vegetable preparation	455(94.7)
	Cumin *(Cuminum cyminum)*	Roasting 20 gm of cumin seeds for 2-3 minutes and add little amount of rock salt in it	410(85.41)
	Bethuwa (*Chenopodium album* L.)	Boiling leaves by adding one tsp of lemon juice in it	418(87)
	Ginger*(Zingiber officinable*)	Extracting 50 gm juice from fresh rhizome and add one tsp honey in it	400(83.3)
	Guava *(Psidium Guajava*)	Consume one Guava fruit with small quantity of black pepper and rock salt	380(79)
	Harad (Terminalia chebula)	Taking 2-3 pods of *Harad* with warm water during bed time	350(72.9)
	Fenugreek*(Trigonella foenum*)	Roasting 20 gm Fenugreek and 20 gm cumin seeds in a flat surface pan for 2-3 minutes then grinding it	90(18.7)
Diarrhoea	Rice *jaula (Oryza sativa)*	Rice is cooked. Then curd is added to the cooked rice and is re-cooked for 10-15 minutes	480(100)
	Pomegranate*(Punica granatum)*	Taking 20-30 gm fruit rind and make a decoction	433(90.2)
	Timul (Ficus auriculata Lour.*)*	Taking 150 gm fruits and boiling in water for 5-10 minutes. The half boiled fruits are further burnt with ash of wood. The fruits are washed and mix with curd and black pepper	425(88.5)
	Mint*(Mentha Arvensis*)	Extracting mint juice and add mix one tsp lime juice and small quantity of black salt in one glass of water	420(87.5)

- Pomegranate (*Punica granatum*): Cook 50-60 gm fruit rind of Pomegranate and made into a decoction and consume it in morning and evening for controlling diarrhoea (90.2%).
- *Timul* (*Ficus auriculata*): 150 gm fruits of *Timul* are taken and boiled in water for 5-10 minutes. The half boiled fruits are further burnt with ash of wood. The fruits are taken, washed and mixed with curd (250gm) and black pepper (*Piper nigrum*). Add common salt according to taste. This preparation is called *raita*. Eat one bowl *Timul raita* daily for controlling diarrhoea (88.5%).
- Mint (*Mentha arvensis*): Extract the juice from mint then mix one tsp lime juice and small quantity of black salt in one glass of water. This preparation is taken daily 4-5 times (87.5%).

Dysentery: Regarding dysentery farm families use their own indigenous method presented in Table 4.35

- Rhododendron (*Rhododendron arboreum*): Boil the bark of Rhododendron in water for 15-20 minutes and strained the juice properly. This juice is taken twice a day in morning and evening (68.7%).
- *Rambas* (*Agave americana*): 20 ml sap of *Rambas* is extracted and dissolve in one glass of water to cure dysentery (37.5%).
- *Bhilmor* (*Rumex histatus*): Grind *Bhilmor* leaves properly then juice is extracted and half glass juice is taken daily in morning time to cure bloody dysentery (34.5%).

Stomach pain

- *Tulsi* (*Ocimum sanctum*): 5-6 fresh leaves of *Tulsi* and 5 gm of carom seeds are grinded and make a fine paste then add half tsp honey in it as it immediately cured the gripping of stomach and relieve from pain (51%).
- *Gwal kakkar* (*Soena amplexicaulis*)*:* Crush the roots and seeds of *Gwal kakkar* and made into a fine paste. This paste is taken orally with one glass water daily as it cures digestive disorders (34.3%).
- *Nirbisi* (*Delphinium denudatum*): Consume 3-4 dry leaves of *Nirbisi* orally with milk for one week continuously (25%).

Table 4.35: Indigenous practices followed by farm families regarding dysentery and stomach pain N=480

Health problem	Name of the Plant	Indigenous method of preparation	f (%)
Dysentry	Rhododendron*(Rhododendron arboreum*)	Boiling 50 gm of bark and strain the juice	330(68.7)
	Rambas (Agave Americana Linn.*)*	Peeling the leaf of *Rambas* and extract the sap(20ml) then dissolve the sap in one glass of water	180(37.5)
	Bhilmor (Rumex histatus)	Grinding 10-15 leaves and extract juice	165(34.5)
Stomach Pain	*Tulsi (Ocimum sanctum* L.)	Grinding basil leaves with 5 gm cumin seeds and mix half tea spoon honey in it	245(51)
	Gwal Kakri (Soena amplexicaulis)	Crushing the root and seeds and make a fine paste	165(34.3)
	Nirbisi(Delphinium denudatum Wall.*)*	Taking dry leaves orally with one tsp milk for one week	120(25)

Vomiting

- Onion (*Allium cepa*): 10 ml juice of onion and 10 ml juice of mint are extracted and this mixture is taken when somebody feels the sensation of vomiting (89.58%).

The results are in line with the findings of Ballabh and Chaurasia (2009) revealed that paste of fresh bulbs of *Allium cepa(Pyaz)* mixed with local mint, minerals and salts is used in small doses as appetizer against vomiting.

- *Aonla* (*Phyllanthus emblica*):Extract the juice of *Aonla* (20 ml) by mixing 125-250 mg borax in it and this preparation is taken during excessive vomiting.
- Pomegranate(*Punica granatum*): Extract the juice of Pomegranate seeds(10 ml) and this concentrated juice is mix with 5gm sugar in half glass of water and given at the time of vomiting sensation(83.33%).
- *Harard* (*Terminalia chebula*): 5-6 green pods of *Harad* is taken and cooked in 200 ml cow's milk then re- cooked in 100 ml cow's urine. At the last stage add

two drops of honey in it. Small quantity of this preparation is taken at the time of vomiting (66.66%).

Table 4.36: Indigenous practices followed by farm families regarding vomiting

N=480

Health problem	Name of the Plant	Indigenous method of preparation	f (%)
Vomiting	Onion *(Allium cepa)*	Extracting 10 ml juice from one small bulb and mix small amount of mint juice in it	430(89.58)
	Aonla (Phyllanthus emblica)	Grinding the leaves by adding water and extract 10-15 ml juice. Finally add 125-250 mg borax powder in it	425(88.54)
	Pomegranate *(Punica Granatum*)	Extracting pomegranate juice and mix 5gm sugar in it	400(83.33)
	Harad (Terminalia chebula)	Cooking 5-6 *Harad* green pods in 200 ml cow's milk then in 100 ml cow's urine and add two drops of honey in it	320(66.66)

Itching (Table 4.37)

- **Cow's urine:** In *Kumaon* Himalayan cow urine is treated a pious drink and use in all major ritual and ceremonies. Farm families believe that cow's urine has multiple medicinal properties and it is a miracle in itself. Bath with 50 ml urine by mixing in 15 litre water. Respondent reported that bathing with cow's urine daily diminishes the problem of itching on the body parts (98.95%).

- **Mustard oil:** Massage the affected body part with mustard oil as it cures itching (88.54%).

- **Deodar oil:** Massage the body with deodar oil and also consume (20 ml) during body itching (25%).

Table 4.37: Indigenous practices followed by farm families regarding skin problems N= 480

Health problem	Name of the Plant	Indigenous method of preparation	f(%)
Itching	Cow's urine	Add 15 ml cow urine in 15 litres water and bath by this solution daily	475(98.95)
	Mustard oil	Massage the affected parts with mustard oil	425(88.54)
	Deodar (*Cedrus deodar* Loud.)	Massage the body with oil and consume 20 ml of oil	120(25)
	Doob grass *(Cynodon Dactylon/*)	Grinding *Doob* grass with turmeric rhizome and make a fine paste	115(23.95)
Psoriases	*Aakash matri (Cuscuta europaea)*	Grinding and extracting the juice completely. Apply externally on affected parts	68(14.16)
Boils and and pimples	*Againbai (Premna mucronata Roxb.)*	Making fine paste of young stem by adding water. Apply gently on and around boils twice a day	425(88.54)
	Flax seed *(Linum Usitatissimum)*	Roasting 10 gm seeds and after that boil in 200 ml of cow's milk	285(59.37)
	Dudhi (Euphorbia hirta)	Leaf juice is applied in boils and skin diseases	180(37.5)
	Semal (*Bombax ceiba*)	Crushing and grinding *Semal* bark by adding water in it and make a fine paste	145(30.20)
	Mursagin (Tephrosia purpurea)	Grinding the roots of *Mursagin* and make a fine paste for application	132(27.5)
	Makrujhar (Thalictrum foliolosum)	Grinding leaves and make a fine paste of it	106(22.08)
	Gewain (*Solanum nigrum* Linn.)	Grinding the leaves of *Gewain* and make a fine paste then add black pepper(1gm) and goat's milk(10ml) in it	86(17.91)
Sores and gingivitis	*Dahya* (*Callicarpa macrophylla* Vahl.)	Grinding 200 gm fresh leaves and make a fine paste	280(58.3)

- ***Doob* grass (*Cynodon dactylon*):** *Doob* grass is grinded and mix turmeric (*Haldi)* powder. Apply this mixture on affected body parts. Respondents stated that it cures eczema and itching of skin (23.9%).

Similar finding also reported by Lal and Singh (2008) in a study that *Cedrus deodara* (*Devdar*) heartwood oil is used for drinking and massage purpose to cure skin itching.

Psoriasis

- *Aakash matri(Cuscuta europaea)*:Grind the leaves and tender stems of *Aakash matri* and make into a fine paste then apply on affected body parts twice a day for continuous two weeks (14.16%).

- Flax seed (*Linum usitatissimum*): 10 gm flax seeds are roasted for 2-3 minutes then boil in 200 ml of cow's milk after that let the milk to cool down and make a paste by grinding it. This paste is applied gently on the boils as it cures burning sensation (59.37%).

- *Dudhi*(*Euphorbia hirta*): Grind the leaves of *Dudhi* and extract the juice then apply leaf juice on boils and skin diseases (37.5%).

- *Semal*(*Bombax ceiba*):Crush and grind the *Semal* bark by adding water in it and make a fine paste. This paste is applied topically on boils and pimples (30.20%).

- *Mursagin*(*Tephrosia purpurea*): The roots of *Mursagin* are grinded and made into a fine paste then paste is applied on pimples. Respondents reasoned that application of *Mursagin* paste on pimples reduced and dried the pimples (27.5%).

- *Makrujhar(Thalictrum foliolosum)*:Grind the leaves of *Makrujhar* and then applied the paste on boils and pimples(22.08%).

- *Gewain*(*Solanum nigrum*):Grind the leaves of *Gewain* and make a fine paste then add black pepper(1 g) and goat's milk(10ml) in it and this paste is applied all over the boils and pimples(17.91%).

Sores and Gingivitis

- *Dahya*(*Callicarpa macrophylla*):Grind 200 gm fresh leaves of *Dahya* and make a fine paste. It is used as a mouth wash for continuous 3-5 days (58.3%).

Wounds and cuts: Regarding indigenous practices of curing wounds and cuts followed by farm families is presented under as:

- Turmeric (*Curcuma longa*): Grind the turmeric rhizomes by adding 5 gm *ghee* in it and this paste is applied on the affected parts of wounds and cuts twice a day for continuous 3-4 days (100%). Respondents stated that it promote healing of wounds as turmeric have great medicinal properties.
- *Kilmora*(*Berberis asisatica*): Fine paste of *Kilmora* by grinding roots and this paste is directly applied on the wounds(90.6%).
- Alovera: Directly apply the sap of alovera on the cut and wounds (79.1%). Respondents stated that alovera has cooling effect and it stop pain sensation in cuts, burns and wounds.

Table 4.38: Indigenous practices followed by farm families regarding wounds/cuts and bleeding **N= 480**

Health problem	Name of the plant	Method of preparation	f (%)
Wounds and Cuts	Turmeric *(Curcuma Longa)*	Grinding of turmeric rhizomes by adding 5 gm *ghee* in it	480(100)
	Kilmora (Berberis asisatica)	Making fine paste of *Kilmora* by grinding of roots	435(90.6)
	Patvari (Aloe barbadensis)	Directly apply the sap of alovera on cut and wounds	380(79.1)
	Pauyoli (Reinwardtia indica)	Crushing and grinding leaves of *Pauyoli* and made into a thin paste by adding water	215(44.7)
	Ghangara (Pyracantha crenulata)	Grinding the leaves of *Ghangara* and made into a fine paste	205(42.7)
	Patee (Artemisia nilagirica)	Grinding the leaves of *Patee* and extract the juice	135(28.1)
	Geu Kakkar (Soena amplexicaulis)	Grinding the root and make a fine paste by adding water	115(23.9)
Bleeding	Pomegranate(*Punica Granatu)*	100 gm leaves of pomegranate are boiled for 15-20 minutes till it become into thick paste	115(23.95)
	Hemp*(Cannabis sativa)*	5-6 leaves of hemp are grinded and made into a thin paste	100(20.83)

- *Pauyoli*(*Reinwardita indica*): Crush and grind the leaves of *Pauyoli* and made into a thin paste by adding water then apply this paste on wounds as it heals faster (44.7%).
- *Ghangara*(*Pyracantha crenulata*):Grind the leaves of G*ghangara* and made into a fine paste then apply directly on wounds(42.7%).
- *Gwal Kakri*(*Soena amplexicaulis*): Grind the roots and make a fine paste by adding water. Apply this paste on affected parts as it heals wounds and puss (23.9%).
- *Patee*(*Artemisia nilagirica*): Grind the leaves of *Patee* and extract the juice then applied on wounds and cuts as prevents from septic (28.1%).

Bleeding: Data in Table 4.38 reveal the indigenous practices prevalent among rural farm families regarding stoppage of bleeding from body parts.

- Pomegranate (*Punica granatum*): 100 gm leaves of pomegranate are boiled for 15-20 minutes till it become into thick paste. This decoction is taken orally in nasal bleeding (23.9%).
- Hemp (*Cannabis sativa*): 5-6 leaves of hemp are grinded and made into a thin paste then this paste is applied on cut and wounds for faster healing as it stops bleeding (20.8%).

Menstruation: Women face lots of problem like pain in lower abdomen, delaying in menses, improper bleeding and heavy flow during menses. *Kumaon* region farm women have their own indigenous practices to overcome all these problems which are presented in Table 4.39.

- *Geloi*(*Tinospora cordifolia*):10 grams leaves of *Geloi* are crushed and juice is extracted (about 2 to 3 ml).This juice is taken with half cup of water till the condition improves during the period of menstruation(47.9%).
- Carom (*Cuminum cyminum*): 10 gm carom powder is taken with one glass hot milk in morning and evening. Respondent reasoned that both carom seeds and milk are hot in nature so it helps in easy blood flow and also reduces pain (37.5%).

Table 4.39: Indigenous practices followed by farm families regarding menstruation, leucorrhoea and urine problem

N= 480

Health problem	Name of the Plant	Indigenous method of preparation	f (%)
Menstruation problem	*Geloi (Tinospora cordifolia*)	10 gm leaves of *geloi* are crushed and juice is extracted (about 2 to 3 ml)	230(47.9)
	Carom seeds(*Cuminum cyminum)*	10 gm carom powder is taken with one glass hot milk in morning and evening	180(37.5)
	Brahmi *(Centella asiatica*)	Grind the roots of *brahmi* by adding water and extract the juice	125(26)
	Onion *(Allium cepa)*	Taking one unripe onion regularly at morning and evening	115(23.9)
Leucorrhoea	Banana (*Musa paradisiacal)*	Taking 2-3 raw pealed banana and cut into small pieces followed by roasting in 10 gm *ghee* for 10 minutes then little amount of water is added and re-cook it for 5 minutes.	145(30.2)
	Denusha (Sida cordifolia)	Grind the roots of *denusha* and cook it for 10-15 minutes	60(12.5)
Urine problem	Cucumber(*Cucumis sativa*)	Extracting the cucumber seeds and made into a paste then this paste is taken with one glass of water	200(41.6)
	Carom seeds *(Cuminum cyminum*)	Taking 3-6 gm of carom seeds with one glass hot water	115(23.9)

- *Brahmi* (*Centella asiatica*):Grind the roots of *Brahmi* by adding water and extract the juice. Intake of juice (20 ml) 2-4 days continuously as it normalized the bleeding in women (26%).

- Onion (*Allium cepa*): One unripe onion is taken regularly in morning and evening to normalize menstrual cycle (23.9%).

Leucorrhoea

- Banana (*Musa paradisiacal*): Take 2-3 raw pealed banana and cut into small pieces followed by roasting in 10 gm *ghee* for 10 minutes then little amount of water is added and re-cook it for 5 minutes. It is consumed daily once a time until the problem of leucorrhoea not solved (30.2 %.).

- *Denusha*(*Sida cordifolia*):Grind the roots of *Denusha* and cook it for 10-15 minutes. This paste is taken daily in morning and evening time. Respondents reported that paste of *Denusha* is very effective in curing problem of *safed pani* among girls and women (12.5%).

Urine problem

- Cucumber (*Cucumis sativa*): Extract the cucumber seeds and made into a paste then this paste is taken with one glass of water daily in morning time (41.6%). Respondents reasoned that it is helpful in reducing burning sensation during urine pass out and also normalized the flow of urine.

- Carom seeds: 10-15 gm of carom seeds are taken orally with one glass of hot water daily in morning time as it cures the problem of urine blockage. The reason given by the respondents that carom seeds are hot in nature so when taken with hot water it opens the blockage of urine path (urethra) (23.9%).

Different body part pain

Information related to indigenous practices prevalent among rural farm families to cure different body pain is presented in Table 4.40.

Tooth ache

- Garlic: 2-3 garlic splits are placed in the tooth cavity to relief from pain (94.7%).

- *Timur*(*Zanthoxylum armatum*): Bark and seeds of *Timur* are grinded into a thin paste then apply directly the paste on affected part of the teeth as it alleviates pain(76%).

Semwal *et al.* (2010) in a study also reported the same that *Zanthoxylum armatum (Timru)* seed paste and twig/bark is used for teeth cleaning, toothache and pyorrhoea.

Knee pain

- Garlic: In *Kumoan* region the knee pain above 40 years of age of farm families is common. Respondents use to grind the garlic and make a thin paste then mix 5 gm cow's ghee in it. This paste is applied directly on and around the knee during the rest time which gives relief from the knee pain (84.3%).

Rheumatic pain and Swelling

- Stinging nettle (*Utrica dioca*)**:** Rub the leaves of stinging nettle (*Utrica dioca*) on the joint or muscle having pain. Farm families stated that stinging nettle leaves have some kind of medicinal properties which alleviates pain(94.7%) whereas, 65.6 per cent of the respondents cook the leaves of stinging nettle by adding 100 ml mustard oil and 8-10 splits of garlic till dark black colour is appeared. This paste is then applied on affected parts of joint and muscle.
- *Shiwai*(*Vitex negundo*): Roots of *Shiwai* are grinded and made into a thin paste then apply this paste on the swelling parts of the body(21%).

Khare *et al.* (2012) reported the same that stinging nettle (*Utric dioica)* traditionally employed as a folklore remedy for a wide spectrum of ailments. The leaves and roots both are used internally as a blood purifier, diuretic. An infusion of the plant is used for nasal and menstrual haemorrhage, diabetes, rheumatism, eczema, anaemia, hair loss and as an anti-diarrhoeal. Leaves of this plant reported to be hypertensive, anti-inflammatory, to be useful in the therapy of prostatic hyperplasia, diuretic, immune modulator to alleviate rheumatic pain, and to serve as an adjuvant therapeutic agent in rheumatoid arthritis.

The study conducted by Semwal *et al.* (2010) also reported alike that bulb of *Allium sativum* L.(*Lahsun*)is extracted and mixed with mustard oil and boiled is taken orally as well as applied externally in case of arthritis and joints pain further also

reported that *Urtica dioica* L. (*Kandali)* dry leaf extract is taken orally; also useful during joints and muscular pain.

Table 4.40: Indigenous practices followed by farm families regarding body pain

N= 480

Health problem	Name of the Plant	Indigenous method of preparation	f (%)
Tooth ache	Garlic *(Allium sativum)*	Keeping split of garlic in tooth cavity	455(94.7)
	Timur (Zanthoxylum armatum)	Bark and seeds of *Timur* are grinded into a thin paste then apply directly the paste	365(76)
Knee pain	Garlic *(Allium sativum)*	Grinding the garlic and make a thin paste then mix 5 gm cow's ghee in it	405(84.3)
Rheumatic pain and swelling	Stinging nettle *(Utrica dioica* Linn.*)*	Rub the leaves of sting nettle (*Utrica dioca*) on the joint or muscle having pain	455(94.7)
		Cooking the leaves of stinging nettle by adding 100 ml mustard oil and 8-10 splits of garlic till dark black colour is appeared	315(65.6)
	Shiwai (Vitex negundo Linn.)	Roots of *Shiwai* are grinded and made into a thin paste	103(21.4)
Ear pain	*Gewaii(Solanum nigrum L.)*	Crushing the leaves of *Gewain* and extract the juice then pour two drops in to the ear	290(60.4)
	Hazaree (Tagetus miniata)	Grinding 5-6 leaves of *Hazaree* and put few drops of it in ear	115(23.9)
	Onion*(Allium cepa)*	Extracting the juice from 1 onion bulb and mix with thin paste of linseeds	95(19.7)
	Garlic (*Allium sativum*)	10-15 splits of garlic is taken and made a decoction then add 10 gm *ghee* and 25 ml mustard oil in it, now 3-5 drops is poured in to the ear	88(18.3)
Headache	*Doob* grass *(Cynodon dactylon)*	30-50 gm of *Doob* grass is grinded and made a thin paste then mix 10 ml mustard oil in it	270(56.2)
	Brahmi(Centella asiatica)	Chewing 2-3 leaves of *Brahmi* leaves	210(43.7)
	Titpatee (Oxalis corniculata L.)	Grinding the leaves of *Titpatee* and made into a fine paste then apply the paste directly on the forehead	210(43.7)
Eye pain	*Baheda (Terminalia bellirica* Roxb.*)*	Making fine paste of *Baheda* by adding water in it. After that ½ tsp honey is added and applied on the eyes	75(15.6)
	Cow's *ghee*	Pour 2 drops of cow's *ghee* in to the eyes	70(14.5)
Stone pain	Flour of Barley, Finger millet and Barnyard millet	Taking 40 gm flour of *jau*, *mandua* and *jangora* then boil in 500 ml of water for 5 minutes	210(43.7)

Ear pain

- *Gewain*(*Solanum nigrum*)**:** Crush the leaves of *Gewain* and extract the juice then pour two drops in to the ear for alleviating the pain(60.4%).
- Marigold (*Tagetus miniata*): Crush the leaves of marigold plant and extract the juice then pour two drops of juice in the ear for relieving pain (23.9%).
- Onion (*Allium cepa*): Extract the juice from 1 onion bulb and mix with thin paste of linseeds. Then juice is extracted from the paste and little amount is pour into the ear (19.7%).
- Garlic (*Allium sativum*): 10-15 splits of garlic is taken and made a decoction then add 10 gm *ghee* and 25 ml mustard oil in it, now 3-5 drops is poured in to the ear twice a day in morning and evening (18.3%).

Headache: Information regarding indigenous practices related to headache presented in the Table 4.40.

- *Doob* grass (*Cynodon dactylon*): 30-50 gm of *Doob* grass is grinded and made a thin paste then mix 10 ml mustard oil in it and this paste is applied directly on the forehead(56.2%).This process is called *chaper* in local dialect (56.2%).
- *Brahmi*(*Centella asiatica*):Chew 2-3 *Brahmi* leaves during headache(43.7%).
- *Titpatee*(*Oxalis corniculata*):Grind the leaves of *Titpatee* and made into a fine paste then apply the paste directly on the forehead. In an informal discussion, farm families stated that *Titpatee* paste is very effective in migraine pain also (43.7%).

The results are in conformity with the findings of Semwal *et al*.(2010) reported that *Centella asiatica* (*Brahmi)* leaf extract is taken with honey acts as a coolant and relieves headache.

Eye pain

- *Baheda*(*Terminalia bellirica*): Regarding eye pain or stressed eyes, some of the respondents (15.6%) use to make fine paste of *baheda* by adding water in it. After making paste, ½ tsp honey is added and this paste is applied on the eyes to cure pain and stress.

- Cow's *ghee*: Pour 2 drops of cow's *ghee* in to the eyes. Farm families stated that by pouring cow's *ghee* in to the eyes if there is any foreign particle it comes out (14.5%).

Stone pain

- Flour of Barley, Finger millet and Barnyard millet: Take 40 gm flour of *jau, mandua* and *jangora* then boil in 500 ml of water for 5 minutes. This mixture is consumed daily for releasing stone pain (43.7%).

Toe sores

Toe sores are mainly caused by fungus infection and in Himalayan region farm families mainly work in marshy area with bare foot which aggravates the problem of toe sores infection. Data in Table 4.41 depict the various indigenous practices related to toe sores.

- Pomegranate: Take 100 gm of pomegranate seeds and grind into a thin paste then cook for 10-15 minutes by adding water. This paste is applied on affected parts of feet during bed time (43.75%). In *Kumaon* Himalayans it is an effective remedy to cure toe sores, called *Kotya* in local dialect.
- *Garupaan* (*Micromeria biflora*):Grind the leaves of *Garupaan* and make a thin paste then add mustard oil in it. This paste is applied on the affected parts of fungal infection (15.62%).
- *Padhar* (*Leptodermis lanceolata*):Crush the leaves of *Padhar* and made into a thin paste then paste is applied in between the feet for treating fungal infection (8.95%).

Crack heel

- Pine resin: Apply pine resin on cracks of foot during bed time daily. It heals the crack of foot if use continuously as stated by the respondents (87.5%).

Bone fracture

- Pine resin: Take 100 ml pine resin and heat it for 5 minutes then hot pine resin is applied on the affected part and tie with cotton cloth for 8-10 days. The respondents reported that pine resin is helpful in repaying bone muscle (42.7%).

Table 4.41: Indigenous practices followed by farm families in different health problems N= 480

Health problem	Name of the Plant	Indigenous method of preparation	f(%)
Toe-sores	Pomegranate*(Prunam gratum)*	Taking 100 gm of pomegranate seeds and grind into a thin paste then cook for 10-15 minutes by adding water	210(43.75)
	Garupaan (Micromeria biflora)	Grinding leaves of *Garupaan* and make a thin paste then add mustard oil in it	75(15.62)
	Padhar(Leptodermis lanceolata Wall)	Crushing the leaves of *Padhar* and made into a thin paste then paste is applied in between the feet	43(8.95)
Crack heel	Pine resin (*Pinus roxburghii* Sarg.)	Apply pine resin on cracks of foot during bed time daily	420(87.5)
Bone fracture	Pine *(Pinus roxburghii* Sarg.)	Appling pine resin on fracture part then tie it with cloth for 8-10 days	205(42.7)
Parasites	*Indrian (Trichosanthes tricuspidata)*	Grinding 50-60 gm of inner black portion of *Indrian* (wild fruit) and mix it with *gur*(Jaggery)	145(30.20)
	Carom seeds (*Trachyspermum ammi)*	Boiling 15 gm carom seed in 400 ml of water till water is reduced to one fourth	125(26.04)
	Shiwai (Vitex negundo Linn.)	Extract two tea spoon juice of *Shiwai* leaves and it is consumed with curd	118(24.58)
	Wallnut*(Juglans regia*)	Taking 60-80 gm of wallnut hull then boil in water for 15-20 minutes	115(23.9)
Body odour	*Paatee* Grass *(Artemisia nilagirica)*	Rubbing the *Patee* leaves all over the body before bathing	75(15.62)
Cancer	Cow's urine Wheat grass	Drinking of 20 ml cow's urine daily Grinding of 200gm wheat grass by mixing bark of *Sesam* (*Sesamum indicum)* and stem of *Geloi(Tinospora cordifolia).*Then made into a fine paste	305(63.54) 63(13.12)
Heat Stroke	*Kuri (Galium aparine* L.)	Crushing leaves of *Kuri* and apply the paste on body parts	116(24.16)
	Onion*(Allium cepa)*	Taking 4-5 fresh onion and extract juice	106(22.08)

Parasites: Parasites inside the human body like tape worm and round worm cause a great loss to the health of human as parasite suck the nutrition and food. It mainly found in the stomach and intestine of human body. To kill the parasites rural farm families have their own indigenous practices.

- *Indrian* (*Trichosanthes tricuspidata*): Grind 50-60 gm of inner black portion of *Indrian* (wild fruit) and mix it with *gur*(Jaggery).This mixture of fruit and *gur* is consume at night time after meal. It kills internal parasites (30.20%).
- Carom seeds: Boil 15 gm carom seed in 400 ml of water till water is reduced to one fourth and this solution is taken at night time which kills worms in the stomach (26.04%).
- *Shiwai*(*Vitex negundo*):Extract two tea spoon juice of *Shiwai* leaves and it is consumed with curd for 3-4 days continuously at night time after meal(24.58%).
- Wallnut(*Juglans regia*): Take 60-80 gm of wallnut bark then boil in water for 15-20 minutes. This decoction is taken at night time for killing the stomach worm (23.9%).

Body odour

- *Patee* grass *(Artemisia nilagirica):* In reducing the body odour rub the *Patee* leaves all over the body before bathing, it removes sweat smell and energizes the body as reported by respondents (15.62%).

Cancer

- Cow's urine: Drink 20 ml cow's urine (*Gout*) daily in morning time as it is highly beneficial for curing cancer and other diseases (63.54%).
- Wheat grass: Grind 200gm wheat grass by mixing bark of *Sesam* (*Sesamum indicum)* and stem of *Geloi(Tinospora cordifolia).*Then made into a fine paste and is taken regularly for three months continuously. Respondent stated that it cures any type of cancer in the body (13.12%).

Heat stroke

- *Kuri (Galium aparine):* Crush the leaves of *Kuri* and made into a thin paste then paste is applied on all over the body. Respondents reasoned that *Kuri* leaves act as a cooling agent (24.16%).
- Onion: Extract the fresh juice of onion and apply it all over the body as it immediately cures the impact of heat stroke (22.08%).

Conclusion: Despite the development of rural health services, villagers are still using local indigenous knowledge to a large extent for treatment of common health problems due to the distance from the urban market centre and lack of modern health care practices. Rural farmers are rich in indigenous health care knowledge and they belief that indigenous methods are claimed to be highly effective in keeping health as well as in curing common problems. Hence, there is an urgent need of detailed investigation, documentation and validation of indigenous knowledge about health care practices which were being passed orally from generation to generation.

4.3.9 Indigenous Food Practices of Farm Families

Picturesque state of Uttarakhand has a simple yet delectable cuisine. The food is extremely nutritious to suit the high energy requirements of the hilly and cold region**.** Most of the traditional cuisines of the region are yet to gain popularity. In order to ensure the food and nutritional security local farming communities have encouraged the utilization of cultivated as well as wild edible plant species, available in the surrounding environment. Hence an attempt was made to document the indigenous food practices of *Kumaon* region people.

- ***Kaffa* (Combination of green leafy vegetables)**

This is a green curry that is served in lunch or dinner and is eaten with *roti* and boiled rice. It is prepared by cooking green leafy vegetables (Spinach, radish, coriander and Fenugreek). Data in Table 4.41 depict that all the respondents use to make *kaffa* as it is a good source of energy and enhances blood in the body. The method of preparation is given as under:

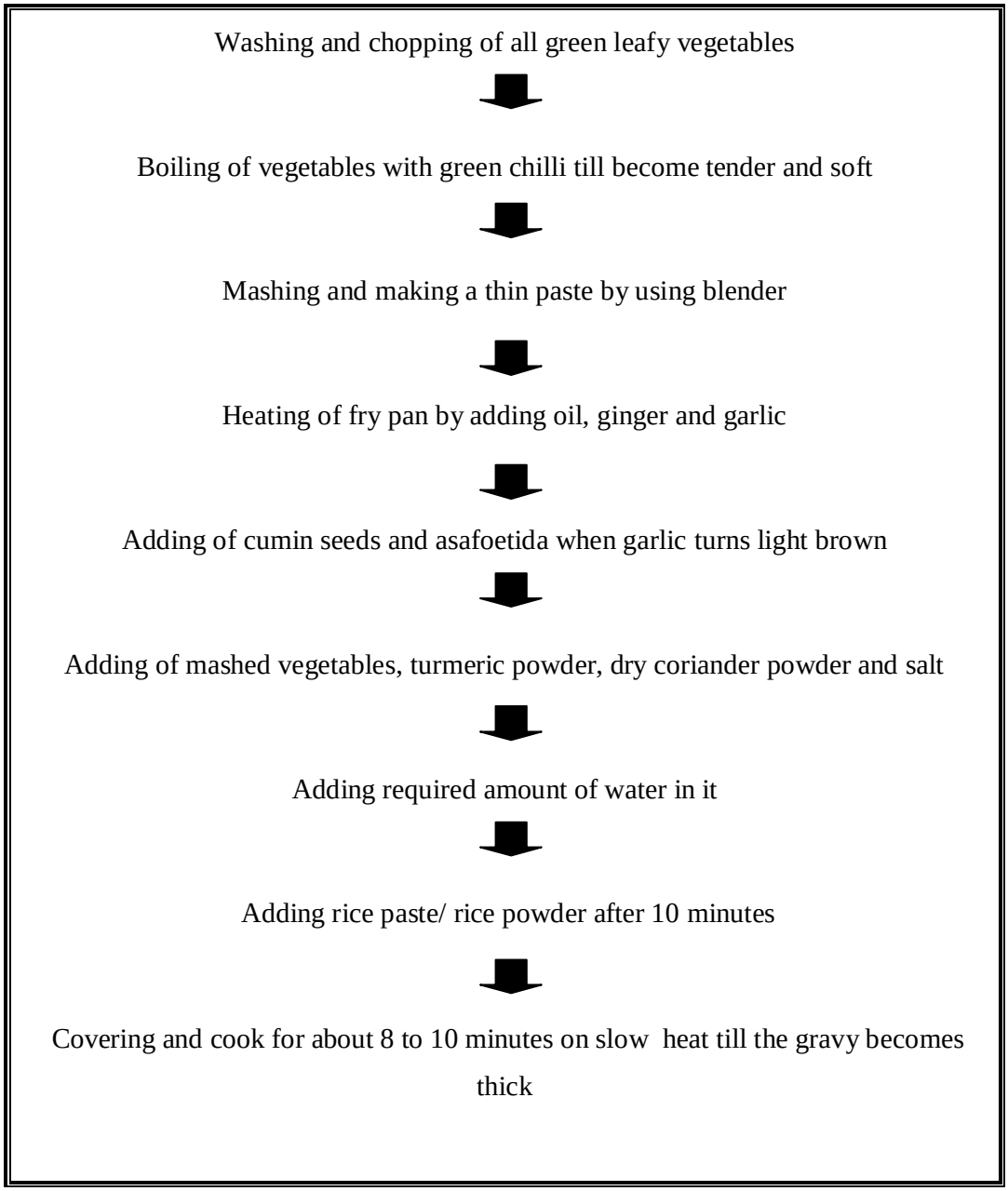


Fig 15: Indigenous method for preparation of *Kaffa*

Table 4.42: Indigenous food practices followed by farm families

N=480

S.N	Indigenous food	Reason	f(%)
1.	Kaffa made from green leafy vegetables	Good source of energy and enhances blood in the body	480(100)
2.	Sisunak Saag made from stinging nettle (*Utrica dioca*)	It increases blood and circulation	220(45.83)
		Good for Joint problem, gout and swelling	260(54.16)
3.	Gahat dal (*Macrotyloma uniflorum*)	Keep the body warm in winter and effective in dissolving Kidney stone	480(100)
4.	Bhang ki Chutney (*Cannabis sativa* L.)	Keep the body warm in winter season	280(58.33)
5.	Mandua ki roti (*Eleusine coracana*)	It helps to clean the digestive system	150(31.25)
		Good for Diabetes and	55(11.45)
		High in energy content	275(57.29)
6.	Bhatt ka dubka(Glycine max)	Good for in recovery of jaundice	415(86.45)
7.	Burans ke phoolo ki chatni (*Rhododendron arboretum*)	Burans is cool so prevent from sunstroke	300(62.5)
8.	Liun ki sabji(*Diplanzium esculentum*)	It is anti- malarial and	250(52.08)
		It is consumed to cure jaundice and constipation	230(47.91)
9.	Timul ka rayata(*Ficus auriculata*)	It controls dysentery	420(87.50)
10.	Bhatt ki Churkani(Glycine max)	High protein so it is good for growing children	395(82.29)
11.	Lal Chawal Ki Kheer(Red rice)	It is high energy content	415(86.45)
12.	Kauni ka Pulao(Foxtail millet)	Good for diabetic patient and children affected from measles	410(85.41)

❖ **Stinging nettle** (***Urtica doica***)

It is a green leafy vegetables dish having high nutritional value and 89.5 per cent of the respondents stated that stinging nettle are good for health as it increases blood in the body and good for rheumatic pain, gout and swelling. The method of preparation is given as under:

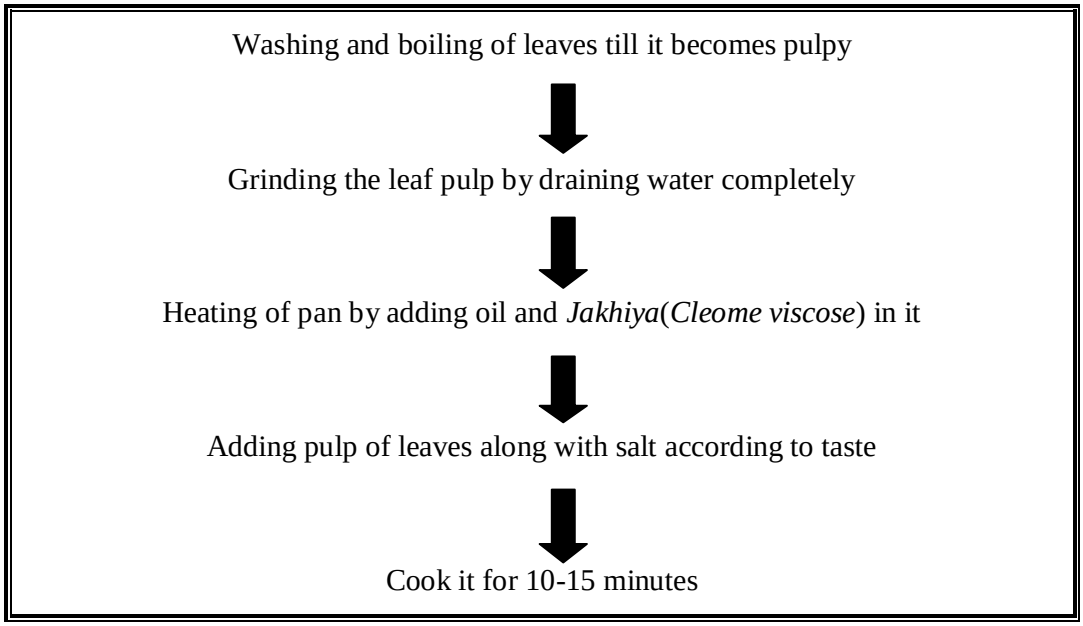


Fig 16: Indigenous method for preparation of Sisunak Saag

❖ **Gahat dal (*Macrotyloma uniflorum*)**

All the respondents use to make *Gahat dal* twice in a week with the reason that consuming *Gahat dal* is good for kidney stone and keeps the body warm in winter season. The method of preparation is as under:

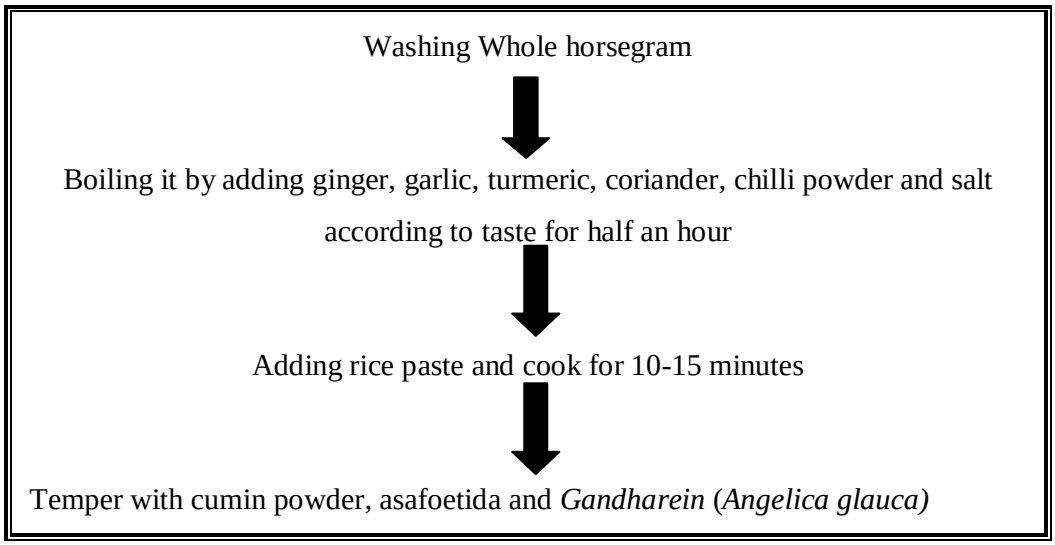


Fig 17: Indigenous methof for preparation of Gahat dal

Kala (2007) reported that *Gahat* (*Macrotyloma uniflorum)* is one of the important pulses of *Kumaon* region, which is used in curing kidney stones.

❖ **Bhang ki Chutney (Cannabis sativa L.)**

Data in Table 4.42 show that more than half of the respondents (58.33) use to make *bhang ki chutney* in lunch time. Respondents reasoned that it keeps the body warm in winter season whereas 41.66 per cent respondents reported that hemp (bhang) is beneficial in healing piles and ulcer. The method of preparation is given as under:

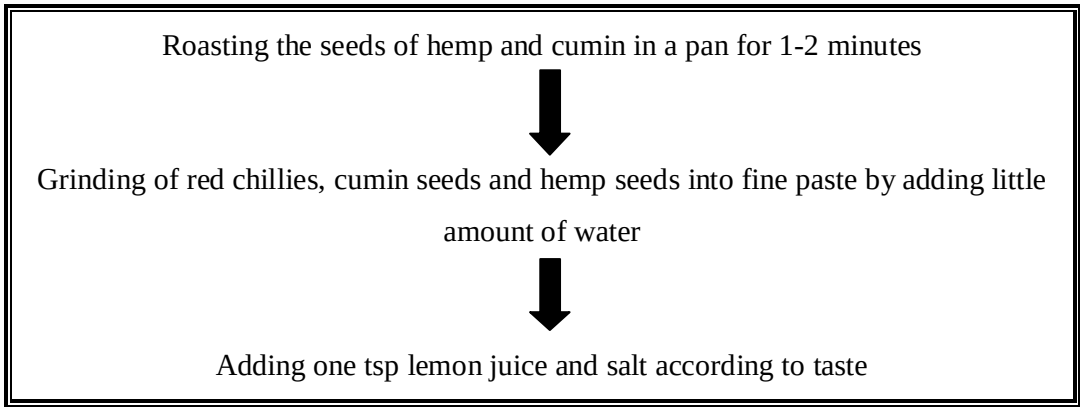


Fig 18: Indigenous method for preparation of Bhang Ki Chutney

❖ **Mandua ki roti (*Eleusine coracana*)**

Data in Table 4.42 reflect that 31.25, 11.45 and 57.29 per cent of the respondents consume Finger millet chapatti as it helps to clean the digestive system, good for person suffering from diabetes and have high energy content, respectively. The method of preparation is given as under:

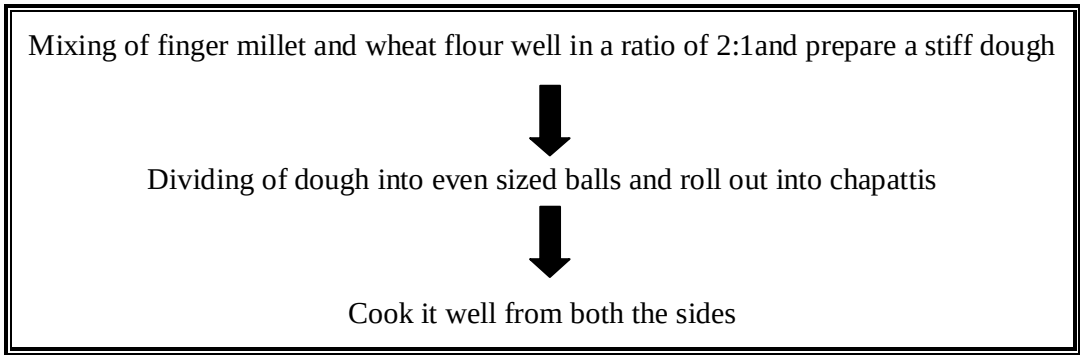


Fig 19: Indigenous method for preparation of Mandua ki Roti

Kala (2007) in a study on "Prioritization of cultivated and wild edibles by local people in the Uttaranchal hills of Indian Himalaya" reported that *mandua*(*Elusine coracana)* is still preferred by most of the respondents in all

Himalayan districts because of its high nutritional values. Earlier, the local people used to prepare many dishes of *Elusine coracana* including *chapati* and *halwa*. The dishes prepared by *Elusine coracana* were easy to cook and consumed less time. Moreover, *Elusine coracana* was also recommended by the traditional herbal healers in curing pneumonia and skin diseases.

Apetrei (2012) in a study on "Food security and millet Utilization" reported that in Suyalbari area of Almora district, farmers seem to be aware of the health benefits of *madua* – they mentioned that it is rich in calcium, high energy content and that it can be used as heart medicine – while also appreciating the grain for its palatability.

❖ **Bhatt Ka dubka (*Glycine max*)**

Majority of the respondents reported that they use to make *dubka* twice in a week or as per demand of the family members. Respondents further reported that *bhatt ka dubka* is good for people suffering from jaundice as it recovers jaundice very fast. The method of preparation is given as under:

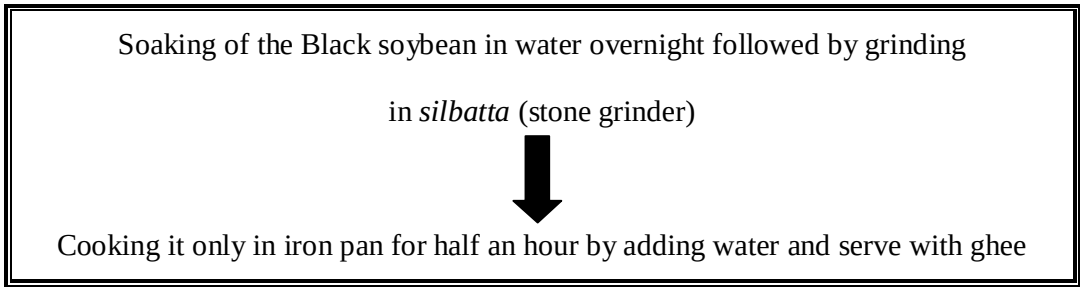


Fig 20: Indigenous method for preparation of Bhatt Ka dubka

❖ **Burans ke phoolo ke chatni *(Rhododendron arboretum)***

Rhododendron is an evergreen tree mainly found in high altitude in Himalayan region. The flower blossoms in the month of March and April. *Buraansh ke phoolo ki chutney* is prepared by the respondents as *Burans* flower is cool in nature so prevent from sunstroke (62.5%) and a good heart tonic (37.5%).The method of preparation is given as under:

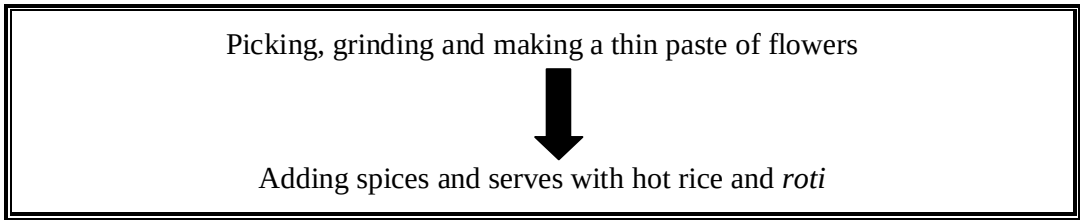


Fig 21: Indigenous method for preparation of Burans ke phoolo ke chatni

❖ **Liun ki sabji (Diplanzium esculentum)**

Liun is a wild variety of vegetable which is mainly found in dense forest, near water bodies and in marshy areas. Data in Table 4.42 show that more than half of the respondents (52.08%) consume the *liun* vegetable as it is anti-malarial whereas 47.91 per cent of the respondents reported that it is consume to cure jaundice and constipation. The method of preparation is as under:

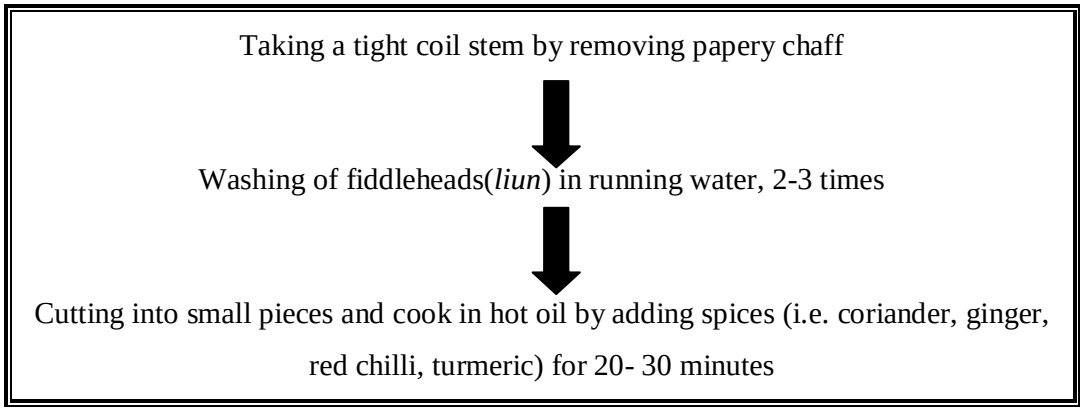


Fig 22: Indigenous method for preparation of Liun ki sabji

❖ **Timul ka raita *(Ficus auriculata)***

Timul is a fruit bearing tree and fruit is consumed in many ways, either raw, by making vegetable or in *chutney* form. Data in Table 4.42 show that majority of the respondents (87.5%) consume *timul* in the form of *raita* either with rice or *roti*. The reason given by the respondents that *timul* controls diarrhoea and helps in speedy recovery. The method of preparation is as under:

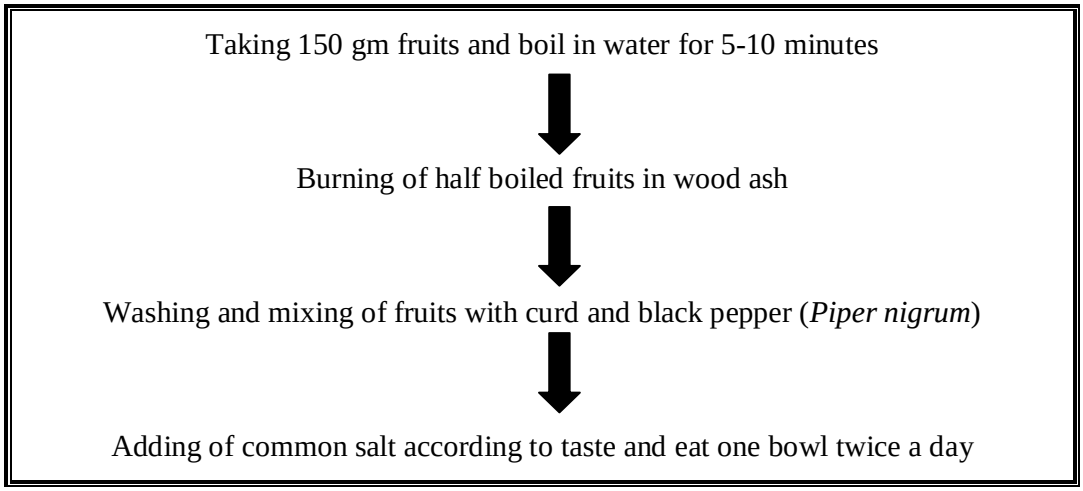


Fig 23: Indigenous method for preparation of Timul ka raita

❖ **Bhatt ki Churkani (Black soyabean)**

Bhatt ki churkani is another famous dish among *Kumaon* people. Respondents reported that *bhatt ki churkani* has high protein content so it is good for growing children. The method of preparation is as under:

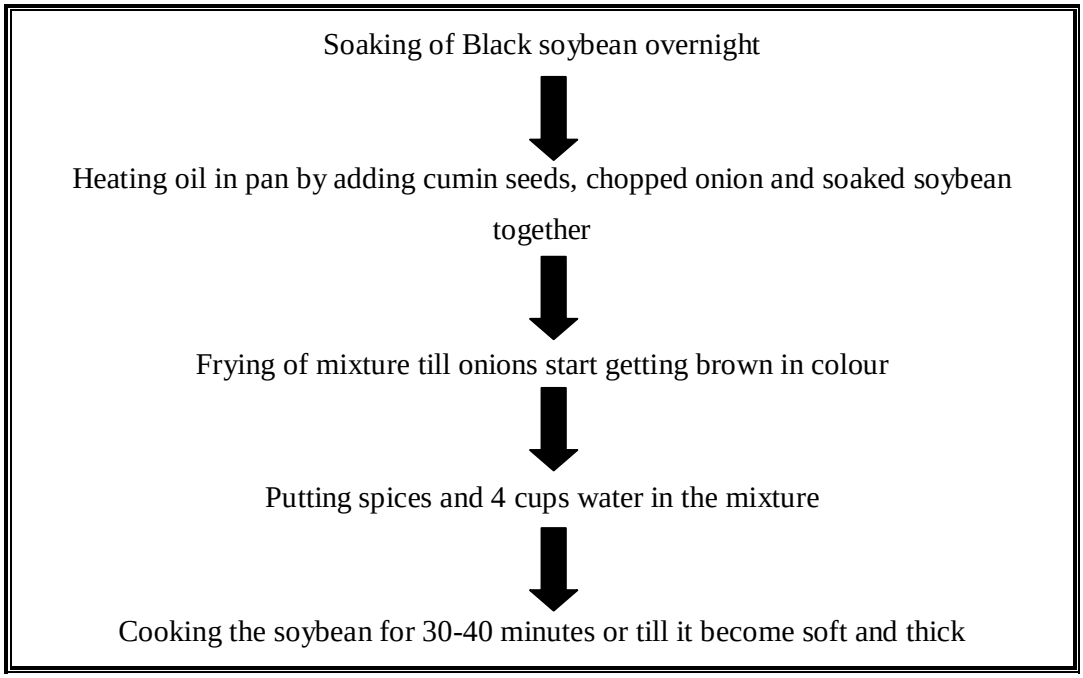


Fig 24: Indigenous method for preparation of Bhatt ki Churkani

Shah (2006) reported the same study that Soybean is one of the staple foods of the people of *Kumaon*. It is cooked in several ways: *churkani, rasa* or *thatwani, dubka, bhat- jaula, bhuti- bhat*(roasted soyabean).

❖ **Lal Chawal Ki Kheer(Red rice Porridge)**

Majority of the respondents (86.45%) consume *kheer* in special occasions and festivals. The respondents reported that *lal chawal ki kheer* has high energy content. The method of preparation is as under:

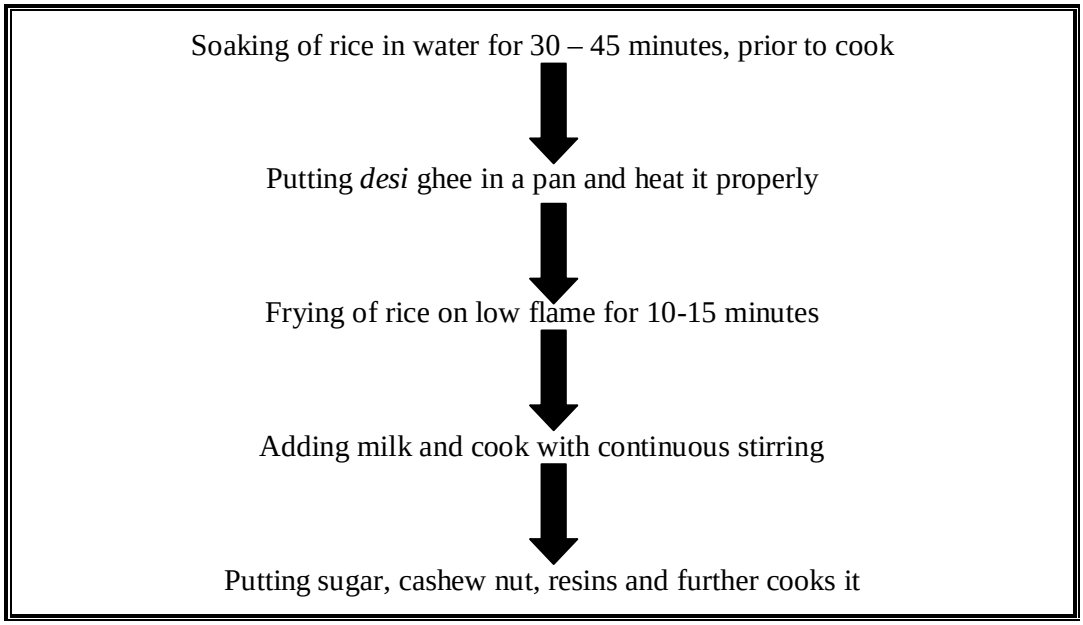


Fig 25: Indigenous method for preparation of La Chawal Ki Kheer

❖ **Kauni Pulao(Foxtail millet)**

The millet, known as *Kauni* in local parlance, remains to be the staple diet of rural *Kumaoni* people in older days. Now the use is limited to certain areas and it is made only for special purpose. Majority of the respondents (85.41%) reported that *Kauni pulao* is a high energy giving food and good for recovering from measles in children whereas 33.33 per cent of the respondents reported that it is good for diabetic patient. The method of preparation is as under:

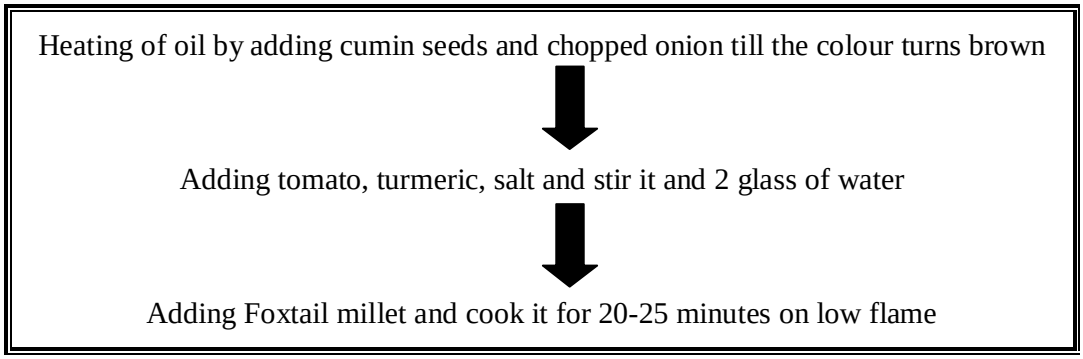


Fig 26: Indigenous method for preparation of Kauni Pulao

Conclusion

From the above findings it can be concluded that the people of *Kumoan* region have their own food practices which they widely consume in their daily life. These ethnic

food mainly wild vegetables, fruits and cereal based diet which has rich nutrition and medicinal properties. The urgent requirement is to validate these food habit practices for their contemporary use in modern time so that more number of people across the country can taste the usefulness of these ethnic foods.

Scientific Validation of Indigenous Agriculture and Homestead Practices

Farmers of *Kumaon* region are practicing a basket full of indigenous knowledge in their farm and home condition for completing day to day activities. In the area of agriculture and homestead, farm families practicing the indigenous method without knowing the scientific reason and they are totally dependent in their local wisdom either in cultivation of cereal crops, performing postharvest operations, curing different health problems, caring new born child, performing postpartum practices and indigenous food practices. The existence of modern farming system not even have sustainability but will also create fatal results in somewhat future. Hence it is mandatory to validate the agriculture and Homestead practices for their tremendous and mass scale application without any fear and doubt. Hence in this section an attempt was made to validate the selected indigenous practices in agriculture and homestead areas by the experts in three point continuums i.e. scientific, unscientific and unknown.

4.4 Scientific Validation of Agriculture practices in Selected Crops

Various indigenous practices of cultivation of selected cereal crops under the study area provide an idea about the basic pattern of agriculture in rural areas of Kumaon region. Hence in this section an effort was made to validate the indigenous agriculture practices in selected crops from the agriculture experts i.e. agronomist and plant pathologist.

4.4.1 Paddy

(a) Land preparation and sowing in upland paddy cultivation

Data in Table 4.43 depict that all the experts considered the practice i.e. keeping land fallow for 2-3 months followed by cleaning, broadcasting of organic manure, ploughing and sowing of seeds in land preparation and sowing of *chetuar dhaan* as

scientific. Experts from agronomy reasoned that the direct sowing of local paddy varieties in the month of March is a good practice for capturing winter rain and precipitation present in the fallow field after wheat harvesting. About land preparation and sowing of *Saie dhaan* and *Khaagi dhaan* 80 and 70 per cent experts were uncertain about the practices followed by farm families, respectively.

(b) Land preparation and sowing in lowland paddy cultivation

Land preparation in low land paddy cultivation, majority of the experts (80%) considered the practices i.e. burning of field, then broadcasting of organic manure, ploughing, after that fallow the land for 1-2 weeks, ploughing one day before transplanting the paddy and finally puddling of soil in standing water as scientific. The experts reasoned that burning of field kill all the harmful insects -pests resides in the soil, land is kept fallow for regaining moisture and also maintains good soil texture whereas ploughing and puddling destroy the hibernating stage of white grubs (*Kurmu*) which may cause harm to the root of seedlings.

Regarding growing of paddy in standing water throughout the growth cycle was considered scientific by majority (80%) of the experts. Experts reasoned that standing water stops the weed growth due to inability of germination conditions. About the practice of transplanting of paddy in second week of July was considered scientific by all the experts as availability of monsoon and also good for local varieties of rice in hilly region of *Kumaon.*

All the experts considered the practice of transplanting 10-15 days old seedlings in the main field as scientific. Experts reported that transplanting very young seedlings (8-12 days old) carefully and precisely gives the best crop growth to the farmers. Majority of the experts (70%) considered the practice of farm families of transplanting paddy in any direction as unscientific. Experts reasoned that transplanting seedlings singly in a square crop geometry pattern in 25x25cm distance is appropriate for proper growth of paddy plant.

(c) General land preparation practices

All the experts considered the practice of preparing field bunds in hilly terraces as scientific. The experts reasoned that it conserves the rainwater during monsoon seasons and checks the soil erosion.

Das *et al.* (2003) reported the same in a study on "Sustainable management of land and water resources through indigenous technological knowledge" that field bunding by earthen bunds is a popular method of rain water harvesting. Soil loss through erosion and water loss through runoff from the field can also be effectively checked by making bunds around the field.

All the experts considered the practice of ploughing the land several times before the onset of monsoon under rainfed conditions as scientific as it conserves water and increases water retention capacity of soil. The practice of keeping land fallow for 2-3 days after deep ploughing was considered scientific by all the experts by this way sunlight can reach at the deepest layer possible that kills the harmful microorganisms and weeds can be managed.

The findings are in conformity with Das *et al.* (2003) who reported in a study on "Sustainable management of land and water resources through indigenous technological knowledge" that during summer ploughing (April May) soon after the pre monsoon showers farmers plough the field slightly to increase the infiltration of rainwater and moisture holding capacity of the soil. It also reduces the evaporation loss of water by breaking the capillary flow of soil water and weeds, pests, and diseases are also reduced by this method.

All the experts considered the practice of more number of ploughing in heavy soil as scientific. Experts suggested that number of ploughings necessary to obtain a good tilth depends on soil type, eradicate weed problem and crop residues from the soil surface.

(d) Tillage practices

1. Primary tillage

Tillage is the physical manipulation of soil with tools and implements to result in good tilth for better germination of seed and subsequent growth of crops (Ready *et. al.*,1993). The tillage operation that is done after the harvesting of crop to bring the land under cultivation is known as primary tillage. From the Table 4.43 shows that all the experts considered the primary tillage performed by the farm families as scientific. The reason given by the experts that primary tillage is done to separate the top soil from lower layers and for uprooting of weeds. Further reported that tillage helps to

improve the physical condition of soil, control weeds, insect pests and diseases and also bring nutrient available to plant. Experts from G.B. Pant Agriculture University reported that the cultivation is not possible without tillage operation and the crops production depends on good tillage operations.

2. Secondary tillage

The tillage operations that are performed on the soil after primary tillage to bring a good soil tilth are known as secondary tillage. Harrowing and planking is done by the farm families to serve those purposes. Planking is done to crush the hard clods, level the soil surface and making soil compact (100%).

3. Puddling tillage

The tillage operation that is done in a land with standing water is called wet or puddling tillage and it is performed in low land cultivation of paddy crop; this practice was considered scientific by all the agricultural experts due to following reasons:

- ✓ It creates an impervious layer below the surface to reduce deep percolation, losses of water and to provide soft seed bed for planting rice.
- ✓ It hastens transplanting operation easily and smoothly by the rural women.
- ✓ It checks and destroys the hibernating stage of white grub in *Kumaon* hills.

Apart that the experts from MPUAT suggested that tillage helps to improve the capacity of soil to receive rain or irrigation water and to retain the moisture for growth and it improves the soil aeration which is beneficial for respiration of plant root.

Ghosh and Das, 2011 reported the same that puddling hastens transplanting operation easily and smoothly as well as the establishment of seedlings.

(e) Seed treatment

Regarding seed treatment following practices are identified and validated by experts

- ✓ The practice of soaking of seeds in water for 2-3 minutes was considered scientific by majority (90%) of the experts. They reasoned that it helps in discarding unwanted seeds by draining it out.

- ✓ The indigenous practice of mixing ash of cow dung and cow urine was considered scientific by 90 per cent of the experts as both the cow dung and urine is disinfectant in nature and helps to minimize spreading of spores and microorganisms.

- ✓ All the experts considered the practice of soaking paddy seeds in water for 2-3 days before sowing as scientific. They reported that it helps in minimizing dormancy period as outer cover becomes soft and in another terms it reduces the germination time and improve percentage of germination (priming in scientific language).

  Tilahun-Tadesse *et al.* (2013) in a study on "Effect of hydro-priming and pre-germinating rice seed on the yield and terminal moisture stress mitigation of rain-fed lowland rice" revealed the same that pre-germination is a pre-sowing process whereby rice seeds are soaked in water for some time and taken out to remain incubated in a moist shaded place until the seed starts germinating. The pre-germinated seeds sprout more quickly compared to dry seed thereby reducing the time of exposure to different environmental stresses that may affect seedling development.

- ✓ All the experts considered the practice of keeping the paddy seeds in moist jute bags for 4-5 days as scientific. Experts reported that there are chances of 30 to 40 per cent high yield of paddy crop due to quick establishment of seedlings and zero post transplantation shock.

(f)Nursery bed techniques

Regarding nursery bed technique by dry bed method all the experts considered the practice followed by farm families was considered scientific. The experts reasoned that ploughing helps the soil to get toiled, pulverised and clots are broken down.

The practice of covering nursery bed with paddy straw or cowdung layer was considered scientific by all the experts. Experts reported that organic mulches improve the fertility of soil and checks losses of water through evaporation and also regulates soil temperature.

The practice of planting dense population of paddy by the farm families in nursery bed was considered scientific by all the of the experts as high seed rate results in dense plant population growth and also helps to check weed growth.

Das *et al.* (2003) in a study on "Sustainable management of land and water resources through indigenous technological knowledge" reported that mulching is one of the important soil and water conservation techniques where soil around the plant is covered with grasses, crop residues, rice straw and plant litter. Moisture in the root zone is retained for longer time by this method, direct impact of raindrop on bare soil is reduced, weeds are suppressed and mulching also regulates soil temperature and increases organic matter of the soil.

(g)Nutrient management

Regarding nutrient management the practice of broadcasting fully decomposed organic manure of livestock dung and leaves was considered scientific by 70 per cent of the experts. Experts reasoned that fully decomposed manure have all essential nutrients (NPK) whereas 30 per cent experts recommended application of NPK fertilizers @ 800-1000g, 600g and 400g per *nali* for local varieties of paddy in hilly area. Further experts considered the practice of introduction of earthworm in crop land as scientific. The experts reasoned that it improves soil stability, air porosity and moisture holding capacity by burrowing and aggregating the soil; creating channels for drainage, aeration, and better root growth. Experts of VIKAPS, Almora reported that earthworms benefit soil quality by shredding residues, stimulating microbial decomposition, improving soil fertility and physical properties such as soil aggregation and infiltration.

It is clear from the Table 4.43 that 80 per cent experts considered the practice of application of 10-15 t/hectare farm yard manure in the field as scientific. Experts stated that manure supplies nutrient and organic matter and stimulates the biological process in the soil that helps to build fertility. The practice of ploughing the field just after application of organic manure was considered scientific by 80 per cent of the experts. Experts reported that about 30 per cent of nitrogen, 60 to 70 per cent of phosphorus and 70 per cent of potassium are available to the first crop.

Mishra and Rai(2013) in a study on 'Use of indigenous soil and water conservation practices among farmers in Sikkim Himalaya" reported that adoption of terrace cultivation, construction of retention walls, bunds, construction and maintenance of

waterways, mixed cropping, crop rotation, mulching, agroforestry, and use of farm yard manure are found significantly higher in all ecological zones of the watershed.

(h)Irrigation

Majority (80%) of the experts considered the practice of irrigating *Khaagi dhaan* field two times as water is needed for proper growth till flowering stage whereas in transplanted paddy, field is flooded with water throughout the growth period as standing water restricts the growth of the weed plant.

(i)Intercultural management

The practice of hoeing is performed 3-4 times during plant growth stage was considered scientific by 80 per cent of the experts as it looses the weed root and aerate the soil for proper functioning. Experts from VIPKAS, Almora reported that weeds compete with crop plants for water, airspace, light, mineral and other factors in the micro environment. Weeds are capable of absorbing more amounts of nutrients from soil than the crops plants. *Echinochola colonum*, *Echinochola crusgalli*, *Cynodon dactylon*, *Marsilea sp.* Ipomoea reptans etc.are the main weeds in paddy field. Scientist from VIPKAS, Almora also recommended the use of weedicides such as Butachlor 50 EC @60 ml/*nali*, Anilpphos 30 EC @33 ml/*nali* and Pandimithilin 30 EC @66ml/*nali*.

The practice that no hoeing operation is performed in low land paddy cultivation as reported scientific by 80 per cent of the experts. They reasoned that water restricts the growth of weed by providing improper conditions and also helps to check white grub attack. Half of the experts considered the practice of application of common salt at the time of land preparation stage as scientific. They stated that Sodium and Chloride salts checks the growth of weeds by destroying it.

Rathore *et al.* (2012) in a study reveal the same that the age old practice of using common salt for weed control under acidic conditions of *jhum* paddy in north east India is not only effective in minimization of weed competition with cultivated crop (paddy) but also results in comparatively high paddy productivity without having any negative effect on growth, yield attributes of paddy. The practice of use of salt for weed management is also cost effective compare to other popular practice of weed

management like hand weeding. The acidic soils of shifting cultivation have not shown any deterioration in its quality but there is need to study the long term effect of use of salt on physico-chemical properties of the soils.

(j) Mixed cropping

All the experts considered the practice of growing the pulses i.e. cow pea (*Phaseolous mungo L.*), black soybean (Glycine max), whole horsegram (*Macrotyloma uniflorum*) and red kidney bean (*Cicer arietinum*) in between the paddy crop as scientific. The reason given by the experts that it is considered a soil conservation and fertility management practice by adding nitrogen to the soil.

(k)Soil erosion

Planting of plant fodder and fuel yielding trees among the bunds was considered scientific by all the experts as roots of these plants binds the soil tightly so check the soil erosion in hilly terrains.

Das *et al.* (2003) reported the same in a study on sustainable management of land and water resources through indigenous technological knowledge reported that some farmers grow *Vetiveria spp*. on field bunds to check water erosion from the bunds.*Vetiver* strengthens the bund to hold sufficient rainwater in the field.

(l)Insect- Pest Management

- ✓ Broadcasting common salt mixing with ash at the rate of 1 kg/*nali* in the paddy field was considered unscientific by 80 per cent of the experts and experts recommended insecticide quinolphos 25 EC @80 ml/*nali* for killing the white grub which is very effective to stop the menace.
- ✓ Ninty per cent experts considered the practice of hand hoeing for killing of *Holotrichia longipennis* as unscientific. Experts recommended chemical insecticides such as chlorpyriphos @15 ml/*nali* and imidachloprid@8 ml/*nali* for controlling the menace.
- ✓ The practice of sprinkling the mixture of cow urine and fenugreek seed paste in 3:1 ratio for controlling rice leaf folder was considered unscientific by majority of the experts (80%). They suggested the application of cartap hydrochloride 50 w.p.

Table 4.43: Scientific validation of indigenous paddy cultivation practices followed by farm families

***Scientific ** Unscientific *** Uncertain**

S.No.	Agriculture practices in paddy	Experts opinion			Reason
		S*	US**	UC***	
Land preparation and sowing of *Chetuar dhaan*					
1.	Keeping land fallow for 2-3 months, cleaning, broadcasting of organic manure, ploughing and sowing of seeds	100			For capturing winter rains and precipitation present in the fallow field after wheat harvesting
Land preparation and sowing of *Saie dhaan*					
2.	Ploughing, cleaning, flooding with water, puddling, sowing of seeds, broadcasting of organic manure and performing tillage practices		20	80	More research is needed
Land preparation and sowing of *Khaggi dhaan*					
3.	Burning of field, broadcasting of manure, ploughing of field, flooding of field, sowing of seeds and performing tillage practices	20		80	Research is needed
Land preparation and sowing in low land paddy cultivation					
4.	Burning of field, broadcasting of organic manure, ploughing, fallow land for 1-2 weeks, ploughing one day before transplanting and puddling of land	80	20		✓ Burning of field kill all the harmful insects -pests resides in the field ✓ Fallow land regains the moisture and maintain good soil texture ✓ Ploughing and puddling destroy the hibernating stage of white grubs which may cause harm to the root of seedlings
5.	Paddy is grown in standing water throughout the growth cycle	80	20		Standing water stops the weed growth due to inability of germination conditions
6.	Transplanting of rice in second week of July	100			✓ Good yield due to availability of monsoon ✓ Good for local varieties of rice
7.	Transplant 10-15 days old seedlings	100			Transplanting very young seedlings (8-12 days old) carefully and precisely gives the best crop growth
8.	Transplant paddy in any direction		70	30	Transplant seedlings singly in a square crop geometry pattern, in 25x25cm

General land preparation practices					
9.	Preparing field bunds in slopy land	100			Helps in conserving rain water and prevents soil erosion
10.	Ploughing of land several times before the onset of monsoon under rain fed condition	100			✓ To conserve water and increase water retention capacity of soil ✓ The summer ploughing reduces the evaporation loss of water by breaking the capillary flow of water
11.	After deep ploughing, land is left fallow for 2-3 days	100			Helps in controlling of weeds and penetration of sunlight in to the soil at deepest layer
12.	More number of ploughing in a heavy soil	100			Obtain fine texture of soil
Tillage practices					
13.	Performing primary tillage after the harvesting of previous crop by ploughing the land	100			To separate the top soil from lower layers and uprooting of weeds
14.	Performing secondary tillage practices after primary tillage by harrowing and planking	100			To crush the hard clods, level the soil surface and make soil compact
15.	Wet or puddling tillage is performed in low land paddy cultivation	100			✓ Creates an impervious layer below the surface to reduce deep percolation, losses of water and to provide soft seed bed for planting rice ✓ It hastens transplanting operation easily and smoothly as well as establishment of seedlings ✓ It checks and destroys the hibernating stage of white grub
Seed treatment					
16.	Soaking of seed in water for 2-3 minutes	90		10	Helps in discarding unwanted seeds
17.	Treatment of seed with cowdung ash+ cow's urine	90		10	Anti infectant in nature and protect the seed from spores
18.	Soaking seed in water for 2 to 3 days	100			✓ It helps in minimizing dormancy period as outer cover becomes soft ✓ To reduce the germination time and improve percentage of germination, called priming
19.	Germination of seed in moist jute bag	80		20	Faster germination of seedlings and 30 to 40 per cent increase in yield

Nursery bed techniques **a. Dry bed method**					
20.	Cleaning, broadcasting of organic manure, raising and tilling, spreading of seeds(3-4 kg/*nail*), ploughing, covering with paddy straw/cowdung and sprinkling of water	100			✓ By ploughing soil get toiled, pulverised and clots are broken down ✓ Organic mulche improve the fertility of soil and checks losses of water from the soil through evaporation ✓ Mulching also regulates soil temperature and increases organic matter of the soil ✓ High seed rate results in dense plant population growth and helps to check weed growth
b. Wet bed method					
21.	Cleaning, puddling in standing water, application of FYM, levelling, sowing of seeds and saturating the bed with water for 4-5 days.		20	80	Research is needed
Nutrient management					
22.	Fully decomposed organic manure of livestock dung and leaves is used	100		10	Decomposed manure have all essential nutrients (NPK)
23.	Introduction of earthworm in the main crop land	100			Improve soil stability, air porosity and moisture holding capacity by burrowing and aggregating soil creating channels for drainage, aeration, and root growth
24.	Nearly 10- 15t/hec. FYM is applied in the field	80		20	Supply nutrients and organic matter and stimulates the biological process in the soil
25.	Ploughing is done after broadcasting of manure	70		30	About 30 per cent of nitrogen, 60 to 70 per cent of phosphorus and 70 per cent of potassium are available to the crop

Irrigation					
26.	In *Khaggi dhaan* cultivated field is irrigated two times	80		20	As water is needed for proper growth till flowering stage
27.	In transplanted paddy, field is flooded with water through out the growth period	80		20	Standing water restricted the growth of weed plant
Intercultural practices					
28.	Hoeing is performed 3-4 times during plant growth stage in upland paddy cultivation	80		20	It looses the weed root and aerate the soil for proper functioning
29.	Harrowing after 15 days of first hoeing	40		60	Research is needed
30.	No hoeing operation is performed in low land paddy cultivation	80		20	Water restrict the growth of weed by providing improper conditions also helps to check white grub attack
31.	Application of common salt at the time of land preparation stage	50		50	Na and Chloride salts checks the growth of weeds
Mixed cropping					
32.	✓ Paddy +Black gram(*Mans*) ✓ Paddy+ Black soyabean(*Bhatt*) ✓ Paddy +Wholehorse gram (*Gahat*) ✓ Paddy +Barnyard millet (*Jangora*) ✓ Paddy +Foxtail millet (*Koni*) ✓ Paddy+ Sesame(*Til*)	100			It is considered a soil conservation and fertility management practice by adding nitrogen to the soil
Soil erosion					
33.	Planting fodder and fuel wood yielding trees on the bunds of crop fields	100			The roots binds the soil tightly so check the soil erosion

Insect-pest management					
34.	White grub-Broadcasting common salt +ash after first ploughing @ 1 kg/*Nali*	20	80		Na and Cl activity kills the white grub
35.	Hand hoeing is performed to kill the *Holotrichia longipennis*		90	10	Research is needed
36.	Rice leaf folder- Sprinkling the mixture of cow urine +fenugreek seed paste in 3:1 ratio	20	80		
37.	Red spot- Spraying butter milk in field (3liters/*nali*)		90	10	
38.	Sprinkling solution of common salt(250g) at the rate of 2 liters/*nali* in the field	10	20	70	Research is needed
39.	Rodents (Bait method) ❖ Mixture of wheat flour +ground glass kept near the rodent hole	70		30	Provide physical injury
	❖ Sting nettle and Barberry thorns are kept near the rodent hole	20	80		
Judgement of harvesting					
40.	In the month of mid September paddy spikes will get yellow	100			Mid September is the right age of harvesting
41.	Pressing the grains with fingers	80		20	It indicates the hardness and softness of grain

with neemcake @ 12 g /*nali* in the paddy field as it kills the leaf folder. Regarding the practice of spraying butter milk in field (3liters/*nali*) for controlling red spot was considered unscientific by 60 per cent of the experts. They suggested the application of mancozeb(0.25%) solution per *nail* in the field.

- ✓ About sprinkling the solution of common salt (250g) at the rate of 2 liters/*nali* in the field for controlling red spot 70 per cent of the experts were uncertain about this practice.
- ✓ The practice of using bait for killing the rodents was considered scientific by 70 per cent of the experts as glass provides internal injury to the rodents. The practice of keeping the leaves of sting nettle and thorns of barberry near the rodent hole was considered unscientific by majority of the experts (80%) as these are not the permanent solution to get rid from rodents.

(m) Harvesting

Regarding harvesting, majority (80%) of the experts considered the practice of pressing the grains with fingers as scientific. They reasoned that it indicates the hardness and softness of grains.

4.4.2Finger millet cultivation practices

(a)Land preparation and sowing

The practices followed by farm families i.e. cleaning of land , broadcasting of FYM, ploughing of field, sowing of seeds and tapping of soil by wooden log was considered scientific by all the experts. They reasoned that it is an appropriate practice of growing finger millet and tapping of soil with wooden log helps in inserting seeds into the soil. Further experts from VIPKAS reported that millets are well suited to difficult production environment. As they require little water and millets are particularly adapted to regions of low moisture and difficult soil. Their deep root systems and short life cycles make it possible for millets to grow in places where the mean annual precipitation is as low as 300mm.

Michaelraj and Shanmugam (2013) reported the same in a study that millets are grown on poor shallow and marginal soils under rainfed conditions. Some of these are

still grown in the hilly areas under shifting cultivation which is one of the most primitive ways of crop production. The soils on which these crops are cultivated have low moisture retention capacity.

(b)Seed treatment

The practice of milling the seeds lightly in the *okhali* before sowing in field was considered scientific by majority of the experts (80%) as milling removes the outer hard cover, so easy to germinate the crop.

(c)Nutrient management

All the experts considered the practice of applying FYM in the field as scientific. The experts reasoned that FYM supplies plant nutrients including micronutrients to the soil, improve soil physical properties like soil structure and water holding capacity.

(d)Intercultural management

The practice of hoeing and harrowing after one month of sowing was considered scientific by all the experts as it aerate, toil the soil and removes the weeds whereas second hoeing after one month interval was considered scientific by 80 per cent of the experts as hoeing removes weed and increases better plant growth.

(e)Mixed cropping

The practice of growing cow pea (*Vigna sinensis*), black soybean(*Glycine max*) and whole horsegram (*Macrotyloma uniflorum)* in between finger millet crop was considered scientific by all the experts as the leguminous crop fix the atmospheric nitrogen and increases soil fertility. Experts further reported that leguminous plants have a special relationship with nitrogen-fixing bacteria called rhizobium. By biologically fixing nitrogen levels in the soil, legumes provide a relatively low-cost method of replacing nitrogen in the soil, enhancing soil fertility and boosting subsequent crop yields.

(f) Harvesting

All the experts considered the practice of harvesting finger millet when ear heads get dried or turn brown as scientific. They reported that it is the sign of ripening of ear heads, which is collected by cutting it.

4.4.3 Whole horsegram cultivation practices

(a)Land preparation and sowing

Practices related to land preparation and sowing of whole horsegram i.e. cleaning of land, sowing of seeds and ploughing of field was considered scientific by all the experts. They reported that it is the appropriate way of land preparation.

(b) Seed treatment

The practice of coating of seeds with mixture of cow dung and cow urine was considered scientific by all the experts as both are anti-infectant and anti fungal in nature and checks spreading of diseases.

(c)Time of sowing

The practice of sowing of seeds in mid of May to June was considered scientific by 80 per cent of the experts as it is a good time to sow the local varieties of whole horsegram in hilly areas.

(d)Nutrient management

Majority (80%) of the experts considered the practice of broadcasting of FYM in whole horsegram as unscientific. They reported that FYM in itself not adequate for providing proper nutrient and experts further recommended adding of lime @ 500 kg ha-1 and P_2O_5 @ 25 kg ha-1in the field.

(e) Intercultural management

The practice of removing of weeds by manual picking or use of hand hoe was considered scientific by all the experts as it enhances yield by proper plant growth whereas hoeing and harrowing during early plant growth period was also considered scientific by all the experts as it increases aeration in the soil which results in vigorous plant growth.

(f) Mixed cropping

Mixed cropping of amaranth and barnyard millet with whole horse gram was considered scientific by 80 per cent of the experts as it enhances productivity and fertility of the soil.

Table 4.44: Scientific validation of indigenous finger millet and whole horsegram cultivation practices followed by farm families

***Scientific ** Unscientific *** Uncertain**

S.No.	Indigenous practices	Expert opinion			Reason
		S*	US**	UC***	
Finger millet					
Land preparation and sowing					
1.	Cleaning, broadcasting of FYM, ploughing of field, sowing of seeds and tapping of soil by wooden log	100			Appropriate practice of growing finger millet and tapping helps in inserting of seeds
Seed treatment					
2.	Milling of seeds in *okhali* before sowing	80		20	Milling removes the outer hard cover, so easy to germinate
Nutrient management					
3.	Broadcasting of FYM (*moe*) in the field	100			✓ It supplies plant nutrients including micronutrients ✓ It improve soil physical properties like structure and water holding capacity
Intercultural practices					
4.	❖ Hoeing and harrowing after one month of sowing ❖ Second hoeing after one month interval	100 80		20 20	It aerates, toil the soil and removes the weeds Removes weed and better plant growth
Mixed cropping					
5.	Fingermillet+Cow pea(*Vigna sinensis*) Fingermillet+Blacksoybean(*Bhatt*) Fingermillet +Wholehorse gram(*Gahat*)	100			Leguminous crop fix the atmospheric nitrogen, increases the soil fertility and prevent soil erosion
Harvesting					
6.	Ear heads get dried or turn brown	100			Sign of ripening

Whole horsegram					
Land preparation and sowing					
1.	Cleaning of land, sowing of seeds and ploughing of field	100			Appropriate method of land preparation
Seed treatment					
2.	Coating of seed with cow dung and cow urine	80		20	Anti fungal and anti infectant in nature
Time of sowing					
3.	Mid of May to June	80		20	Good time to sow the local varities of whole horsegram in hilly areas
Nutrient management					
4.	Application of FYM in the field	20	80		FYM is not adequate for proper nutrient, add lime @ 500 kg ha-1 and P_2O_5 @ 25 kg ha-1
Intercultural operations					
5.	Removal of weeds by manual picking or use of hand hoe	100			Enhances yield by proper plant growth
6.	Hoeing and harrowing during early plant growth period	100			Increases aeration in the soil which results in vigorous plant growth
Mixed cropping					
7.	Wholehorse gram+ Amaranth(*Chulai*)	80	20		Enhances soil fertility
8.	Whole horsegram +Branyard millet *(Jhangora)*	80		20	Enhances soil fertility
Insect-pest management					
9.	Formation of ditches around the crop field	20	60	20	-
10.	Burning of fire and smoking during night time		100		-
Harvesting					
11.	Uprooting of plants and allow to pre-dry in the sun for few days	100			Drying removes the excessive moisture and helps in ripening of pod

(g) Insect -pest management

The practice of controlling insects-pests by formation of ditches around the field was considered unscientific by 60 per cent of the experts whereas all the experts considered the practice of burning of fire and smoking during night time as unscientific.

(h) Harvesting

Practices regarding harvesting i.e. uprooting of the plants and then allow pre-drying in the sun for few days was considered scientific by all the experts. They reported that drying removes the excessive moisture and helps in ripening of pod.

Conclusion

From the above study it is concluded that in cultivation of paddy, finger millet and whole horse gram, there are many practices which have scientific base and farm families are unaware of it. It becomes important to highlight these scientifically validated practices for mass scale dissemination in those areas with same agro climatic and micro farming situation.

4.5 Scientific Validation of Homestead Practices

Homestead in the present study includes indigenous post harvest operations in selected crops, child and postpartum care, health care practices and traditional food practices followed by farm families. Hence in this section an effort was made to validate the indigenous homestead practices by panel of experts.

4.5.1 Scientific Validation of Indigenous Postharvest Practices

I Paddy

(a) Threshing

Data in Table 4.45 show that all the experts considered the practice of cutting and keeping the paddy crop in the field for few days as scientific. The experts reasoned that it helps to remove excessive moisture and save the grain from spoilage. The heat generated within the heap will help in easy separation of grains. Experts from agronomy further reported that harvesting coinciding with heavy rains and lack of

sunny days leading to problems like lodging, shattering of grains, blackening of grains and straw whereas rubbing of paddy crop with bare human feet in field was considered scientific by 80 per cent the experts as it separates panicle from paddy stalks. Majority (70%) of the experts considered the practice of beating of grain with wooden log as unscientific as it breaks the grains and deteoriate the quality also.

(b) Winnowing

Winnowing is done either with the help of folded cloth sheet or with *soop* was considered scientific by all the experts as it removes lighter dirt and external particles.

(c) Sun drying

Sun drying of paddy grains for a week before keeping in storage structures was considered scientific by all the experts as it removes moisture which leads to pest attack.

(d) Dehusking

Majority of the experts considered the practice of dehusking the paddy grain with the help of mortar and pestle as unscientific. They reported that there are more chances of grain breakage whereas all the experts considered the practice of feeding rice husk to the animals as scientific. They reasoned that rice husk gives strength to drought and milch animals.

II Wheat

(a) Threshing

Data in Table 4.45 shows that majority of the experts (80%) considered the practice of threshing by trampling bullocks for 3-4 hours as scientific. Experts reasoned that it separates the panicle from wheat stalk.

(b) Winnowing

Winnowing with the help of cloth sheet and with *soop* was considered scientific by 80 per cent of the experts as straw, chaff, immature grains, stones, and other substances are separated easily.

(c) Milling

In a peculiar practice of milling of wheat grain majority of the experts (70%) considered the practice of using water mill for grinding wheat grain as scientific where the pressure of water converts grain into the flour.

III Millets (Finger millet, Foxtail millet and Barnyard millet)

(a) Threshing

About threshing of millets , majority of the experts (80%) considered the practice of beating millets with stick as unscientific, they reasoned that it damage the grain whereas all the experts considered the practice of threshing the millets with bare human feet or with wooden log as scientific which separate spikelets from millet easily.

(b)Winnowing

Winnowing is done with the help of *soop* was considered scientific by all the experts which separate upper glumes and lower glumes or the outer layer.

(c)Milling

Milling of millets in *okhali* before grinding into flour was considered scientific by all the experts as it looses epidermal layer or chaff.

IV Pulses (Whole horsegram, black soybean and lentil)

(a)Threshing

Beating pulses either with 3 to 4 m wooden log or with iron rod continuously considered scientific by 70 per cent of the experts as it separates the pod and seed from the pulse crop.

(b)Winnowing

Winnowing with the help of *soop* was considered scientific by all the experts as straw, chaff, immature grains, stones, and other substances are separated easily from the pulses.

Table 4.45: Scientific validation of indigenous post harvest practices followed by farm families in cereals, pulses and millets

***Scientific ** Unscientific *** Uncertain**

S.No.	Post harvest practices	Expert opinion			Reason
		S*	US**	UC***	
Paddy					
Threshing					
1.	Keeping harvested crop in the field for 3-4 days	100			✓ It helps to remove moisture and save grain from spoilage ✓ Heat generated within the heap will help in easy separation of grains
2.	Rubbing of paddy stalk with bare human feet in field	80	20		It separates panicle from paddy stalks
3.	Beating with wooden log or iron stick	30	70		It breaks the grain structure and deteoriate the quality
Winnowing					
4.	Falling of paddy from shallow bamboo basket (4-5 feet) in the direction of wind by folded cloth sheet	100			It removes lighter dirt and external particles
5.	Paddy is kept in shallow basket and allow to fall from a height of about 4-5 ft in a thin vertical flow	100			It removes lighter dirt and external particles
Sun drying					
6.	Sun drying for a week in the courtyard	100			It removes moisture which leads to pest attack

Dehusking					
7.	Use of stone made mortar and pestle(wooden 6 feet log have metal round plate at the edges)	30	70		Breaking of grains in more quantity
	Feeding of rice husk to the drought and milch animals	100			Provide strength to the animals
Wheat					
Threshing					
1.	Threshing by trampling bullocks	80	20		Separates the panicle from paddy stalk
Winnowing					
2.	Wheat is placed in shallow basket, and allow to fall from a height of about 4-5 ft in a thin vertical flow	80	20		Straw, chaff, immature grains, stones, and other substances are separated easily
3.	Falling of wheat from shallow basket(4-5 feet) in the direction of wind by folded cloth sheet	80	20		Straw, chaff, immature grains, stones, and other substances are separated easily
Milling of wheat grain					
4.	Water mill (*gharat)* commonly used for grinding of wheat grain	70		30	Pressure of water converts grain into the flour
Millets					
Threshing					
1.	Rubbing either with hands or legs	100			It separated spikelet from the ear heads
2.	Beating with wooden log	20	80		Damage the grain by breaking it

Winnowing					
3.	Millet is kept in shallow basket and allow to fall from a height of about 4-5 ft in a thin vertical flow	100			Separates upper glumes and lower glumes
Milling					
4.	Milling of millets in *okhali* before grinding into flour	100			It looses epidermal layer or chaff
Indigenous practices in Pulses					
Threshing					
1.	Beating pulses with wooden log or iron rod	70	30		It separates the pod from the pulse crop
Winnowing					
2.	Placing in shallow basket is allow to fall from a height of about 4-5 ft in cross wind direction	100			Straw, chaff, immature grains, stones, and other substances are separated easily
Sun drying					
3.	Drying for a week in sunlight	100			It removes excessive moisture for less pest attack
Milling					
4.	By stone mill(hand *chakki*) By slight grinding in granite stone(*seel batta)*	100			It removes the outer hard cover

(c)Sun drying

Drying in sun for one week before storage was considered scientific by all the experts as it removes excessive moisture for less pest attack.

(d)Milling

Using stone mill or hand *chakki* to dehusk lentil was also considered scientific by all the experts as it removes the outer layer.

4.5.3 Scientific Validation of Indigenous Storage Practices

The storage condition should be such to provide the grain protection from insects. The ill storage condition results in loose of food grains. The seeds that contain high moisture are subjected to the attack of insects and microorganisms. Moist seeds are amenable for easy bitting or chewing by insects. For preserving grains and seeds for longer time period proper storage is essential. Data in Table 4.46 show the scientific validation of indigenous storage practices followed by the farm families.

1. Majority (80%) of the experts considered the practice of plastering storage structure (*Bhakar* and *Doke*) with cow dung and mud for keeping paddy and wheat as scientific . The experts reasoned that cow dung is antibacterial and prevents from spoilage of grains.

2. Keeping dried leaves of walnut for storing grains (Wheat) were considered scientific by all the experts as it emits pungent smell which acts as an insect repellent.

Similar findings were also reported by Mehta *et al*. (2012) who revealed that the uses of *Vitex negndou, Azadirachta indica* and *Eucatyplus* are very common and effective treatments for storing grains for longer time period. The uses of various plant parts as storage pesticides, because these plant parts emit a pungent type smell. This is because of availability of essential oil in the plant parts which acts as a repellent of insect and deters their survival.

3. The practice of mixing cow dung ash in wheat grains was considered scientific by 80 per cent of the experts as the layer of ash on grains inhibits insects from egg laying.

4. Application of common salt in paddy grains was considered scientific by 60 per cent of the experts as salt helps in reducing moisture. Further experts reported that sometimes moist grains may even germinate and become unfit for consumption as grains are hygroscopic and absorb moisture from the atmosphere.

5. Keeping turmeric rhizome or onion splits in paddy grains were considered scientific by 70 per cent of the experts. The experts reported that it provides protection against insects.

6. Use of Lime and wood ash for controlling grain insect-pest in paddy was considered scientific by majority of the experts (80%) as lime and ash makes a fine film coating over the grains which prevent spoilage.

   Karthikeyan *el al*. (2009) in a study on "Traditional Storage Structures" reported the same that farmers of Tamil Nadu traditionally follow a practice of storing grains along with lime powder. In this practice, farmers dusted about 10 gm of lime per kg of grains. After thorough mixing they stored them in jute gunny bags. The limes have a property of emitting irritating odour that repelled insects and prevented the grains from damage. By this way, grains could be stored for even one year.

7. All the experts considered the practice of mixing mustard oil and table salt in pulses as scientific. The experts reasoned that both oil and salt save the grain form spoilage.

8. All the experts considered the practice of using mustard oil and garlic *(Allium sativum)* splits for storing pulses as scientific. The experts reasoned that layer of oil on grains prevent insects from laying eggs and also avoid the attack of pulse beetle *(Callosob ruchus sp.)* whereas allilcin compound found in garlic is antimicrobial in nature and work against bacteria, fungi and parasites.

Table 4.46: Scientific validation of indigenous grain storage practices followed by farm families in cereals, pulses and millets

***Scientific ** Unscientific *** Uncertain**

S.No.	Storage practices	Expert opinion			Reason
		S*	US**	UC***	
1.	Plastering storage structures(*Bhakar* and *Doke*) with cow dung and mud	80		20	Antibacterial and disinfectant and prevents from spoilage
2.	Dried leaves of walnut in paddy and wheat	100			Emits pungent smell and acts as a insect repellent
3.	Use of cow dung ash in wheat grains	80		20	Inhibits insects from egg laying
4.	Application of common salt in paddy grains	60		40	Salt helps in reducing moisture
5.	Keeping turmeric rhizome or onion in paddy	70		30	Provides protection against insects
6.	Use of Lime *(Chuna)* and wood ash for controlling grain insect pest	80		20	Lime and ash makes a fine film over the grains which prevents insects
7.	Mixing of mustard oil and table salt in pulses	100			Prevent from spoilage of grains
8.	Use of mustard oil in pulses	100			Layer of oil on grains prevent insects from laying eggs.
9.	Use of garlic splits *(Allium sativum)* in pulses	100			Check the attack of pulse beetle *(Callosob ruchus sp.)*
10.	Soaking pulses in cow urine followed by sun drying	80		20	Cow's urine prevent from bacterial wilt

9. Soaking pulses in cow urine followed by sun drying was considered scientific by 80 per cent of the experts as cow's urine prevent from bacterial wilt.

4.5.4 Scientific Validation of Indigenous Child Care Practices

The indigenous practices related to child care followed by rural farm women of *Kumaon* region were scientifically validated by a panel of experts from areas of Human Development and Family Studies, Foods and Nutrition and Ayurvedic doctors.

CHILD BIRTH

Data in Table 4.47 reveal that the practice of delivering baby at the home with the help of traditional midwives *(choi)* was considered unscientific by all the experts as they reasoned that delivery at home is unsafe and unhygienic which lead to fatal results and put the mother and child's life in danger and doctors feel that such a practice may also affect the infant's heart.

Data further explained that all the experts considered the delivery practices used by rural women such as using new blade, clean bowl and clothes as scientific. About place of rest of women, coated with cow dung, majority of the experts (80%) considered the practice scientific. According to experts cow dung has anti bacterial and anti septic properties which prevents mother from infection. Another practice considered unscientific by the experts was child and mother resting in a separate room without proper ventilation and light. According to the experts, a well ventilated room is essential for the health of newborn as proper light kills many microorganisms and reduce the foul smell.

Studies from different parts of the world reveal that all young children need adequate nutrition, health and care from birth onwards. The lack of these supports during the early years has permanent negative effects on later development. At birth and during the first two years of life the child is at the greatest risk of mortality. Hence, great care is demanded on the part of family for the overall growth and development and growth of child.

CHILD CARE

Bathing

In child care, majority of the experts (70%) considered the practice of bathing and cleaning of child with luke warm water after 20-30 minutes of birth as unscientific According to experts a newborn baby should not be given bath till 24 hours after birth as newborn babies take some time to regulate their body temperature. Experts from Human development and Families Studies reported that bathing a baby immediately after birth can increase the risk of hypothermia, and if the baby is of low birth weight the risk is even greater so bath of new born should be delayed. Doctors reasoned that natural stickiness (Vernix) on the baby's body acts as a protective layer and helps to maintain the temperature of the new born baby.

The study is line with Romano (2005) who reported that bathing a baby immediately after birth removes the normal skin flora and exposes baby to infection. Infants should be bath after the vernix has absorbed into the skin i.e. after 24 hours as vernix has moisturizing and hydration factors, anti-infective and antioxidant qualities which prevents the infant from infection.

Duration of bathing

Practice of giving bath to new born baby on alternate days was considered scientific by majority of the experts (80%) as daily bathing can cause cold and fever to the baby. Experts' from HDFS recommended that topping and tailing should be done which means cleaning baby's body from head to toe with a warm, damp sponge or a piece of moistened cotton cloth.

Prelecteral feed

About prelecteral feed i.e. *gutti* in the form of honey was considered unscientific by 80 per cent of the experts (Table 4.47). They reasoned that nothing should be given to newborn baby except colostrum feeding, whereas 20 per cent expert (*ayurvedic* doctors) considered this practice as scientific with the reason that prelecteral feed helps to clean the intestine of newborn baby. Honey is also a powerful immune system booster due to its antioxidant and antibacterial properties and also provides warmth feeling to the baby after bath.

Massaging

All the practices related to massaging were considered scientific by majority of the experts. The reason given by the experts that regular massaging of infant with mustard oil in early sunlight is essential as mustard oil is thermogenic in nature, tones the muscles and stimulate the blood circulation (100%) whereas massaging the infant body under sunlight provides vitamin D. Majority of the experts (80%) considered the practice of massaging with wheat dough dipped in mustard oil as scientific as it removes the excess hair and smoothen the infant's body. Majority of the experts (70%) were uncertain about the use of *bhangjeera* oil to massage the baby's body so further research on this issue is needed (Table 4.47).

Sleeping pattern

Regarding child's sleeping pattern i.e. on back was considered unscientific by 70 per cent of the experts. They reported that child should be made to sleep on side position just after breast feeding and every 2-3 hours position should be changed to avoid pressure on heart and vomiting (Table 4.47).

Breast feeding practices

All the experts considered the practice of starting breast feeding 8-10 hours after birth as unscientific (Table 4.47). Experts reasoned that first milk known as colostrums should be strictly fed to the child just after delivery as it contains a wide range of anti infective including lymphocytes, secretary immunoglobulin and vitamin 'A' which is very essential for new born to fight against diseases. Experts from Human Development and Family Studies reported that early breast feeding is important because a baby's suckling reflex is strongest and the baby is more alert, within the first hour of birth. Early breastfeeding also helps babies to get enough colostrum, which is the first and very nutritious breast milk. Lack of breastfeeding leads to **Sudden Infant Death Syndrome (SIDS)**.Other benefits of early breastfeeding includes greater bonding and communication between mother and the baby.

According to the report of **Ministry of Human Resource Development (2004)** highlighted that it is important to ensure exclusive breast feeding as it saves babies from diarrhoea and pneumonia. It also helps in reducing the ear infection and risk of

attack of asthma and allergies. WHO studies estimate that death rate in babies can go down four times if they are exclusively breastfed for the first six months.

Duration of breast feeding

Majority of the experts (80%) considered the practices of breast feeding the child as per demand (8-10 times) as scientific. They reasoned that the new born child should be breast fed with the gap of 1 to 2 hours as it fulfils the body requirements. Regarding breast feeding of baby in sitting position, 70 per cent experts considered it scientific as there are less chances of throat choking.

Regarding duration of breastfeeding, majority of the experts (90%) considered the practice of feeding breast milk till 2 years as scientific. Experts reasoned that breastfeeding must be continued upto the age of two years. Continuing breastfeeding along with adequate supplementary food to the baby provides all the nutrients such as calories, high quality protein, vitamin A optimum growth and development of the child. The practice of giving cow's milk if mother's milk is not sufficient was considered scientific by 80 per cent of the experts and they accepted the logic given by the farm women i.e. cow's milk is easy to digest (Table 4.47).

According to the report of Ministry of Human Resource Development (2004) cited the same in a report on "National guidelines on infant and young child feeding" that breastfeeding must be continued upto the age of two years or beyond. Continuing breastfeeding while giving adequate complementary foods to the baby provides all the benefits of breastfeeding to the baby. In other words, the child gets energy, high quality protein, vitamin A and anti-infective properties.

Supplementary Feeding Practices

Data in 4.47 depict that the practice of starting supplementary feeding to baby girls after 5 months and to baby boys after 7 months was considered unscientific by all the experts. As it is a misconception of the farm families. The reason given by the experts that the right age of introducing supplementary feeding is after six months of birth irrespective of gender. The purpose of supplementary feeding is to complement the breast milk as young child need more nutrients, energy and protein to grow normally.

Most of the supplementary foods given to the infant were considered scientific by all the experts. These are *dal* soup, cooked rice water, mashed rice and banana, mashed chapatti in *dal*, mashed green leafy vegetables, *khichdi* and *lapsi*(made of milk, sugar/jaggery and wheat flour) as these are rich in essential nutrients i.e. carbohydrate, protein, minerals, fat and vitamins. Experts further stated that adding sugar or jaggery and g*he* or oil is important as it increases the energy value of the food.

The introduction of all types of food i.e. cereals, pulses, fruits, vegetables etc. in infant's diet after one year was considered scientific by 90 per cent experts as it provides essential micro-nutrients to the body. Similarly 80 per cent experts considered the introduction of non vegetarian diet especially fish and boiled egg in the diet of child as scientific. Experts reported that non vegetarian diet contains high quality protein, essential for growth and development of the child. Regarding frequency of meal, supplementary food given more than three times in a day was regarded scientific by all the experts as they reasoned that infant should be fed 5-6 times a day in addition to breast feeding. They highlighted that inadequate feeding of young children during the first two years is the main cause of malnutrition (Table 4.46).

The findings are in conformity with Sinha (2004) who reported that most of the supplementary feed given by the respondents to the infant was considered scientific by all the experts. These were *dal* water, cooked rice water, soft rice, cooked banana, mashed potato, spinack(*palak*) juice, chapatti mashed in *dal* as these are rich in essential nutrient i.e. carbohydrate, protein, mineral, fat and vitamins.

CHILD HEALTH CARE PRACTICES

Infant are very sensitive to environmental stimulus so they easily get affected by the external factors and as their body is not adapted fully to fight against the diseases. Rural farm women cure common child health problems by using their location specific indigenous knowledge but, it is also important to ensure that either these practices have some scientific base or not. Hence, scientific validation of indigenous child health practices followed by the farm women in treatment of common ailments has been made and the results are presented as under.

Vomiting

- Honey with mother's milk: It is evident from Table 4.46 that in case of vomiting, 60 per cent of the experts were uncertain about the practice of giving honey with mother's milk, hence further research is needed in this area.

Stomach pain and cramps

- *Hisalu* (*Rubus ellipticus*): Majority of the experts (80%) were uncertain about the practice of giving root decoction of *Rubus ellipticus* in curing stomach pain. Hence further research is needed.

- *Kaphlya*(*Geranium wallichianum)*: About *Geranium wallichianum(Kaphlya),* again majority of the experts(70%) were uncertain about its properties.

- Carom seeds: The practice of taking boiled water of carom seeds was considered scientific by 80 per cent of the experts as it is anti-spasmodic, stimulant and carminative in nature and can be given to child in stomach pain and indigestion.

- Apricot (*Prunus armeniacal* L.): All the experts were uncertain about the practice of taking ripens seeds of apricot (*Chuaar)*.Hence further research is needed.

- *Babansi* (*Valeriana jatamnsi*) :Regarding taking root decoction of *Babansi*, majority of experts (80%) were uncertain about its use in curing stomach pain whereas *ayurvedic* literature support it as it is carminative, digestive, stomachic, expectorant and stimulant in nature and used for curing stomach related disorder.

- *Harad*(*Terminalia chebula*) *:*Regarding stomach cramps more than half of the experts (60%) considered the practice of giving half piece of *Harad*(*Terminalia chebula*) with luke warm water as scientific. They reasoned that that *Harad is* anti-inflammatory, anodyne and carminative in nature and helps in relieving stomach pain.

Fever

- *Tulsi* (*Ocimum sanctum*): Data in Table 4.46 clearly indicate that the practice of giving decoction of *Tulsi* and *Ajwain* to child in fever was considered as scientific by 80 per cent of the experts. They stated that *Tulsi* has anti inflammatory, anti-septic, anti-viral, anti-bacterial and antimicrobial properties whereas similar properties also

hold by *Ajwain* seeds. Experts also suggested that the decoction of both is antiseptic, cool and open the body's pour through which heat comes out during fever.

- Cold water sponging: The practice of cold water sponging was considered scientific by majority of experts (80%) as it drops down the body temperature.

Eczema

- Peach (*Prunus persica*): Majority of the experts (80%) were uncertain about the practice of rubbing grinded leaves of *paatee*(*Artemisia nilagirica*) and peach(*Prunus persica*) on affected parts of body. That mean further research is needed in this area.

- Cow urine: Majority of the experts (80%) validated the practice of applying cow urine on affected body parts for solving the problem of eczema as scientific. *Ayurveda* doctors reported that cow urine is basically an excellent germicide that kills a variety of germs. Also cow urine destroys the poisonous effect of residues and makes body disease free and improves body immunity.

Diarrhoea

- Salt and sugar solution: Regarding treatment of diarrhoea the practice of giving solution of sugar and salt to child 3-4 times a day was considered scientific by all the experts (100%). They reasoned that in diarrhoea, the real danger is the loss of liquid and nutrients from the child's body which can cause dehydration and malnutrition. To prevent too much liquid being lost from the child's body, an effective oral rehydration solution can be made using ingredients found in almost every household such as salt-sugar solution, d*al* water, vegetable soup, *dahi paani*. One of these drinks should be given to the child every time when a watery stool is passed.

- Intake of boiled water: The practice of giving boiled water always to the child was considered scientific by all the experts. Experts reported that boiling the water kills the harmful micro-organisms and germs/worms which cause water born diseases.

Cough and Cold

- Garland of garlic: Majority of the experts were uncertain (60%) about the practices of putting garland of garlic around the child' neck for curing cough and cold whereas 40

per cent experts considered the practice as scientific. Experts stated that garlic (*Allium sativum*) has medicinal properties i.e. anti-inflammatory and antioxidant in nature which boost immunity and cure against cough and cold.

- *Tulsi*(*Ocimum sanctum*), carom seeds and ginger: Majority of the experts(70%) experts considered the practice of giving decoction of *Tulsi*, carom seeds and ginger by adding little amount of honey in it as scientific. *Ayurvedic* doctors reported that *tulsi* and carom seeds have anti inflammatory properties as it alleviates kapha and *vata* whereas ginger and honey due to hot in nature helps in curing cough and cold in infants.

- Pomegranate *(Punica granatum)*: Regarding pomegranate majority (80%) of the experts were uncertain about it uses in curing cough and cold.

- Mother's milk: Majority of the experts (90%) considered the practice of feeding mother's milk during cold and cough. The experts reported that mother's milk contains immunoglobulin and antibodies which protect the baby from cold and cough and other diseases and provides immunity.

  Fernándezet *et al.*(2013) in a study on "The human milk microbiota: Origin and potential roles in health and disease" reported the same that human milk is a complex species-specific biological fluid adapted to satisfy the nutritional requirements of the rapidly growing infant. Culture-dependent and -independent techniques have revealed the dominance of staphylococci, streptococci, lactic acid bacteria and bifidobacteria in this biological fluid, and their role on the colonization of the infant gut. These bacteria could protect the infant against infections and contribute to the maturation of the immune system and confers a certain degree of protection against pathogens.

Measles

- Foxtail millet: It is evident from Table 4.47 that all the experts were uncertain about the practice of using foxtail millet for curing measles. Hence strong research is needed in this field.

- Avoidance of fried foods: All the experts considered the practice of avoiding fried foods during measles as it aggravates the itching problem effect.

Table 4.47: Scientific validation of indigenous child care practices followed by farm women

***Scientific ** Unscientific *** Uncertain**

S.No.	Indigenous practices	Expert opinion			Reason
		S*	US**	UC***	
DELIVERY OF CHILD					
1.	Delivery is performed at home with the help of traditional midwife(*Choi*)		100		It is unsafe and unhygienic which could leads to fatal results
2.	Use of clean bowl, clean clothes and new blade for delivery	100			Maintains hygienic conditions
3.	Women rested in a separate room coated with cow dung	80			Anti bacterial,anti septic properties and prevent from infection
4.	Child and mother rested in a separate room without proper ventilation and light		100		Proper light kills many microorganisms and reduce the foul smell
CHILD CARE					
1.	Bath is given to newborn with luke warm waterafter 20-30 minutes of delivery	30	70		Bathing a baby immediately after birth can lead to hypothermia
	Bath the new born on alternate days	80	20		Daily bath can cause cold and fever in the child's body
2.	Prelecteral feed i.e. honey is given to child after 1-2 hours of birth	20	80		Only colostrum feeding should be is given to newborn after delivery
3.	Massing is done with mustard oil thrice aday in early sunlight till one year	100			❖ Mustard oil is thermogenic in nature and tones the muscles ❖ Massaging the infant body under sunlight provides vitamin D
4.	Massaging is done for 3 months with wheat dough dipped in mustard oil	80		20	It removes hair and smoothen the body

5.	Massaging is done with *bhangjeera* oil	30		70	Research is needed
6.	Make child sleep straight i.e. on back	30	70		Position should be change to avoid pressure on heart
BREAST FEEDING PRACTICES					
1.	New born is breast fed after 8-10 hours of birth		100		First milk i.e. colostrum is very essential as it contains antibodies and other substance which protect the baby against diseases
2.	New born is breast fed as per demand (8-10 times in a day)	80		20	Breast feed with the gap of 1- 2 hours fulfils the body requirements
3.	Breast feeding of baby in sitting position	70		30	There is less chances of child's throat choking
4.	Breast fed the infant till 2 years	90	10		Breast feeding along with complementary food reduces the chances of malnutrition and many diseases
5.	When mother's milk is insufficient cow'smilk is given along breast feeding(1:1 and 1:1.5)	80		20	Cow's milk is easy to digest
SUPPLEMENTRY FEEDING PRACTICES					
1.	Supplementary feeding after 5 months for baby girl and 7 months for baby boy		100		Right time is after 6 months of birth as young child need nutrients, energy and protein to grow normally
2.	*Dal* soup, cooked rice water, mashed rice and banana, mashed chapatti in *dal*, mashed green leafy vegetables , *Khichdi*and *Lapsi*	100			Rich in essential nutrients and easy to digest
3.	After one year all types of cooked foods are introduced with non-vegetarian food	90		10	Diversified diet will provide essential micro-nutrient to the body
4.	Giving supplementary food more than three times a day	100			Inadequate feeding of young children during the first two years is main cause of malnutrition

CHILD HEALTH CARE PRACTICES					
VOMITING					
1.	Mixing 1 drop honey with 4 drop mother' breast milk	40		60	Have anti-vomiting property
STOMACH PAIN AND CRAMPS					
1.	Making paste of 20 gm of *Hisalu (Rubusellipticus* Sm.) roots		20	80	Research is needed
2.	Making paste of *Kaphlya*(*Geranium wallichianum*D.Don) roots	10	20	70	Have anti- bacterial properties and reduces stomach infection
3.	Boilingcarom seeds (*Trachyspermumammi*) in water	80		20	Anti-spasmodic, anodyne and carminative in nature
4.	Making paste of 10 -15 seeds of ripen apricot (*Prunusarmeniacal* L.) by adding water			100	Research is needed
5.	Making decoction of *Babansi(Valerianajatamansi* Jones*)* leaves, mixed with milk	20		80	Carminative, digestive and stomachic
6.	Consume half piece of *Harad*(*Terminaliachebula*)with lukewarm water	60		40	Anti-inflammatory, anodyne and carminative in nature
FEVER					
1.	Making decoction of aerial parts of *Tulsi* (*Ocimum sanctum*) and *Ajwain*seeds	80		20	*Tulsi*-Anti- inflammatory, anti-bacterial and anti-microbial *Ajwain*- Anti- inflammatory and thermogenic and open the through which heat comes out
2.	Cold water sponging	80	20		Drops down the body temperature
ECZEMA					
1.	Grinding 5-6 leaves of *Paatee* (*Artemisia nilagirica*) and Peach (*Prunuspersica*)		20	80	Research is needed
2.	Apply cow's urine on affected part of the body	80		20	❖ Excellent germicide and anti infectant ❖ Destroy the poisonous effect ❖ Improve immunity

DIARRHOEA					
1.	Giving solution of salt and sugar(3-4 times a day)	100			It recovers the loss of water from the body
2.	Giving boiled water	100			It kills the harmful micro-organisms
COUGH AND COLD					
1.	Making garland of garlic and put it around child neck	40		60	Have antioxidants, anti-inflammatory properties and boost immunity
2.	Grinding 5-6 leaves of *Tulsi*(*Ocimum Sanctum)* with 5 gm carom seeds and ginger	70		30	❖ *Tulsi* and carom seeds are anti-inflammatory in nature ❖ Ginger is hot in nature
3.	Giving paste of grinded bark of Pomegranate		20	80	Research is needed
4.	Mother's milk	100			Contains immunoglobulin and antibodies
MEASLES					
1.	Spread over the bed and feed the child foxtail millet rice			100	Research is needed
2.	Restriction on fried foods	100			Aggravates the problem
3.	Restrict the bath till 22 days	80		20	Aggravates the problem and fever
JAUNDICE					
1.	Give mashed banana, buttermilk, redish leaves and cooked black soyabean	100			Helps to control the excess secretion of bilirubin content in the blood

- Avoiding bath: Avoiding of bath during measles till 22 days was considered scientific by majority of the experts (80%). They stated that bathing aggravate the measles and fever also.

Jaundice

- It is apparent from Table 4.47 that for curing jaundice the practice which is followed by farm families were considered scientific by all the experts i.e. giving mashed banana, cut pieces of raddish, raw leaves of raddish, butter milk and *Bhatt ka jaula* (*Glycine max*) as it does not aggravates the problem and helps deranging the liver problems by controlling the bilirubin content.

Conclusion

It can be concluded from the findings that many of the indigenous practices related to child health care were found to be scientific while some of them were unscientific and some were uncertain where more research is needed. Hence there is a need to disseminate the scientific indigenous practice with the help of proper linkages with different private and public health organizations and warn the people regarding unscientific indigenous practices. It can be suggested that identified scientific indigenous knowledge should integrated with the modern science to make it more acceptable in the society.

4.5.5 Scientific Validation of Postpartum Practices

The indigenous practices related to postpartum care followed by rural farm women of *Kumaon* region were scientifically validated by a panel of experts from the areas of Human development and Family Studies, Foods and Nutrition and Ayurvedic doctors. The results are presented as under:

For effective delivery

- Clove, Nutmeg and *Ghee*: The practice of giving grounded clove, nutmeg and *ghee* with one glass of milk was judged as scientific by majority of the experts (70%). Experts reveal that the lady must take hot drinks to have easier and faster delivery. Clove and nutmeg are thermogenic, purgative and cathartic in nature. *Ghee* act as a lubricant and helps in easy delivery.

- Warm milk and decoction of carrom and fenugreek seeds: The practice of intake of warm milk with *gur*(brown sugar) and decoction of carrom (*Trachyspermumammi* concoction) and fenugreek seeds was considered scientific by 80 per cent of the experts as these all are thermogenic and purgative in nature and helps in inducing child birth by stimulating uterine contractions.

- *Bhimal(Grewia optiva):* Majority of the experts(80%) were uncertain about the practice of giving grounded bark of *bhimal* to women during delivery, hence research is needed to validate it.

- *Tulsi*, cow's urine and cow's dung: All the experts were uncertain about the practice of giving the mixture of all these items during the delivery of child and experts recommended for further research on this issue.

Removal of placenta

All the experts (100%) considered the practice of burying the placenta under green fruit bearing tree as unscientific. The experts reasoned that all these are the wrong notions and misconceptions of the rural farm women.

First diet after delivery

Perusal of Table 4.48 clearly indicates that regarding first diet after delivery, majority of the experts (80%) declared the practice of giving hot *suji halwa*, hot glass of milk and one tsp of fenugreek seeds with cow's *ghee* as scientific. The experts revealed that all these practices help to overcome the weakness of the women and increases milk secretion. The intake of one cap brandy after delivery was considered unscientific by majority of the experts (80%).

According to *www.health.india.com*, Fenugreek should be given to nursing mothers. This is due to the presence of diosgenin in the spice which increases milk production in lactating mothers.

Indigenous food preferences

1. Hot wheat flour *halwa*

Table 4.48 clearly shows that the practice of giving *halwa* was declared scientific by majority of the experts(80%).Experts reasoned that the ingredients mixed in *halwa*(

Ghee+ Black pepper + Almonds+ fig+ Coconut) are highly nutritious and hot in nature so provide strength to the lady after delivery and helps to regain her health.

2.*Bhutti bhaat*(Fried rice)

Perusal of Table 4.48 depicts that majority of the experts (80%) were uncertain about giving fried rice after delivery to the women whereas 20 per cent considered it unscientific. The experts reasoned that rice is bulky in nature and also have cold *taseer* so it should be avoided.

3. Coconut, Jaggery, Turmeric and Carom seeds

Practice of giving coconut, jaggery, turmeric and carom seeds till 11 days were judged as scientific by almost all the experts (90%). The experts reasoned that all these are hot in nature and helps to clean uterus. The doctors reported that coconut provides strength and increases milk secretion, jaggery is hot in nature helps to clean uterus, turmeric is anti-bacterial, anti-septic and anti-inflammatory in nature hence helps to heal wounds and also releases pain and swelling. Carrom seeds also help in digestion and are antiseptic in nature.

4. Simple diet after 11 days

The practice of giving simple diet food with little spices after 11 days of delivery was considered scientific by all the experts as it helps the women to adjust in normal routine.

Food avoided after delivery (Till six months)

- **Wheat and finger millet chapatti**

Majority of the experts (70%) considered this practice as unscientific as these provide energy to the body.

- **Rice**

Majority (70%) of the experts reported were considered the avoidance of rice as scientific because rice may create gastric problem in the mother’s stomach.

- **Consumption of pulses like Cow pea *(Vigna mungo*Linn.*)*and Black soybean*(Glycine max)***

  Table 4.48 clearly portrays that majority of the experts (70%) judged the practice of avoiding cow pea and black soybean as scientific. The experts reasoned that these pulses are heavy as well as gas producing in nature which creates problem both to mother and child. Thus, the practice of giving such foods should be avoided.

- **Chillies, spices and fried food**

  According to Table 4.48 it is clear that all the experts judged the practice of avoiding chilli, spices and fried food as scientific. The reason given by experts was that these foods causes burning sensation in the mother's stomach and creates other problems like indigestion and constipation. Hence these should be avoided.

- **Restriction of too much water**

  All the experts considered this practice as unscientific and experts reasoned that water is an essential component and is needed to rejuvenate the body of the mother as it transport the essential nutrients, regulates body temperature and eliminates waste and harmful toxicants from the body, hence the mother should be given water as per her requirement.

- **Cauliflower, potato and pumpkin**

  The practice of avoiding cauliflower, potato and pumpkin were considered scientific by all the experts with the logic that these food items are gas producing in nature and thus cause stomachache and indigestion.

Place of rest

Women rested in a separate room coated by cow dung and mud was considered scientific by majority of the experts (80%) as cow dung has anti-bacterial and anti-septic properties and prevents infection to mother.

Rest and relaxation time

All the experts considered the practice of rest and relaxation of women for 11 days as scientific. The experts reported that after delivery women's body is too weak to work effectively. However they suggested for regaining women's strength and overcoming weakness at least one month rest is mandatory with good diet so that all the body losses can be compensated.

Table 4.48: Scientific validation of indigenous postpartum practices followed by farm women
***Scientific ** Unscientific *** Uncertain**

S.No.	Indigenous practices	Experts Opinion			Reasons
		S*	US**	UC***	
FOR EFFECTIVE DELIVERY					
1.	Grounded clove and nutmeg with one glass hot milk	70		30	❖ Clove and nutmegare anti-inflammatory, ,thermogenic, purgative, cathartic and acts as a lubricant ❖ *Ghee*: Act as a lubricant
2.	Warm milk with *gur* Boiled carom seeds water Boiled fenugreek seeds decoction	80		20	❖ All are thermogenic and purgative in nature ❖ Helps in inducing childbirth by stimulating uterine contractions
3.	Grounded bark of *bhimal*		20	80	Further research is needed
4.	*Tulsi*, cow's urine and cow's dung			100	Further research is needed
REMOVAL OF PLACENTA					
1.	Placenta is buried under the milk secreting tree		100		Wrong notions and misconceptions of farm women
FIRST DIET AFTER DELEVERY					
1.	*Sujihalwa*, hot glass of milk and Fenugreek seeds + cow's *ghee*	80		20	Help to overcome the weakness of the women and increases milk secretion
2.	One cap of brandy		80	20	-

INDIGENOUS FOOD PREFERENCES					
1.	Hot wheat flour *Halwa*[Ghee+ Black pepper+ Almonds+ Fig + Coconut]	80		20	❖ Black pepper: Hot and carminative in nature and increases digestive power ❖ *Ghee*: Helps to regain strength ❖ Almonds: Provides strength and checks amenorrhoea ❖ Fig*:* To overcome weakness ❖ Coconut: Provides strength and increases milk secretion
2.	*Bhutibhaat* (Fried rice)	20		80	Bulky in nature and have cold *taseer*
3.	Coconut, Gur, Sonth , turmeric and carom seeds	90		10	❖ Coconut provides strength and increases milk secretion ❖ All are hot in nature and helps to clean uterus ❖ Turmeric is anti-bacterial and anti-inflammatory ❖ Carom seeds helps indigestion and antiseptic in nature
4.	Simple diet after 11 days with less spices	100			To adjust in normal routine
FOOD AVOIDED AFTER DELIVERY(Till six months)					
1.	Wheat and Finger millet chapatti	30	70		Provides carbohydrate and energy
2.	Rice	70	20	10	Rice may create gastric problem in the mother's stomach
3.	Cow pea(Vignamungo) and Back soybean (*Glycine max*)	70	20	10	Heavy and gas producing
4.	Chilli, spices and fried food	100			Burning sensation in the mother's stomach and creates other problems like indigestion and constipation
5.	Restriction of too much water		100		Water is essential to regulate body temperature and eliminates waste and harmful toxicants
6.	Cauliflower, potato and pumpkin	100			Gas producing and cause stomachache

PLACE OF REST					
1.	Women rested in a separate room coated with cow dung and mud	80	20		Cow dung is anti-bacterial and anti-septic in nature
REST AND RELAXATION TIME PERIOD					
1.	Rest and relaxation for 11 days after delivery	100			For regaining strength and overcome weakness
SEXUAL ABSTINENCE					
1.	Women resume sexual intercourse after 3 to 4 month of delivery	100			Atleast 4-6 months sexual abstinence is required to heal wounds and injuries of cervix
BATHING AND CLEANING OF REPRODUCTIVE PARTS					
1.	Women bath on 2nd , 3rd , 5th , 7th , 9th and 11th day after delivery	100			Daily bathing can catch cold and influenza to rural women in hilly areas
2.	Women clean the genital organs with water very rarely		100		Daily cleaning and washing of genital parts with soap and water solution for avoiding infection
MASSAGING PRACTICES					
1.	Massage with apricot oil		30	70	Further research is needed

Sexual Abstinence

The practice of sexual abstinence for a period of 3-4 months after delivery was considered scientific by all the experts. The reason given by the experts that after delivery the reproductive part of the women is so week to perform sexual activity/intercourse and at least 4-6 months sexual abstinence is required so that the wounds and injuries can be healed properly.

Carlough (1999) in a manual on "Postpartum and newborn care" reported the same that women should be advised not to have sexual intercourse for at least four weeks to two month after delivery. It is important for women not to have intercourse because the cervix is still open during this time and it is easy for bacteria to get inside the uterus and cause infection.

Bathing and cleaning of reproductive parts

Bathing of rural hilly women on alternate days was considered scientific by majority of the experts (70%) as daily bathing can catch cold and influenza to the women. Hence daily bath should be avoided as per hill conditions. Regarding cleaning of reproductive parts i.e. cleaning of genital organs with water rarely was considered unscientific by all the experts. The experts reasoned that mothers should wash their genitals with solution of water and soap regularly for avoiding infection.

Massaging practices

Regarding massage, 70 per cent of the experts were uncertain about the practice of massaging with apricot oil. Hence, further research is needed in this direction.

4.5.7 Scientific Validation of Health Care Practices

The indigenous practices related to health care followed by rural farm families of *Kumaon* region were scientifically validated by a panel of experts from areas of Foods and Nutrition, CIMAP and Ayurvedic doctors.

Jaundice

- **Black soybean *(Glycene max)***

Perusal of Table 4.49 clearly show that the practice of giving *jaula* made up of black soybean was considered scientific by 70 per cent of the experts as black soybean has medicinal properties. This regulates the proper functioning of liver and controls the excess production of bilirubin in the blood which is the main reason of yellowing of skin. However in the *ayurvedic* literature nothing like this was found regarding the consumption of black soybean during jaundice.

- **Redish(*Raphanus sativus* Linn.*)***

Majority of the experts (90%) had declared the consumption of raw radish leaves as scientific for curing jaundice. Experts reasoned that as the leaves and roots contain medicinal properties that cure liver problems. The *ayurvedic* literature also strongly supports this practice, mentioning that radish leaves are good for bile duct, liver, gall bladder and also the leaves and pod are active against gram-positive bacteria as it inhibits the growth of Staphylococcus aureus, E. coli, streptococci and Pneumococci .

- ***Giloi (Tinospora cordifolia)***

Regarding information of taking boiled stem water of *Giloi*(*Tinospora cordifolia*) for curing jaundice was considered scientific by 70 per cent of the experts. The logic given by them was that the stem is hepatic stimulant and is given in jaundice and torpidity of the liver. The *ayurvedic* literature (*Dravya gun vigyan*) strongly supports this practice and mentioned that stem of *giloi* is anodyne, alterant, hematinic, depurative, hepatoprotective, anti periodic and anti-spasmodic and used for intermittent fever, inflammation, anaemia and jaundice.

- ***Aonla(Phyllanthus emblica)***

In another practice using decoction of *Aonla*(*Phyllanthus emblica*) was considered scientific by 80 per cent experts and logic given by them was that fresh juice is vermifuge, purify the blood and helpful in curing jaundice and dyspepsia. It is also supported by *ayurvedic* literature that it alleviates the liver disorders and also an excellent intestinal astringent, cooling, stomachic and blood purifier.

❖ **Sugarcane *(Saccharum officinale)***

About sugarcane slices (*Saccharum officinale*), 80 per cent of the experts considered scientific and experts reasoned that sugarcane has medicinal properties which balance the bilirubin level in the body. The *ayurvedic* literature also support the consumption of sugarcane stem for curing jaundice as it is refrigerant, diuretic and controls secretion of bilirubin.

❖ ***Makrujhaar(Thalictrum foliolosum)***

In case of *Makrujhaar*(*Thalictrum foliolosum*) all the experts were uncertain about its medicinal properties in curing jaundice and in *ayurvedic* literature no information is available. Hence a research is needed to validate this practice.

Kidney stone

❖ ***Silfer(Bergenia ciliate)***

Data in Table 4.49 indicate that to cure stone problem the practice of taking ground roots of *silfer* was considered scientific by majority of the experts (80%).The experts stated that *Silfer* has some chemical properties which help in dissolving kidney stone. The *ayurvedic* literature also supports this practice. The roots are bitter, astringent, cooling, laxative, analgesic, styptic, litholytic and used for urinary and renal calculi, dysuria, renal failure and cystitis.

'Bashir and Gilani (2009) in a study on 'Antiurolithic effect of *Bergenia ligulata* rhizome: An explanation of the underlying mechanisms' reported that, results of the study indicate the presence of antiurolithic effect in *Bergenia ligulata* rhizome against calcium oxalate stones, mediated possibly through a combination of CaC2O4 crystal inhibitory, diuretic, antioxidant and hypermagneseuric effects, rationalize its medicinal use for urinary stone disease.

❖ **Whoe horsegram*(Macrotyloma uniflorium)***

It is evident from the Table 4.49 that majority of the experts (90%) considered the practice of consuming *gahat dal* in kidney stone as scientific. The expert opinion that *gahat dal* has great medicinal properties which is helpful in dissolving kidney stone.

The *ayurvedic* literature also supports this practice. The seeds are thermogenic, astringent, anthelmintic, diaphoretic, diuretic, expectorant and prescribed for urolithiasis, nephrolithiasis, for renal and vesical calculus.

- ***Gokharu(Tribulus terrestis Linn.)***

Table 4.49 clearly portrays that majority of the experts (80%) were uncertain about the use of *Gokharu* plant in dissolving kidney stone whereas *ayurvedic* literature support this practice. The roots and fruits are refrigerant, diuretic, aphrodisiac, spasmolytic, hypoglycaemic, anti-inflammatory and prescribed for insufficiency of urine and diseases of kidney.

Diabetes

- ***Jamun(Syzygium cumini)***

Regarding consumption of ground bark and seed water of *jamun* in controlling diabetes was considered scientific by majority of the experts (70%) as *jamun* juice stimulates the secretion of insulin from pancreatic gland which regulates glucose in the body. Experts from Foods and Nutrition department reported that *Syzygium cumini* seed extract stimulates insulin secretion in isolated islets of langerhans from normal as well as from diabetic person and also inhibited insulinase activity from liver and kidney. *Ayurvidic* literature also supports its use in controlling diabetes. The bark is astringent, refrigerant, diuretic, constipating and useful in curing diabetes, stomatalgia and fever.

Kumar *et al.*(2008) in a study on "Anti-diabetic activity of Syzygium cumini and its isolated compound against streptozotocin-induced diabetic rats" reported the same that *Syzygium cumini* is widely used traditional system of medicine to treat diabetes in India. The compound 'Mycaminose' and ethyl acetate and methanol extract produced significant ($p<0.05$) reduction in blood glucose level.

- ***Kilmora(Berberis asisatica)***

Data in Table 4.49 reveal that majority of the experts were uncertain (70%) about the practice of taking boiled root water of *Kilmora* in diabetes. In *ayurvedic* literature, it is mentioned as anti-inflammatory, hypoglycemic and anti-coagulant in nature.

❖ ***Chirat (Swerita chirayita)***

Table clearly depicts that majority of the experts were scientific (60%) about the practice of giving of *chirat's* leaves paste with water daily for controlling diabetes. They reasoned that it is a good remedy for liver disorders.The ayurvedic literature supports this practice as *chirat* helps in lowering down the glucose level in the blood as it is hypoglycaemic in nature. *Chirat* is also a blood purifier, liver tonic and anti-asthmatic and is given in all type of fever and in burning sensation.

Blood pressure

❖ ***Buransh (Rhododendron arboretum)***

Regarding the practice of drinking *buransh* juice in blood pressure, 70 per cent experts were uncertain about its use. The same is supported by *ayurvedic* literature where there are no lines in favour of *burans* juice consumption in high blood pressure. Hence both the experts and literature not supported this practice, so there is need to carry out research to prove its validity.

❖ **Asthma and bronchitis**

It is evident from the Table 4.49 that all the experts were uncertain about the practices related to asthma i.e. intake of *Gethi (Diosorea deltodea)* and *Darim (Punica granatum)* and no information regarding these practice were found in *ayurvedic* literature. Hence further research is needed to validate these practices.

Pneumonia fever

Pneumonia is an infection of the lungs that is caused by bacteria, viruses, fungi or parasites. It is characterized primarily by inflammation of the alveoli in the lungs or by alveoli that are filled with fluid (alveoli are microscopic sacs in the lungs that absorb oxygen).It causes fever, cough, chill and problem in breathing.

❖ ***Garlic(Allium sativum)***

It is apparent from the Table 4.49 that 60 per cent experts considered scientific the practice of applying the paste of garlic with mustard oil on chest area as scientific.

The experts reasoned that both garlic and mustard oil are hot and carminative in nature and when rubbed in chest the cough and cold inside the lungs area reduced gradually and gives relief. The *ayurvedic* literature also supports this practice of curing pneumonia fever as garlic is thermogenic and expectorant in nature whereas mustard seeds are high in **selenium and magnesium**. Both the components (selenium and magnesium) give it a unique **anti inflammatory** property. It is further recommended that when it is consumed regularly, it is known to control and keep the symptoms of asthma, cold and chest congestion.

Fever

- ***Chirat(Sweritia chirayita)***

Majority of the experts (80%) considered the practice of giving *churan* made of *chirat,* black pepper and clove as scientific. The experts reasoned that *chirat* helps to alleviate the body temperature. The *ayurvedic* literature also strongly support this practice as *chirat* is anti-inflammatory, sudorofic and given in fever, diarrhoea and weakness as the whole plant is used medicinally and the roots are said to be the most powerful part. Besides that black pepper is alterative, thermogenic and anti periodic in nature and clove is anti bacterial, antiseptic and analgesic in nature.

Joshi and Dhawan (2005) stated the same that according to *ayurvedic* pharmacology, *chirata* is described as bitter in taste (*rasa*). The thermal action (*virya*) of *chirata* is defined as cooling (*shita*). *Chirata* is light (*laghu*), i.e. easily digestible and *ruksha* (dry). These characteristics drain heat from the blood and liver. Concoction of *chirata* with cardamom and turmeric is given for gastrointestinal infections, and along with ginger it is considered good for fever.

- ***Tulsi* (*Ocimum tenuiflorum*)**

Majority of the experts (70%) considered the practice of giving juice of *Tulsi* with black pepper and honey as scientific. *Ayurvedic* literature also supports the medicinal use of *Tulsi,* black pepper and honey for reducing fever. In *ayurveda Tulsi* is considered as carminative, stomachic, anti-asthmatic, expectorant, stimulant, anti periodic which reduces the fever. Decoction of *Tulsi* leaves induces perspiration and relives fever. Same the properties also hold by black pepper and honey.

- ***Patvari(Aloe barbadensis)***

It is reflected from the Table 4.49 that 60 per cent of the experts considered scientific the practice of giving *patvari* powder in fever. The experts reasoned that *Patvari* has cooling property, bitter in taste and is anabolic in its action. This property enables it to guard against fever. In *ayurvedic* literature it is mentioned that the *Patvari* alleviates *vaata*, *pitta* and *kapha* and the plant is bitter, cooling, carmitive, cathartic, anti-inflammatory that is good for reducing fever.

- **Coriander*(Coriandrum sativum)***

It is evident from the Table 4.49 that 80 per cent experts were uncertain about the practice of giving coriander decoction in fever whereas *ayurvedic* literature mentioned that coriander act as an astringent, anti-inflammatory, alleviates *vaata* and *pitta*. Further it is mentioned in literature that if seeds are inhaled it cures fever.

- **Fenugreek *(Trigonella foenum)***

It is reflected from the Table 4.49 that 70 per cent experts were uncertain about the use of fenugreek seeds in fever whereas *ayurvedic* literature support the effectiveness of fenugreek in alleviating fever as seeds are aromatic, carminatve, anti-iflammatory, thermogenic and mild antiseptic which is good for alleviating fever.

Cough and cold

- *Baheda (Terminalia bellirica):* Data in Table 4.49 indicates that all the experts considered the practice of giving *baheda* as scientific in cough as it is thermogenic. *Ayurveda* literature also supports the practice of giving *baheda* in cough as it comes under the group of *tibhitaki* that is a group of *Triphala* which is prescribed in a variety of diseases like that affects the eyes, anaemia, cough and fever. The drug has been found to have anti-pyretic, thermogenic, bronchodilator, antispasmodic and antiasthmatic properties.

- Turmeric (*Curcuma domestica*): About the use of turmeric, 60 per cent experts were uncertain about the practice of giving turmeric *(Curcuma longa)* in cough and cold whereas there is no information available in *ayurvedic* literature about use of turmeric in cough and cold. Hence strong research is needed in this direction.

- *Tulsi*(*Ocimum tenuiflorum*) and Carom seeds (*Trachyspermum ammi*): The practices of giving *tulsi* and carom seeds were considered scientific by 70 per cent of the experts as *tulsi* and *ajwain* are hot in nature, provide warmth feeling. Ayurvedic literature also supports this practice as *tulsi* is immunomodulatory (helps to modulate the immune system), antitussive (suppresses the cough center, reducing the amount of cough) and expectorant (helps expel phlegm from the chest), that make it a great relief for coughs, cold and other respiratory disorders including chronic and acute bronchitis. Carom seeds are carminative, anti-spasmodic and used for removing cough and cold.

Motamarri (2012) reported in a study on "Terminalia belerica Roxb.-A Phytopharmacological Review" that in *ayurveda* the drug is classified as an expectorant. It is an integral part of *ayurvedic* laxative formulation, *Triphala* used in treatment of common cold, pharyngitis and constipation.

Indigestion and constipation

- *Gandrayani (Angelica glauca)*: *Gandrayani/chora* is used as condiment in cookery by the people of Himalayan region and have high medicinal value. Majority of the experts (80%) considered the use of roots as a spice by the rural people as scientific. Experts reported that *Angelica glauca* is digestive in nature and enhances digestion process. In *ayurvedic* literature there is vast information is available about G*andrayani*. Root of the plant is carminative, diaphoretic and used in flatulent, colic; further the plant has been described in *ayurveda* as a stimulant which can be very effective in stimulating the digestive system and also acts as a laxative.

Butola and Vashistha (2013) reported the same that Angelica *glauca* roots have been indigenously used as spice and medicine in upper Himalayan region. Roots contain valeric acid, angelic acid and angelisine resin and have stimulant, cardioactive, carminative, digestive, sudorific, expectorant and stomachic properties.

- **Carom seeds *(Trachyspermum ammi)***

Majority of the experts considered the practice of giving carom (*ajwain)* seeds during constipation as scientific (90%). Experts reasoned that carom seeds has highest amount of thymol. This chemical is very effective in helping the stomach to release gastric juices that speed up digestion. *Ayurvedic* literature also support this practice

and mentioned that the fruit is carminative, antispasmodic, anti-diarrhoeal and stimulant in nature and used for constipation, colic, helminthiasis, flatulence and for indigestion.

- ***Bathuwa(Chenopodium album)***

Data in Table 4.49 depict that majority (70%) of the experts considered the consumption of *Bathuwa* leaves as scientific. Experts from CIMAP reported that *Bathuwa* is a common weed of the *rabi* season crop and it is collected as a green vegetable. The plants are laxative which helps in constipation problem. *Ayurvedic* literature also support the practice and mentioned that the plant is digestive, appetizer, carminative, laxative, diuretic, anthelmintic and useful in removing constipation, round worm, spleen enlargement, peptic ulcers, and flatulence and hepatic disorders.

- **Ginger (*Zingiber officinable*)**

Data in Table 4.49 show that the practice of giving ginger juice with honey was considered scientific by majority of the experts (60%) as ginger and honey both have medicinal properties which removes indigestion. Experts reasoned that ginger is carminative (gas expulsion) in nature and provides relief from bloating and gas and helps reduce flatulence. *Ayurveda* also supports this practice as ginger is thermogenic, carminative, digestive and laxative in nature and prescribed for anorexia, dyspepsia, inflammations and pharyngopathy. It is used in indigestion, vomiting and constipation.

- **Guava (Psidium *guajava*)**

Majority (80%) of the experts considered scientific the practice of consuming guava in constipation. Experts reported that guava is rich in fibre and increases bowl movements. *Ayurvedic* literature also supports the relevance of guava for curing all stomatic problems. The fruit is refregerent, aphrodisiac, laxative and tonic used for burning sensation, colic and in dysentery.

- ***Harard(Terminalia chebula)***

Data in Table 4.49 represent that all the experts considered the practice of consuming *harad* in constipation as scientific. *Ayurvedic* literature also strongly supports this

practice. The mature fruits are thermogenic, anodyne, anti-inflammatory, carminative, digestive and alterant. Used in flatulence, constipation, indigestion and vomiting.

- **Fenugreek (*Trigonella foenum*)**

Majority of the experts (80%) considered the practice of consuming the mixture of fenugreek seeds and carom for removing indigestion. Experts reported that fenugreek helps to flush out harmful toxins and relieves indigestion and carom seeds increase the secretion of gastric acid and also enhances the activity of digestive enzymes. *Ayurvedic* literatures also support this practice as it is very useful in fever and indigestion.

Diarrhoea

- **Rice *jaula*(*Oryza sativa*)**

Data in Table 4.49 show that 60 per cent experts considered the practice of giving *jaula* made of rice and curd to the patient suffering from diarrhoea as scientific. The experts reasoned that rice with curd binds the stomach and controls diarrhoea. The *ayurvedic* literature also supports this practice. The rice grains are oleaginous, demulcent, carminative and anti-dysenteric and used to control diarrhoea, burns and wounds.

- **Pomegranate *(Punica granatum)***

Majority of the experts (60%) considered the practice of giving rind of the fruit in curing diarrhoea as scientific. Experts reported that the fruit is astringent and control diarrhoea very fastly. *Ayurvedic* literature also strongly supports this practice as it is astringent, digestive, stomachic and highly effective in chronic diarrhoea and dysentery, dyspepsia and in urine disorders.

- ***Timul* (*Ficus auriculata* Lour.)**

All the experts were uncertain about the practice of giving *timul raita* to the patient in diarrhoea whereas *ayurvedic* literature supports this practice. The unripe fruits are considered as astringent, carminative, digestive, stomachic used for diarrhoea, dysentery and in dyspepsia.

❖ **Mint (*Mentha arvensis*)**

As per the Table 4.49 shows that 70 per cent experts considered scientific the practice of giving juice of mint with lime and black salt. Experts reasoned that mint has great medicinal properties and when it is given with lime and black salt it stops diarrhoea. The *ayurvedic* literature also supports this practice. The leaves of mint are aromatic, stimulant, anodyne, carminative, anti-septic, stomachic and anti-spasmodic and used in indigestion, colic, diarrhoea, cough and fever.

Dysentry

❖ **Rhododendron (*Rhododendron arboreum*)**

It is evident from the Table 4.49 that only 60 per cent of the experts considered the intake of bark juice of rhododendron for curing dysentery as scientific. The experts reasoned that rhododendron juice maintained the water level in the body as it has medicinal properties and the fruit and bark juice is taken in dysentery. In *ayurvedic* literature there is no information available about the rhododendron properties for curing dysentry.

A study conducted by Verma *et al.* (2011) reported in the line of the study that Phytochemical screening revealed the presence of numerous constituents such as flavonoids, saponins, tannins, phytosterols, reducing sugars and phenolic compounds in rhododendron flower and bark. Hence tannins, reducing sugars and sterols may be responsible for mechanism of anti-diarrhoeal activity of EFRA. Further the ethyl acetate fraction of *Rhododendron arboreum* (flowers) showed potent anti- dysentery and diarrhoeal activity (Laloo *et al.*, 2006).

❖ ***Rambass (Agave Americana* Linn.*)***

Data in Table 4.49 show that 80 per cent of the experts were uncertain about the properties of *Rambass* in curing dysentery whereas *ayurvedic* literature supports this practice. The leaves are demulcent, antiseptic and are use to cure dysentery.

❖ ***Bhilmor(Rumex histatus)***

Regarding *Bhilmor* majority (80%) of the experts were uncertain about the medicinal properties of *Bhilmor*. In *Ayurveda* there is no information is available regarding *Bhilmor*. Hence a strong research is needed to validate it.

Stomach pain

- ***Tulsi (Ocimum sanctum)***

Data in Table 4.49 reveal that 60 per cent of the experts considered scientific the practice of giving *Tulsi* juice with carom and honey in releasing stomach pain causes due to improper food digestion. *Ayurvedic* literature also supports this practice as *Tulsi* has medicinal properties which are given during stomach pain as it is antispasmodic, demulcent and anticatarrhal in nature.

- ***Geu Kakkar(Soena amplexicaulis)***

All the experts were uncertain about the properties of *Geu Kakkar* and in *ayurvedic* literature there is no information is available about this plant. Hence a strong research is needed for extracting the medicinal properties of this plant.

- ***Nirbisi(Delphinium denudatum)***

Further Data in Table 4.49 show that all the respondents were uncertain about the medicinal properties of *Nirbisi* plant but the *ayurvedic* literature supports this practice as the plant is bitter, cooling, astringent, anodyne, anti tonic, aphrodisiac, anti inflammatory and used in stomach pain, toothache, painful piles and skin diseases.

Vomiting

- **Onion (*Allium cepa*)**

From the Table 4.49 depicts that majority of the experts (60%) considered the practice of giving onion and mint juice to the patient as scientific in feeling of vomiting sensation. In *ayurvedic* literature onion is considered as thermoginic, anti bacterial, emollient, aphrodisiac, diuretic, anodyne which improves physical strength, good appetizer and rejuvenates. Used for controlling vomiting, and loss of appetite.

- ***Aonla (Phyllanthus emblica)***

It is apparent from Table 4.49 that 70 per cent of the experts were uncertain about the intake of *aonla* juice with borax for controlling vomiting. The *ayurvedic* literature strongly supports the practice of giving *aonla* juice to the patient. The fruit is

refrigerant, anabolic, anti-emetic, anti-oxydant. *Ayurveda* mentioned that if 5gm cold infusion of fruit powder of described plant, 5gm heart wood powder of *Santalum album* is taken with 10 gm sugar candy powder and 10 gm honey two times a day is useful in controlling vomiting.

- **Pomegranate(*Punica granatum*)**

About the role of pomegranate juice for controlling vomiting 60 per cent experts were uncertain. The *ayurvedic* literature supports that pomegranate is act as refrigerant and aphrodisiac in nature.

- ***Harad(Terminalia chebula)***

Majority of the experts (80%) were uncertain giving *harad* with cow milk and cow urine in vomiting whereas *ayurvedic* literature *supports* the practice of giving *harad* in vomiting.

Itching

- **Cow urine**

Regarding cow urine all the experts considered scientific the practice of drinking and bathing cow urine for alleviating the itching problem. Experts reasoned that drinking of cow urine makes body healthy and removes all impurities from the body as it contains enzymes which make the body healthy. *Ayurvedic* literature strongly supports this practice. Cow urine is the best remedy for every external and internal disease of the body as it purifies blood and clears skin problems.

Bhurani (2012) in a study on “Natural benefits of urine therapy” reported that urine contains the chemical compounds which are very essential for the growth and maintenance of the health of human body. Cow’s urine contains some volatile salts which are highly beneficial. These salts powerfully absorb acids and eradicate most of the diseases from human body.

- **Mustard oil (*Brassica campestris* Linn.)**

Data in Table 4.49 represent that majority of the experts (80%) considered the massage of body with mustard oil as scientific for controlling itching and skin allergies. Experts reported that mustard oil contains sulphur and it is antibacterial,

antifungal and anti-inflammatory in action. The antibacterial and antifungal properties work well against rashes and skin infections. *Ayurvedic* literature also support that mustard oil is thermogenic, soporific, anti-inflammatory, anodyne and anti-septic in nature. It is good for curing itching and skin diseases.

- ***Deodar* (*Cedrus Deodar* Loud.)**

Data in Table 4.49 show that 60 per cent of the experts were uncertain about the practice of massaging with deodar oil whereas *ayurvedic* literature supports this practice as deodar oil alleviates *kapha* and *vaata*. The oil is antiseptic, diaphoretic and depurative used for skin diseases, wounds and ulcer.

- ***Doob* grass(*Cynodon dactylon*)**

Majority (70 %) of the experts were uncertain about the *Doob* grass and turmeric property in controlling eczema and itching of skin whereas *ayurvedic* literature supports both *Doob* grass and turmeric for controlling skin diseases when applied externally. The *Doob* plant is astringent, anti- septic and cooling in nature and used for itching and burning sensation. The rhizomes of turmeric are used for inflammation of skin diseases and wounds.

Psoriases

- ***Aakasmatri (Cuscuta eurpaea)***

Data in Table 4.49 reveal that all the experts were unaware and uncertain about the medicinal properties of *Akashmatri* in psoriases whereas *ayurveda* literature mentioned that it is helpful to remove skin problem as anti-inflammatory in nature.

Boils and pimples

- ***Againbai* (*Premna mucronata* Rpxb.)**

Regarding the application of stem paste of *Againbai* for curing boils majority of the experts (80%) were uncertain or had no information. In *ayurvedic* literature there is no information is available about the *Againbai*.

From above it is clear that for curing boils further research work need to be carried out to validate such practices.

- **Flax seeds (*Linum usitatissimum*)**

About application of leaf paste of flax seeds 60 per cent expert were uncertain whereas *ayurvedic* literature strongly support the application of the seed paste on burn parts of the body as it is demulcent, emollient, anodyne, used for skin diseases, inflammations, ulcers and boils.

- ***Dudhi(Euphorbia hirta)***

Majority of the experts (80%) were uncertain about the properties of *dudhi* in curing boils and skin diseases but *ayurvedic* literature supports this practice as the plant is anti inflammatory. Apart that *dudhi* is mainly used to cure ring worm and wounds as it is anti-fungal in nature and its latex is used to cure acne vulgarise.

- ***Semal(Bombax ceiba)***

The application of bark paste of *Semal*, 70 per cent of the experts considered scientific as *Semal* bark has anti bacterial and cooling effect whereas *ayurvedic* literature supports this practice as *semal* alleviates *pitta* and *vaata*. The stem bark is demulcent, styptic, and mucilaginous used for fomenting, healing wounds and skin eruptions like pimples and boils.

- ***Mursagin (Tephrosia purpurea)***

Majority of the experts (80%) were uncertain about the medicinal properties of *Mursagin* and *ayurvedic* literature strongly support this practice. The leaves are anti inflammatory and used for curing skin diseases, pimples and boils.

- ***Makrujhar(Thalictrum foliolosum)***

This plant is found in temperate region of Himalaya. Data in Table 4.49 reflect that majority of the experts (80%) were uncertain about the use of *Makrujhar* and no information is available in *ayurvedic* literature. Hence further research work should be carried out to validate the practices performed by rural farm families.

- ***Gewain(Solanum nigrum)***

Data in Table 4.49 depict that majority of the experts (80%) were uncertain about the use of *Gewain* in boils and pimples whereas *ayurvedic* literature support this practice as it is anti-inflammatory, anti-septic, expectorant, anodyne and anti-spasmodic.

Sores and gingivitis

- ***Dahya(Callicarpa macrophylla)***

The practice of mouth wash with *Dahya* shows that all the experts were uncertain about its use for curing sores and gingivitis and no information regarding this practice is available in *ayurvedic* literature. Hence there is need for research in light of this direction.

Wounds and cuts

- **Turmeric*(Curcuma longa)***

Data in Table 4.49 depicts that majority of the experts (80%) considered the practice of applying turmeric paste on wounds as scientific and experts reasoned that it has antiseptic, anti-bacterial and anti-inflammatory properties which helps in healing of wounds. The *Ayurvedic* literature also support this practice as rhizome of turmeric is thermogenic, chologogue, anti-oxidant, detoxifier and styptic in nature and used for inflammations of skin diseases, wounds and haemorrhage.

- ***Kilmora (Berberis asisatica)***

The practice of applying root paste of *Kilmora*, all the experts were uncertain about its properties in healing wounds whereas *ayurvedic* literature supports this practice as *Kilmora* is anti-inflammatory, anti-coagulant and anti-bacterial in nature.

- ***Patvari(Aloe barbadensis)***

Sixty per cent of the experts considered scientific the practice of applying sap of *Patvari* in cuts, burns and wounds. Experts reasoned that aloe vera is a succulent and mucilaginous plant and has cooling and fast healing properties and *ayurvedic* literature also support this practice as the plant is cooling, carminative, anti-inflammatory, and haemostatic and used for burns and skin disordersa

- ***Pauyoli (Reinwardtia indica), Ghangara* (*Pyracantha crenulata)* and *Gwal Kakri (Soena amplexicaulis)***

Data in Table 4.49 depict that all experts were unaware about the healing properties of these plants and in *ayurvedic* literature no information is available about healing

power of these plants. Hence a further research is needed to validate these plants as mentioned by farm families.

- ***Patee (Artemisia nilagirica)***

Majority of the expert(80%) were unaware about the properties of *Patee* plant in healing wounds and cuts whereas *ayurvedic* literature supports this practice as the leaves are used locally as antiseptic, astringent, anodyne, anti-inflammatory and expectorant in nature.

Bleeding

- **Pomegranate*(Punica granatum)***

Regarding pomegranate majority of the experts (80%) were uncertain about its use in preventing nose bleeding where as *ayurvedic* literature supports this practice as the leaves are styptic for checking bleeding from nose.

- **Hemp *(Cannabis sativa* Linn.*)***

Regarding application of leave paste of hemp, 60 per cent experts were uncertain about its use in checking bleeding. In *ayurvedic* literature no information is available regarding this practice but mentioned that it is analgesic, anti-inflammatory, tranquilizer and sedative in nature. Hence a strong research is needed in this direction

Menstruation problem

- ***Giloi* (*Tinospora cordifolia)* and Carom seeds *(Cuminum cyminum)***

Data in Table 4.49 show that experts (70%) were uncertain about the use of *Giloi* and carom seeds in menses problem whereas *ayurvedic* literature not clearly supports this practice but both have anti-spasmodic that controls pain during menses cycle. Hence further research is needed in both the areas for proving their validity.

- ***Brahmi (Centella asiatica)* and onion *(Allium cepa)***

Data in Table 4.49 show that majority of the experts(80%) were uncertain about the practice of giving *Brahmi* and onion juice in excessive bleeding during menses where as *ayurvedic* literature supports this practice as the *brahmi* and onion are sedative, hypotensive, act as a local stimulant and used in amenorrhoea.

Leucorrhoea

- **Banana *(Musa paradisica)***

Data in Table 4.49 show that 60 per cent experts were uncertain about the practice of consuming roasted raw banana for recovering problem of leucorrhoea whereas *ayurvedic* literature also supports this practice as banana is scorbutic, depurative and tonic used for dysuria, polyuria and menstrual disorder.

- ***Denusha (Sida cordifolia)***

From the Table 4.49, it reflects that majority of the experts (90%) were uncertain about the practice of giving decoction of *danusha* root in leucorrhoea problem and *ayurvedic* literature strongly support this practice as the plant is vigorating and spermatopoietic.

Urine problem

- **Cucumber *(Cucumis sativa)***

It was cleat from the Table 4.49 that majority of the experts (80%) considered the practice of making seed paste of cucumber and consuming in urine problem as scientific. Experts supported the reason given by farm families as it reduces the burning sensation in urine pass and normalize flow of urine. The *ayurvedic* literature also supports this practice as seeds are astringent, refrigerant and diuretic in nature and use in irritation of urinary tract, burning sensation, renal and bladder calculus.

- **Carom seeds*(Trachyspermum ammi)***

Regarding consumption of boiled water of carom and coriander seeds, majority of the experts (70%) considered it scientific as the seeds of coriander and carom are diuretic and saluretic in nature. *Ayurvedic* literature also supports this practice as carom seeds are diuretic in nature.

Toothache

- **Garlic*(Allium sativum)***

Garlic split can help in relieve toothache as majority of the experts (80%) considered this practice as scientific. The experts reasoned that due to its antibacterial,

anaesthetic and analgesic properties. In addition to that a*yurvedic* literature also supports this practice.

- ***Timur (Zanthoxylum alatum)***

Data in Table 4.49 show that majority of the experts (80%) considered scientific the practice of applying the seeds and bark paste of *timur* on affected part of the tooth as it relief pain. The reason is that it is antiseptic and disinfectant. *Ayurvedic* literature also supports this practice as fruit and bark is aromatic, anti bacterial, anti fungal and used in tooth powders.

Knee pain

- **Garlic *(Allium sativum*)**

Perusal of Data in Table 4.49 shows that majority of the experts (70%) considered scientific the practice of applying paste of garlic and *ghee* on knee area as both has medicinal properties which reduced the knee pain. *Ayurvedic* literature also support this practice as garlic is thermogenic, anodyne, oleaginous, aphrodisiac, expectorant and stimulant in nature which helps in osteoarthritis ,sciatica and rheumatism where as cow's *ghee* is excellent for joint as it lubricates and oxygenates them.

Rheumatic pain

- **Stinging nettle *(Utrica dioica)***

Perusal of Table 4.49 shows that only 50 per cent of the experts considered the practice of rubbing the leaves of stinging nettle on joint or muscle having pain as scientific. The experts reasoned that young leaves of the plant have medicinal properties which are helpful in joint pain, sciatica, gout and rheumatic pains. In *Ayurveda* literature no information about sting nettle hence research is needed.

According to website www.anniesremedy.com, stinging nettle is an almost ideal herb for those with all types of arthritis, rheumatoid arthritis, and gout. The anti-inflammatory substances combined with the rich concentration of the minerals boron, calcium and silicon helps in reducing pain while helping to build strong bones.

- **Paste of Mustard+ Garlic + Stinging nettle *(Utrica dioica)***

Sixty per cent experts expressed that all three are thermogenic, anti-inflammatory and anodyne in nature and increases the blood circulation in the body hence relief the joint

pain. *Ayurveda* literature also support that mustard oil **has** selenium and magnesium content which lend it **anti inflammatory and heat producing properties**. Garlic is also anti inflammatory in nature whereas about sting nettle there is need of research to validate it.

Rheumatic swelling

- ***Shiwai (Vitex negundo* Linn.*)***

Data in Table 4.49 report that majority (80%) of the experts were unaware and uncertain about the use of *shiwai* leaves whereas in *ayurvedic* it is a reputed drug and is reportedly astringent, bitter and cold. The leaves are aromatic, discutient, vermifuge and are very efficacious in dispelling inflammatory swelling of the joints in acute rheumatism.

Ear pain

- ***Gewain (Solanium nigrum)***

Regarding *gewain* juice majority of the experts(80%) were uncertain about the practice of pouring the leave juice of *gewain* in ear pain whereas *ayurvedic* literature supports this practice as it is anti-inflammatory, anodyne, anti-septic and anti-spasmodic in nature and the most used part is the leaves which are externally used as poultice in earache.

- **Onion**(***Allium cepa***)

Experts (60%) considered that juice of onion is harmful for ear while *ayurvedic* literatures support the practice of pouring the juice of onion in ear ache as it is anti-inflammatory, antiseptic and antispasmodic and highly valued for its therapeutic properties.

Kumar *et al.(*2010) in a study on "Allium cepa: A traditional medicinal herb and its health benefits" reported the same that onion juice dipped on cotton wool and put into the ear is a popular Russian remedy for ringing sound in the ears and relieves earache.

- ***Hazaree (Tagetus miniata)***

Regarding pouring the juice of *hazaree* leaves, experts were uncertain (60%) about this practice whereas *ayurvedic* literature supports this practice as leaves are styptic,

carminative, vermifuge and used for earache. It is described that warm juice of leaves if pour 4-4 drops two times a day is beneficial in ear disorder (Otalgia).

Head ache

- ***Doob* grass (*Cynodon dactylon*)**

Majority of the experts were uncertain(70%) about the practice of applying the juice of *Doob* grass on head for relieving pain whereas *ayurvedic* literature support this practice as *Doob* grass is cool, haemostatic, astringent in nature and relief headache.

- ***Brahmi* (Centella asiatica)**

Experts (60%) considered the practice of chewing *brahmi* leaves in headache as scientific. It acts as a local stimulant and has cooling properties. *Ayurvedic literature* also support this practice as *brahmi* plant is cooling, hypotensive, central nervous system relaxant, sedative, brain tonic and improves memory.

- ***Titpati (Oxalis corniculata)***

Data in Table 4.49 show that 80 per cent experts were uncertain about the practice of applying the leave paste of *titpati* whereas *ayurvedic* literature support this practice as the leaves are thermogenic, anodyne, anti inflammatory, cooling and refrigerant in nature.

Eye pain

- ***Baheda (Terminalia bellirica)***

All the experts were uncertain about the practice of applying the bark powder of *Baheda* with honey in eyes .In *ayurvedic* literature no information is available about this practice, but consumption of *Baheda* is regarded highly beneficial for eyes disorders whereas cow's *ghee* is also beneficial for eyes.

Stone pain

- **Flour of Barley, Finger millet and Barnyard millet**

Experts were unaware about the practice of consuming the mixture of all three flours together for relieving stone pain. In *Ayurvedic* literature no information is available about this. Hence a research is needed in this direction.

Toe sores

- **Pomegranate *(Punica gratum)***

Both the experts and *ayurvedic* literature were uncertain and not support this practice respectively, for curing toe sores hence a research is needed to validate it.

- **Wallnut(*Juglans regia*)**

Majority of the experts (80%) considered the practice of applying the hull of walnut in between the toes as scientific. Experts reasoned that walnut hulls contain juglone, a chemical that is antibacterial, antiviral, antiparasitic and a fungicide. *Ayurvedic* literature also supports this practice as it is anti-fungal and anti-septic in nature.

- ***Garupaan (Micromeria biflora)* and *Padhar* (*Leptodermis lanceolata)***

All experts were uncertain about the use of *garupaan* and *padhar* in toe sores. In *Ayurvedic* literature no information is available about both the plant used in toe sores, hence research should be carried out to validate it.

Crack heel

- **Pine resin**

Majority of the experts (70%) were uncertain about the practice of applying pine resin whereas *ayurvedic* literature supports this practice as pine resin is thermogenic in nature and helps to heal cracks.

Bone fracture

- **Pine (*Pinus roxburghii* Sarg.)**

Experts (60%) were uncertain about the application of pine resin in bone fracture. *Ayurvedic* literature support this practice as pine resin has anti-spasmodic, anodyne, anti-septic properties and used as plastered in bone fracture, swelling and sprains.

Parasites

- ***Indrian (Trichosanthes bracteata)***

All the experts were unaware about the *Indrian* ftruit used for killing intestinal worm and *ayurvedic* literature does not support this practice.

❖ ***Shiwai (Vitex negundo* Linn.*)***

Majority of the experts (70%) were unaware about the practice of taking leaf juice for expelling worms from the stomach whereas *ayurvedic* literature support this practice as it is anthelmintic in nature and expels worms when leaf juice is taken with curd for 3- 4 days continuously.

❖ **Carom seeds *(Trachyspermum ammi)***

Majority of the experts (80%) were unaware about the practice of consuming the decoction of carom seeds in killing intestinal worms but the *ayurvedic literature* supports this practice as the seeds are anthelmintic and kills intestinal worm.

❖ **Wallnut *(Juglans regia)***

Experts (60%) considered scientific the practice of consuming bark powder of walnut for expelling intestinal worms. They reported that the bark is antheimintic in nature. The *ayurvedic* literature also supports this practice with the same reason as given by experts.

Upadhyay *et al.(*2010) in a study on "Anthelmintic Activity of the Stem Bark of *Juglans regia* Linn." reported the same that in traditional literature, it was found that *Juglans regia* Linn. stem bark was used as folk medicine as it has anthelmintic property. Thus, the use of bark powder of *Juglans regia* Linn. Showed significant anthelminthic activity against Indian earthworm, Pheretima posthuma. Benzene, methanol and ethanol extracts exhibited significant anthelmintic activity as comparable to that of standard drug Piperazine citrate.

Body odour

❖ ***Paatee (Artemisia nilagirica)***

All experts were uncertain about the practice of rubbing the *paatee* leaves all over the body before bathing whereas *ayurvedic* literature support this practice as *paatee* leaves are antiseptic and expectorant and used for skin diseases.

Cancer

❖ **Cow urine**

Data in Table 4.49 show that majority of the experts (80%) considered the practice of consuming cow urine in cancer as scientific. The reason given by the experts that

urine therapy is effective and has greater benefits than radiation and chemotherapy. It can destroy the growth of cancer cells and prevent them from spreading to the other parts of the body. Apart that it can kill poisonous substance in the cancerous cell without producing any side effect. *Ayurvedic* literature also supports the cow urine as cow urine contains great medicinal properties which not only cure cancer but other diseases also.

Dhama *et al*.(2010) in a research works carried out by Go-Vigyan Anusandhan Kendra (Cow Science Research Center) at Nagpur revealed the beneficial properties of cow urine in the treatment of cancers. Further extensive research on cow urine therapy against fighting cancer was carried out by scientists of Central Institute of Medicinal and Aromatic Plants (CIMAP), CSIR centre at Lucknow, along with collaboration with Go-Vigyan Anusandhan Kendra, Nagpur and confirmed this milestone achievement. Studies highlighted the role of cow urine in treating cancers and also enhance the efficacy and potency of anti-cancer drugs. Recently, this significant achievement has been validated by the grant of U.S. patent (No. 6896907) in the field of treatment of cancers (Amar Ujala, July, 19, 2005). The Indigenous cow urine contains "*Rasayan tatva"*, which is responsible to modulate immune system and act as bioenhancer. Scientists have proved that the pesticides even at very low doses cause apoptosis (cell suicide) in lymphocytes of blood and tissues through fragmentation of DNA. Cow urine helps the lymphocytes to survive and not to commit suicide. It also repairs the damaged DNA and thus is effective for the cancer therapy.

- **Wheat grass**

Regarding intake of paste of wheat grass, *geloi* and flax seeds experts (70%) were uncertain about it. *Ayurvedic* literature support property of wheat grass, *geloi* and sesame seeds to kill cancerous cells as these are anticarcinogenic and also inhibit the growth of cancer cells

Verma *et al*.(2011) in a study on "Evaluation of Anticarcinogenic and Antimutagenic Effect of *Tinospora cordifolia* in Experimental Animals" reported the same that in anticarcinogenic studies, C57BL mice which received *Tinospora cordifolia* extract at the dose of 750 mg/kg for 30 days showed increase in life span of animals and tumor size was significantly reduced in *Tinospora cordifolia* treated mice as compared to

Table 4.49: Scientific validation of indigenous health care practices followed by farm families

***Scientific ** Unscientific *** Uncertain + Supporting ++ Not supporting +++ Unavailable**

SN	Indigenous practices	Experts opinion				Ayurvedic literature
		S*	US**	UC***	Reason	Reason
JAUNDICE						
1.	*Jula* of Black soybean(*Glycine max*) is given to the patient	70		30	Controls the excess production of bilirubin in the blood	UA
2.	Roots and leaves of raddish is taken in raw form	90		10	Leaves and root have medicinal properties	Leaves are depurative, digestive, anti-inflammatory, anodyne, stomachic, useful for dyskinesia of the bile ducts; liver and gall bladder
3.	Boiled water of *Giloi* stem is taken	70		30	Stem is hepatic stimulant	Stem is hematinic, depurative, hepato-protective and anti-spasmodic
4.	Decoction of *Aonla* is given to patient	80		20	Fresh juice is vermifuge, purify the blood	Fruit is antioxidant, anti-emetic, anabolic and antiscorbutic
5.	Regular intake of small slices of sugarcane in diet	70		30	Balance the bilirubin level	It alleviate and regulate the secretion of bilirubin in the body
6.	Ground root of *Makrujhaar* is given to the patient			100	Research is needed	UA
KIDNEY STONE						
7.	Ground roots of *Silfer* is taken	80		20	Helpful in dissolving kidney stone	Roots are astringet, analgesic, litholytic and styptic in nature
8.	Consume *Gahat dal* thrice a week	90		10	Helpful in dissolving kidney stone	Astringent, diuretic, urolithiasis and nephrolithiasis
9.	Whole crushed plant of *Gokharu* is taken orally	20		80	Research is needed	Fruit and roots are refrigerant, diuretic, spasmyolytic, used in diseases of kidney

DIABETES						
10.	Consumption of grinded bark+ seeds of *Jamun*	70		30	Stimulate the secretion of insulin from pancreatic gland	Bark is refrigerant, diuretic and astringent
11.	Boiled root water of *Kilmora*(*Berberis asisatica*)	10	20	70	Research is needed	Anti-inflammatory, Hypoglycaemic and anti-coagulant
12.	Leave paste of *Chirat*(*Swerita chirayita*)	60	10	30	Good remedy for liver disorders	Burifier and hypoglycemic in nature
BLOOD PRESSURE						
13.	Drinking of Rhododendron juice	10	20	70	Research is needed	UA
ASTHMA AND BRONCHITIS						
14.	Intake of *Gathi* and Pomegranate			100	Research is needed	UA
PNEMONIA FEVER						
15.	Massaging chest area with garlic paste+ mustard oil	60	10	30	Both garlic and mustard oil are hot and carminative	❖ Garlic is thermogenic and expectorant in nature ❖ Mustard oil is anti inflammatory and thermogenic in nature
FEVER						
16.	*Chirat* +Black pepper+ Clove	80		20	*Chirat* helps to alleviate the body temperature	❖ *Chirat* is anti-inflammatory, sudorofic and given in fever, diarrhoea and weakness ❖ Black pepper is alterative, thermogenic and anti periodic in nature ❖ Clove is anti bacterial, antiseptic and analgesic in nature

17.	*Tulsi* + Black pepper + Honey	70		30	All are thermogenic and antiseptic in nature	*Tulsi* and black pepper are carminative, expectorant, stimulant and anti- periodic whereas honey is anti-inflammatory in nature
18.	Intake of *Patvari*(*Aloe barbadensis*) powder	60	10	30	It has cooling property, bitter in taste and is anabolic in its action	*Patvari* is bitter, carminative and anti-inflammatory in nature
19.	*Dhaniya* (Coriander seeds) + Rice paste	20	10	80	Research is needed	Coriander is anti-inflammatory and astringent in nature
20.	*Methi* (Fenugreek seeds) + *Harad*	10	20	70	Research is needed	❖ Coriander seeds are carminative , anti-inflammatory, thermogenic and mild antiseptic in nature ❖ *Harad* is anti-inflammatory and astringent
COUGH AND COLD						
22.	Giving powder of *Baheda* (*Terminalia bellirica*)	100			Thermogenic in nature	*Baheda* is anti-pyretic ,thermogenic, bronchodilator and antiasthmatic
23.	*Tulsi* and carom seeds	70		30	Hot in nature and provide warmth feeling	❖ *Tulsi* is immunomodulator, antitussive and expectorant ❖ Carom seeds are carminative and antispasmodic
24.	Rhizome of turmeric is given	10	20	70	Research is needed	UA
INDIGESTION AND CONSTIPATION						
25.	*Gandrayani* (*Angelica glauca*) is used as a spice in food for indigestion	80		20	It speed up digestion process	Roots are carminative, stimulant, diaphoretic and used in flatulent and colic
26.	Intake of carom seeds with luke warm water	70		30	Thymol chemical is very effective in helping the stomach to release gastric juices that speed up digestion	Fruit are carminative, antispasmodic, anti-diarrhoeal and stimulant

27.	Consumption of *Bathuwa* leaves in constipation	70		30	Plants are laxative which helps in constipation problem	Laxative, digestive, appetizer and diuretic
28.	Intake of ginger juice + honey	60	10	30	Have medicinal properties	❖ Ginger is carminative, digestive in nature and provides relief from flatulence ❖ Honey helps in good digestion
29.	Consumption of Guava	80		20	Rich in fibre and increases bowl moments	The fruit is refrigerant, aphrodisiac and laxative
30.	Consumption of *Harad* (*Terminalia chebula*) pods	100			Increases bowl movements	Anodyne, anti-inflammatory, carminative, digestive and alternant
31.	Mixture of fenugreek seeds+ carom seeds	80		20	❖ Fenugreek helps flush out harmful toxins ❖ Carom seeds increase the secretion of gastric acid	Both are useful in treating constipation and fever
DIARRHOEA						
32.	Giving *Jaula* made of rice and curd	60	10	30	Rice with curd binds the stomach and controls diarrhoea	Grains are oleaginous, demulcent, carminative and anti-dysenteric
33.	Use of fruit rind of *Darim* (*Punica granatum*)	60		40	Fruit is astringent in nature	Astringent, stomachic and effective in chronic diarrhoea
34.	Consuming *raita* of *Timul* (*Ficus auriculata* L.)			100	Research is needed	Unripe fruit is astringent, carminative, digestive, stomachic
35.	Mixture of mint+ Lime juice+ Black salt	70		30	Having medicinal properties	Leaves are anodyne, stimulant, carminative, anti-septic and stomachic whereas black salt regulates the electrolyte balance in body

DYSENTRY						
36.	Intake of *Burans* juice(Rhododendron)	60		40	Maintain water level in the body	UA
37.	Intake of *Rambass* juice (*Agave americana* Linn.)	10	10	80	Research is needed	Leaves are demulcent and antiseptic
38.	Intake of *Bhilmor* (*Rumex histatus*) leaves	20		80	Research is needed	UA
STOMACH PAIN						
39.	Juice of *Tulsi*+carom seeds + Honey	60		40	Antispasmodic in nature	❖ *Tulsi* is anti- spasmodic, demulcent and anti-catarrhal ❖ Cumin and honey in releasing stomach pain
40.	Intake of *Geu Kakkar* (*Soena amplexicaulis*) roots			100	Research is needed	UA
41.	Dry leaves powder of *Nirbisi*(*Delphinium dendatum*)			100	Research is needed	Bitter, cooling, anodyne, aphrodisiac and anti – inflammatory
VOMITING						
42.	Intake of onion + mint juice	60	20	20	Stop the vomiting sensation	Anti-vomiting, rejuvenate the body and good appetizer
43.	*Aonla* powder + Borax powder	30		70	Research is needed	Fruit is refrigerant, anabolic , anti-emetic and anti-oxidant
44.	Intake of *Darim* (*Punica granatum*) juice	30	10	60	Research is needed	Refrigerant and aphrodisiac
45.	Mixture of *Harad* + Cow milk + Cow urine + Honey	20		80	Research is needed	❖ *Harad* is useful in digestion and anti-vomiting ❖ Honey increases digestion and helps in the treatment of vomiting

ITCHING AND ECZEMA						
46.	Drinking and bathing of cow urine	100			Removes all impurities from the body as it contains enzymes	It contains enzymes which removes all impurities from the body and purifies the blood
47.	Massage the body with mustard oil	80		20	It is antibacterial, antifungal and anti-inflammatory in action	Oil is anti-inflammatory, anti-septic, anti bacterial and soporific in nature
48.	Massaging the body with Deodar oil	40		60	Research is needed	Oil is anti-septic, diaphoretic and depurative in nature
49.	Apply the paste of *Doob* grass + turmeric rhizome	20	10	70	Research is needed	❖ *Doob* grass act as an astringent, anti-septic, cooling in nature ❖ Turmeric is anti-inflammatory in nature
PSORIASES						
50.	Apply the paste of *Aakashmatri* (*Cuscuta eurpaea*)			100	Research is needed	Helps to remove skin problems as anti-inflammatory in nature
BOILS AND PIMPLES						
51.	Stem paste of *Againbai* (*Premna mucronata*) on boils	20		80	Research is needed	NA
52.	Applying the seed paste of flax seeds on boils	40		60	Research is needed	Seeds are demulcent, emollient, anodyne and anti-inflammatory
53.	Leave paste of *Dudhi*(*Euphorbia hirta*) apply on boils	10	10	80	Research is needed	Plant is anti inflammatory and cures acne vulgarise
54.	Apply the bark paste of *Semal* (*Bombax ceiba*) on boils and pimples	70		30	Anti bacterial and cooling effect	Bark is demulcent, styptic and mucilaginous used for fomenting skin eruptions

55.	Apply root paste of *Mursagin* (*Tephrosia purpurea*)	20		80	Research is needed	Anti-inflammatory in nature
56.	Apply the leave paste of *Makrujhar* (*Thalictrum foliolosum*)		20	80	Research is needed	UA
57.	Juice of Gewian(Solanum nigrum) + Black pepper + Goat milk	40		60	Research is needed	❖ Gewain juice is anti-inflammatory, anti-septic and anodyne ❖ Black pepper is anti-inflammatory
SORES AND GINGIVITIS						
58.	Mouth wash with *Dahya* leaves			100	Research is needed	UA
WOUNDS AND CUTS						
59.	Apply the paste of turmeric + cow ghee on wounds	80		20	Antiseptic, anti-bacterial and anti-inflammatory properties	❖ Turmeric has anti-septic, anti-bacterial, chologogue and detoxifier properties ❖ Cow *ghee* facilitated in recovering from wounds
60.	Apply the root paste of *Kilmora* on wounds			100	Research is needed	Anti-inflammatory, anti-coagulant and anti-bacterial
61.	Applying the sap of *Patvari* on cuts, burns and wounds	60		40	Succulent and mucilaginous plant and has cooling and fast healing properties	Carminative, cooling, anti-inflammatory and haemostatic in nature
62.	Apply leaves paste of *Pauyoli, Ghangara* and *Gwal Kakri*		20	100	Research is needed	UA
63.	Apply the leave paste of *Patee*		20	80	Research is needed	Leaves are anti-septic, astringent and anti-inflammatory

BLEEDING						
64.	Use of *Danim* (*Punica granatum*) leave juice		20	80	Research is needed	Leaves are styptic for checking bleeding from nose
65.	Applying the leaves paste of Hemp	40		60	Research is needed	Anti-inflammatory and analgesic
MENSTRUATION PROBLEM						
66.	Use of *Giloi* and carom seeds	20	10	70	Research is needed	Both are anti-spasmodic in nature
67.	Intake of *Brahmi* and Onion for curing excessive bleeding	20		80	Research is needed	Act as a local stimulant in amenorrhoea
LEUCORRHOEA						
68.	Consuming roasted *Kela* (*Musa paradisica*)	10	10	60	Research is needed	Banana is scorbutic, depurative and tonic in nature
69.	Intake of *Denusha* (*Sida cordifolia*) decoction		10	90	Research is needed	Plant is vigorating and spermatopoietic in nature
URINE PROBLEM						
70.	Drink seed paste of *Kheera*(*Cucumis sativa*)	80		20	Reduces the burning sensation in urine pass and normalize flow of urine	Astringent, refrigerant and diuretic in nature
71.	Consume cumin+ coriander seeds	70	10	20	Seeds are diuretic in nature	Coriander and cumin seeds are diuretic and saluretic in nature
TOOTHCAHE						
72.	Split of garlic kept on affected part of tooth	80		20	Antibacterial and analgesic	Anti-bacterial, anesthetizing and analgesic properties
73.	Applying seeds and bark of *Timur*(*Zanthoxylum alatum*)	80		20	Antiseptic and disinfectant	Anti-bacteria and anti-fungal properties

KNEE PAIN						
74.	Apply the paste of Garlic + Cow's ghee	70		30	Both are thremogenic in nature	❖ Garlic is thermogenic, anodyne, stimulant and tonic in nature ❖ Cow's ghee act as lubricant and oxygenates the muscle cells
RHEUMATIC PAIN						
75.	Apply leave paste of stinging nettle	50		50	Reduced inflammations	NA
76.	Paste of Mustard + Garlic + stinging nettle	60		40	Thermogenic, anti-inflammatory and anodyne	❖ Mustard oil and Garlic is anti-inflammatory and thermogenic
RHEUMATIC SWELLING						
77.	Applying leave paste of *Shiwai* (*Vitex negundo*)	20		80	Research is needed	Dispelling inflammatory swelling of joints
EAR PAIN						
78.	Pouring leave juice of *Gewain*		20	80	Research is needed	Anti-inflammatory, anodyne, anti-septic and anti-spasmodic innature
79.	Pouring Onion juice		60	40	-	Anti-inflammatory, anti-septic and anti-spasmodic in nature
80.	Pouring leave juice of *Hazaree* plant (*Tagetus miniata*)	10	20	70	Research is needed	Styptic, carminative and vermifuge in nature
HEADACHE						
81.	Applying the paste of *Doob* grass		30	70	Research is needed	Doob grass is cool, hoamostatic and astringent
82.	Chewing of *Brahmi* leaves(*Centella asiatica*)	60		40	Acts as a local stimulant and has cooling properties	Leaves are cooling, hypotensive, central nervous system relaxant, sedative and brain tonic
83.	Applying leave paste of *Titpati* (*Oxalis corniculata)*	10	10	80	Research is needed	Thermogenic, anodyne, cooling and refrigerant in nature

EYE PAIN						
84.	Intake of bark powder of *Baheda* and cow's ghee			100	Research is needed	Consumption of *Baheda* and cow ghee is highly beneficial for eyes
STONE PAIN						
85.	Flour of Barley, Finger millet and Barnyard millet			100	Research is needed	UN
TOE SORES						
86.	Apply the seed decoction of *Darim* (*Punica gratum*)			100	Research is needed	Research is needed
87.	Apply the fruit hull of *walnut* (Juglans regia) in between the toes	80		20	Antibacterial, antiviral, antiparasitic and a fungicide	Anti-fungal and anti-septic in nature
88.	Use of leave paste of *Garupan* and *Padhar* plant			100	Research is needed	NS
CRACK HEEL						
89.	Use of pine resin		30	70	Research is needed	Thermogenic in nature
BONE FRACTURE						
90.	Application of Pine resin	20	20	60	Research is needed	Thermogenic ,anti-spasmodic, anodyne and anti-septic in nature
INTERNAL PARASITES						
91.	Intake of inner portion of *Indrian* (Trichosanthes bracteata) fruit			100	Research is needed	NS, Fruit could be poisonous
92.	Intake of leave juice of *Shiwain* (*Vitex negundo*) plant	10	30	70	Research is needed	Anthelmintic in nature and expel worms
93.	Intake of carom seeds decoction	20		80	Research is needed	Anthelmintic in nature
94.	Intake of bark powder of walnut	60		40	Bark powder is anthelmintic	Anthelmintic in nature

BODY ODOUR						
95.	Rubbing of *Patee* (*Artemisia nilagirica*)leaves all over the body			100	Research is needed	Anti-septic and expectorant in nature
CANCER						
96.	Drinking of cow's urine	80		20	It can destroy the growth of cancer cells and prevent them from spreading to the other parts of the body	Kill poisonous substance in the cancerous cell without producing any side effect
97.	Wheat grass + *Tinospora cordifolia* + *Sesamum indicum*	20		60		All three kills cancerous cells
HEAT STROKE						
98.	Apply leave paste of *Kuri* (*Galium aparine*) all over the body			100	Research is needed	Research is needed
99.	Application of onion juice on the body	60		40	Act as stimulant and protect the body from *loo* and heat	As it rejuvenate the body and improves physical strength

control. The study further demonstrated that the, *Tinospora cordifolia* prevents the micronucleus formation in dose dependent manner while in melanoma tumor model, *T. cordifolia* have a preventive effect on tumor volume. It also showed that the mean survival time and increased in life span have increased in test group where animals were treated with *T. cordifolia* extracts as compared to control group. In conclusion, the present result suggests anticarcinogenic and antimutagenic activity of *T. cordifolia* extract.

Raghavan *et al*. (2010) in a study on "Nutritional, Medicinal and Industrial Uses of Sesame (*Sesamum indicum* L.) Seeds "reported the same that sesame oil contains a large amount of linoleate in triglyceride form that selectively inhibit malignant melanoma *in vitro* and the proliferation of human colon cancer cells.

Heat stroke

- ***Kuri (Galium aparine)***

All the experts were uncertain about the *kuri* plant properties in reducing heat stroke. In *ayurvedic* literature there is no information is available regarding this plant in alleviating heat stroke hence further research is needed to validate this practice.

- **Onion *(Allium cepa)***

Sixty per cent of the experts considered the practice of applying the juice of onion on the body parts for relieving sun stroke as scientific. Experts reasoned that it act as stimulant and protect the body from *loo* and heat. *Ayurvedic* literature also supports this practice as it rejuvenates the body and improves physical strength.

4.5.7 Scientific Validation of Indigenous Food Practices

The indigenous practices related to food habit followed by rural farm families of *Kumaon* region were scientifically validated by a panel of experts from areas of Foods and Nutrition and CIMAP, Bageshwar.

- ***Kaffa***

Data in Table 4.50 depict that all the experts judged the practice of consuming *kaffa* as scientific. The experts from the department of Foods and Nutrition reasoned that

dark green leafy vegetables are rich source of nutrients, minerals (including iron, calcium, potassium, and magnesium) and vitamins, including vitamins K, C, E, and many of the B vitamins.

❖ ***Sisun Saag (Utricadioca Linn.)***

It is clear form the Table 4.50 that 70 experts considered the practice of consuming Stingning nettle (*Sisun Saag)* as scientific. The experts reason that stinging nettle (*Utricadioica* Linn.) contains ingredients that decrease inflammation of joints and swelling and efficacious in sciatica, gout and rheumatic pains.

❖ ***Gahat dal (Macrotylomauniflorum)***

Regarding consumption of *gahat dal* in dissolving kidney stone cent per cent experts considered this practice as scientific. The reason given by experts that whole horsegram seeds are anti-urolithiasis and breakdown the calcium and oxalate.

Srinivas(2010) in a study on 'Anti-nephrolithiatic Potential of *MacrotylomaUniflorum*' reported the same that urinary stones could be dissolved with aqueous extract *Macrotylomauniflorum* and without the aid of surgical intervention. The recurrence of stones could also be prevented to a great extent. Administration of aqueous extract of *Macrotylomauniflorum* significantly reduced both calcium and oxalate deposition in the kidneys of both preventive and curative groups when compared to their respective controls. This indicates that aqueous extract of *Macrotylomauniflorum* has beneficial effect in preventing calculi formation.

❖ ***Bhang ki chutney*** (***Cannabis sativa*** L.)

Majority of the experts considered the practice of consuming hemp seeds in healing wounds and ulcer as unscientific (60%) whereas remaining 40 per cent were unaware about this practice. Hence further research is needed in this direction.

❖ ***Manduaki Roti (Eleusinecoracana)***

All the experts considered scientific the consumption of finger millet chapatti for controlling diabetes and increasing bowl movements. The experts from Foods and Nutrition department reasoned that finger millet flour is rich in minerals like thiamine, calcium and iron. Alos a good laxative and helpful in constipation.

Mal *et al.*(2010) reported the same that nutritionally finger millet have high micronutrient content, particularly calcium and iron, high dietary fibre, higher amount of essential amino acids and low glycemic index and thus play an important role in the food and nutritional security of the poor.

Mathanghi and Sudha (2012) in a study on "functional and phytochemical properties of finger millet (*Eleusinecoracana*) for health" reported the same that regular consumption of finger millet is known to reduce the risk of diabetes mellitus and gastrointestinal tract disorders and these properties attributed to its high polyphenols and dietary fibre contents.

- ***Bhatt ka dubuka(Glycine max)***

Majority of the experts (70%) considered scientific the practice of consuming black soybean as it is helpful in curing jaundice whereas 30 per cent were uncertain about this. Experts from the department of Foods and Nutrition reported that black soybean regulates the excessive secretion of bilurubin content in blood.

- ***Burans ke phoolo ki chatni (Rhododendron arboretum)***

Majority of the experts (70%) considered rhododendron flower sauce as scientific as it prevent from heat stroke. The experts reasoned that it act as expectorant and astringent and also applied as poultice in headaches whereas majority of the experts (80%) were uncertain about the property of *Buraans* to reduce blood pressure. Hence further research is needed in this area.

- ***Liun ki sabji (Diplanziumesculentum)***

All the experts were uncertain about the medicinal properties of fiddlehead for curing malaria fever, jaundice and constipation. Hence a strong research is needed to prove the practices carried out by farm families.

- ***Chainsoo*(Black gram)**

Majority of the experts (80%) were uncertain about the practice of using black gram in curing diabetes and it enhances digestion hence further research is needed to proof it.

Table 4.50: Scientific validation of Indigenous food practices of followed by farm families

***Scientific ** Unscientific *** Uncertain**

S.No.	Indigenous ethnic food preferences	Experts opinion			
		S*	US**	UC***	Reason
1.	Consumption of *Kaffa*, a thick paste of green leafy vegetable and rice paste	100			Dark green leafy vegetables are rich source of nutrition, minerals and vitamins
2.	Consumption of stinging nettle (*Utrica dioca Linn.*)as good for Joint problem, gout and swelling	70		30	Stinging nettle (*Utrica dioica* Linn.) contains ingredients that decrease inflammation of joints and swelling and efficacious in sciatica, gout and rheumatic pains
3.	Consumption of *Gahat dal(Macrotyloma uniflorum)* for dissolving kidney stone	100			*Gahat* seeds are anti urolithiasis and breakdowns the calcium and oxalate salts
4.	Consumption of *Bhang ki Chutney*(*Cannabis sativa* L.) for healing wounds		60	40	Research is needed
5.	Consumption of finger millet(*Ragi*) chapattis as good for people suffering from diabetes and constipation	100			*Ragi* is a good laxative for people suffering from constipation and it is a boon for people suffering from diabetes as it controls blood glucose level.
6.	Consumption of *Bhatt ka dubka*(*Glycine max*) in jaundice	70		30	*Bhatt* has the medicinal properties that regulates the excessive bilurubin level

7.	✓ Consumption of *Buraans ke phoolo ke chatni* (*Rhododendron arboretum*) in sunstroke	70		30	It act as expectorant and astringent and also applied as poultice in headaches
	✓ Decreases blood pressure		20	80	Research is needed
8.	Consumption of *Liun ki sabji (Diplanzium esculentum)* as effective in curing malaria, jaundice and constipation			100	Strong research is needed
9.	Consumption of *Timul ka raita (Ficus auriculata)* for controlling diarrhoea	70		30	Unripe fruit are astringent, carminative, digestive, stomachic and used for controlling diarrhoea and dysentery
10.	Consumption of *Bhatt Ki Churkani* as it is nutritious for growing children	70		30	Highly nutritious as it contain 36g/100g protein
11.	Consumption of *lal chawal ki kheer* as it has high energy content	100			It is highly nutritious and healthy and it is rich in fibre, vitamins and minerals
12.	✓ Consumption of *Kauni Pulao*(Foxtailmillet) for controlling diabetes and	100			Foxtail millet releases glucose steadily without affecting the metabolism of the body and rich in dietary fibre and fat
	✓ Controlling measles in children		30	70	Research is needed for proving the role of Foxtail millet for curing measles in children

- ***Timul ka raita(Ficusauriculata)***

The practice of consuming *Timul karayata* for controlling diarrhoea was considered scientific by majority of the experts (70%) .The experts reasoned that the unripe fruits are astringent, carminative, digestive, stomachicin and used for controlling diarrhoea and dysentery.

- ***Bhatt ki Churkani (Glycine max)***

Regarding *Bhatt Ki Churkani*, 70 per cent experts considered it as scientific. Experts reported that black soybean (*Glycine max*) is highly nutritious as it contains 36g/100g protein, hence it should be given to growing children for meeting out their protein requirement.

- ***Lal Chawal Ki Kheer*(Red rice Porridge)**

All the experts support the farm families' practice of consuming red rice as it is highly nutritious and healthy and it is rich in fiber, vitamins and minerals.

- ***Kauni Pulao*(Foxtail millet)**

All the experts considered the practice of consuming foxtail millet by diabetic person as scientific. The experts reasoned that the millets are rich in dietary fibre (6.7 per cent), protein (11 per cent) and low in fat (four per cent).Unlike rice, foxtail millet releases glucose steadily without affecting the metabolism of the body. The experts from Foods and Nutrition department reported that the incidence of diabetes is rare among the population which consumes foxtail millet diet and millets are free of gluten.

About the role of foxtail millet in curing measles, majority of the experts (70%) was uncertain. Hence a strong research is needed to prove this.

4.5.8 Experimentation of Selected Indigenous Practices

In order to judge the effectiveness of the indigenous practices an effort was made to undertake experiments of those practices which were most common among the farm families and also have scientific base according to the experts opinion. Total five experiments were undertaken. The details are as under:

1. Weed management in paddy crop by use of salt solution

In order to know the effectiveness of the salt solution in checking weed growth in paddy crop at plant growth stage an experimental and control group was undertaken under the supervision of agronomist and results were compared after 40 days. The experiment as follows:

Experimental group	Control group
Plot size 5×5 feet ↓ Cleaning of plot by proper bund demarcation ↓ Submerging of land with water and puddling of filed ↓ Transplanting paddy in first week of July ↓ Sprinkling salt solution(20 gm salt in ½ litre of water) four times at 10 days interval after 15 days of transplanting ↓ Less weed growth	Plot size 5×5 feet ↓ Cleaning of plot by proper bund demarcation ↓ Submerging of land with water and puddling of filed ↓ Transplanting paddy in first week of July ↓ No treatment ↓ Vigorous weed growth

Fig 27: Experiment on weed management in paddy by use of salt solution

Results

The results of the experimental group with treatment of common salt solution show that there was less germination of weed and healthy plant growth where no treatment was given vigorous weed growth was recorded after 40 days of observation. Hence it is concluded that sprinkling of common salt solution in paddy crop for checking weed growth is an effective practice and can be popularized among the farming community.

Rathore *et al.* (2012) in a study reveal that the age old practice of using common salt for weed control under acidic conditions of *jhum* paddy in north east India is not only effective in minimization of weed competition with cultivated crop (paddy) but also results in comparatively high paddy productivity without having any

negative effect on growth, yield and attributes of paddy. The practice of use of salt for weed management is also cost effective compared to other popular practice of weed management like hand weeding.

2. Insect- pest management in paddy by use of fenugreek seed and cow urine

In order to know the effectiveness of the solution of fenugreek seed and cow urine in checking insect-pest in paddy crop experiment was undertaken on 5×5 feet plot area by taking two groups i.e. experimental group and control group and results were recorded after 40 days.

Experimental group	Control group
Plot size 5×5 feet ↓ Cleaning of plot by proper bund demarcation ↓ Submerging of land with water and puddling of filed ↓ Transplanting paddy in first week of July ↓ Sprinkling solution of fenugreek and cow urine(20 gm fenugreek seeds and 400 ml cow urine) four times at 10 days interval after 20 days of transplanting ↓ Less insect infestation	Plot size 5×5 feet ↓ Cleaning of plot by proper bund demarcation ↓ Submerging of land with water and puddling of filed ↓ Transplanting paddy in first week of July ↓ No treatment ↓ Insect infestation

Fig 28: Experiment on insect management in paddy by use of fenugreek seeds and cow urine

Results

The results of experimental group with treatment of fenugreek seeds and cow urine show that there was less infestation of insect and healthy plant growth whereas in control group where no treatment was given, insect infestation was recorded after 40 days of observation. Hence it is concluded that sprinkling solution of fenugreek seeds and cow

urine in paddy crop for checking insect infestation is an effective practice and it can be popularized among the farming community.

3. Insect-pest management in wheat grain by keeping wallnut leaves

In order to control the insect-pest attack in stored wheat grain, experiment was undertaken in experimental group and control group and results of both the group were compared.

Experimental group	Control group
Sun drying of 5kg wheat grain for 2 days ↓ Leaves of wall are sun dried for 2 days ↓ Dried leaves are kept in stored wheat grain bag at bottom, middle and top level ↓ Keeping the bag in safe and dry place ↓ Observation was recorded every three months ↓ Less pest infestation	Sun drying of 5kg wheat grain for 2 days ↓ Keeping the wheat in a bag, in a safe and dry place ↓ No treatment ↓ Observation was recorded every three months ↓ Vigorous pest infestation

Fig 29: Experiment on pest management in wheat by using walnut leaves

Results

The results of experimental group with treatment of leaves of walnut show that there was no infestation of pest and can be use for consumption purpose whereas in control group where no treatment was given vigorous pest infestation was recorded after 8 months of the experiment and till the completion of experiment i.e. October, 2013 the wheat grain is converted into white powder by the severe pest attack. Hence it is concluded that keeping of walnut leaves for storing wheat grain helps in checking pest infestation and can be popularized to other part of the country for its wider applicability.

4. Pest management in stored whole horsegram by using mustard oil and salt

In order to control the pest attack in stored pulse grain, experiment was undertaken in experimental group and control group. The results of both the group were recorded and compared after 20 months.

Experimental group	Control group
Sun drying of 2kg pulse grain for 1 day ↓ Mix 2 tsp mustard oil and 1 tsp table salt properly with the 2 kg pulse grain ↓ Kept the mixed pulse grain in a air tight container in a safe and dry place ↓ The container was checked five times at 4 months interval ↓ Safe without pest attack	Sun drying of 2 kg pulse grain for 1 day ↓ No treatment was given ↓ Kept the pulse grain in a air tight container in a safe and dry place ↓ The container was checked five times at 4 months interval ↓ Infested completely by pest and converted into a black powder

Fig 30: Experiment on pest management in whole horsegram by using mustard oil and table salt

Results

The results of the experimental group (Container A) with treatment of mustard oil and table salt show that there was no infestation of pest and can be use for consumption purpose whereas in control group (Container B) where no treatment was given vigorous pest infestation was recorded after one year of the experiment and till the completion of experiment i.e. October, 2013 the pulse grain was converted into a black powder. Hence it is concluded that mixing of mustard oil and table salt for storing pulse grain helps in checking pest infestation and can be popularized to other parts of the country for its wider applicability.

5. Intake of boiled *Silfer* root water in Kidney stone

Effect of *Silfer* root water in kidney stone was judged by conducting the experiments on kidney stone patients. One patient was considered for control group and one for experimental group. The results of both the group were recorded and compared after 8 months.

Experimental group	Control group
Female patient was selected having kidney stone ↓ Instructed to take boiled *silfer* root water(200 gm *silfer* roots are boiled in 1 litre) twice in a day ↓ Patient was examined through ultrasound four times at 2 months interval ↓ Size of stone reduced from 5.8 mm to 2.4 mm	Female patient was selected having kidney stone ↓ No treatment was given ↓ Size of stone increased from 4.1 to 6.1mm

Fig 31: Experiment on Kidney stone patients by taking *Silfer* root water

Results

The size of kidney stone of patient 1(experimental group) was reduced from 5.8 to 2.4mm and the size of kidney stone of patient 2(control group) was increased from 4.1 to 6.1 mm. Hence it was concluded that taking of *Silfer* roots water is an effective practice in dissolving kidney stones and can be popularize to other part of the country for its wider applicability.

4.5.9 Contemporary Relevance of Indigenous Practices in Agriculture and Homestead Areas

Contemporary relevance shows that the indigenous practices which are being followed by farm families are reliable, sustainable and have relevance in present time. In the present

investing an effort was made to know the contemporary relevance of indigenous practices followed by farm families in agriculture and homestead areas by the panel of experts. Those practices which were considered by all the experts as having contemporary relevance were identified.

Contemporary Relevance of Indigenous Agriculture Practices

(a)Paddy cultivation

- The practice of keeping land fallow for 2-3 months followed by cleaning, broadcasting of organic manure, ploughing and sowing of seeds.
- Transplanting of rice in second week of July.
- Transplant 10-15 days old seedlings in the field.
- Fields bunds are prepared in sloppy land for conserving rain water in monsoon season.
- Ploughing of land several times before the onset of monsoon under rain fed condition.
- After deep ploughing, land is left fallow for 2-3 days.
- More number of ploughings is necessary for a soil having high weed growth.
- Regarding tillage practices, farm families performed primary and secondary tillage after the harvesting of previous crop whereas wet or puddling tillage is performed in low land paddy cultivation.
- Soaking the paddy seeds in water for 2-3 days before sowing
- The practice of cleaning, broadcasting of organic manure, raising and tilling, spreading of seeds(3-4 kg/*nali*), ploughing, covering with paddy straw/cowdung and sprinkling of water in dry nursery bed.
- Fully decomposed organic manure of livestock dung and leaves is used (NPK) and introduction of earthworm in crop land.

- ❖ Hoeing and harrowing practices are performed 3-4 times during plant growth stage.
- ❖ The practice of growing the pulses i.e. Lentil (*Phaseolous mungo L.*), Blacksoybean(Glycine max) , Whole horsegram(*Macrotyloma uniflorum*) and Red Kidney bean(*Cicer arietinum*) in between the crop whereas planting of plant fodder and fuel yielding trees among the bunds.
- ❖ The paddy is ready for harvesting in month of mid September as paddy spikes will get yellow.

(b) Finger millet cultivation

- ❖ Cleaning, broadcasting of FYM, ploughing of field, sowing of seeds and tapping of soil by wooden log and broadcasting of FYM (*moe*) in the field.
- ❖ Hoeing and harrowing after one month of sowing.
- ❖ For mixed cropping, cow pea (*Vigna sinensis*),blacksoybean and whole horsegram (*Macrotyloma uniflorum)* are grown in between finger millet crop.
- ❖ During harvesting the ear heads get dried or turn brown.

(c) Whole horsegram cultivation

- ❖ For land preparation and sowing the practice of cleaning of land, sowing of seeds and ploughing of field is considered appropriate.
- ❖ Removal of weeds by manual picking or use of hand hoe.
- ❖ Hoeing and harrowing during early plant growth period.
- ❖ During harvesting the practice of uprooting of plants and allow to pre-dry in the sun for few days have contemporary relevance.

II Contemporary Relevancy of Indigenous Post Harvest Practices

(a)Paddy

- ❖ Keeping the harvested crop in field for 2-3 days have contemporary relevancy and leg pounding with bare human feet in field.

- Sun drying for one week as drying reduced leads to pest attack whereas rice husk provide strength to the animals.

(b)Wheat

- Threshing by trampling bullocks as it separate the wheat grain from outer cover.

(c)Millets

- Threshing with bare human feet have contemporary relevancy as it separates panicle from millet easily.

- Milling in *okhali* before grinding into flour as it looses epidermal layer or chaff.

(d)Pulses

- Sun drying for one week before storage as it removes excessive moisture for less pest attack

- Using stone mill or hand *chakki* to dehusk lentil as it removes outer layer.

(e)Storage practices

- Dried leaves of walnut for storing paddy and wheat grains.

- Use of mustard oil in pulses as layer of oil on grains prevents insects from laying eggs.

- Use of garlic spits *(Allium sativum)* for storing pulses for avoiding the attack of pulse beetle *(Callosob ruchus sp.).*

III Contemporary Relevance of Indigenous Child Care Practices

- Use of clean bowl, clean clothes and new blade for delivery of child.

- *Dal* soup, cooked rice water, mashed rice and banana, mashed chapatti in *dal*, mashed green leafy vegetables, *khichdi* and *lapsi* is given to child after six months and child is giving supplementary food more than three times a day.

- In diarrhoea child is given solution of salt and sugar 3-4 times a day and also give boiled water as it kills harmful micro-organisms.
- Giving decoction of t*ulsi,* carom seeds, ginger in cough and cold.
- Giving mashed banana, buttermilk, redish leaves and cooked black soybean in jaundice.

IV Contemporary Relevance of Indigenous Postpartum Practices

- Simple diet after 11 days of delivery is given to the women for adjusting in normal routine.
- Chilli, spices and fried foods are avoided till six months as it burns mother's stomach and create problem.
- Vegetables like cauliflower, potato and pumpkin are also not given to mother due to gas producing in nature.
- Sexual intercourse after 3-4 months of delivery is preferred and women should bath on alternate days.

V Contemporary Relevance of Indigenous Health Care Practices

- Intake of fenugreek seeds in fever as it is carminative and anti-inflammatory in nature.
- Intake of *Baheda* powder for curing cough and cold as it is thermogenic and bronchodilator.
- Consumption of *Harad* pods for curing indigestion and constipation.
- Drinking and bathing of cow urine for removing itching and eczema.

VI Contemporary Relevance of Indigenous Food Practices

- Consumption of *Kaffa*, a thick paste of green leafy vegetable.
- Consumption of *Gahat dal(Macrotyloma uniflorum)* for dissolving kidney stone.

- ❖ Consumption of finger millet (*Ragi*) *chapattis* in diabetes and constipation.
- ❖ Consumption of *lal chawal ki kheer* as it has high energy content.
- ❖ Consumption of *Kauni Pulao* (Foxtailmillet) for controlling diabetes.

Conclusion

On the basis of present finding it can be concluded that many of the indigenous practices which are being followed by farm families from generation to generation in agriculture and homestead areas have contemporary relevance in present time with no side effects as these practices have scientific base and long term sustainability. Hence efforts should be made to popularize these practices among the general mass for its wider applicability.

LITERATURE CITED

Ahuja, S.C. and Ahuja, U. 2013. Traditional utilization of paddy straw, husk and bran .*Asian Agri History*, **17**(1):25-41.

Amar Ujala.2005. *Gomutra se cancer ka elaj - American patient to India*.

Antwal, P.N., Bhosale, P.B. and C.M., Bellurkar.2009. Medicinal plants for diabetes. *Asian Agri History*,**13**(2): 159-163.

Apetrei,C.2012. Food security and millet cultivation in the Kumaon region of Uttarakhand. Research report for gene campaign. Retrieved from http://www.genecampaign.org/reports/food_security_and_millet_cultivation_in_the_kumaon_region.pdf.pp 7-12 on 10 May, 2014 at 7:38 am.

Arjmandi, H., Mardani, H. and Nazeri, M. 2011. Using of indigenous knowledge in agriculture. *Advances in Environmental Biology*, **5**(9): 3020-3023.

Arya, D. 2013. Major wild edible fruits used by locals of Garhwal Himalaya.*International Journal of Advanced Life Sciences*, **6**(3):145-149.

Awasthi, L. P. and Verma, H.N. 2006. Boerhaavia diffusa- A wild herb with potent biological and antimicrobial properties. *Asian Agri history*, **10**(1): 55-68.

Ayangarya, V. S. 2006.Coweper: An organic fungicidal paste. *Asian Agri History*, **10**(2):105-166.

Ballabh, B. and Chaurasia, O. P . 2009. Medicinal plants of cold desert Ladakh used in the treatment of stomach disorders. *Indian Journal of Traditional Knowledge*, **8**(2):185-190.

Balkrishna, A. 2008. Secrets of Indian herbs. Divya prakashan, patanjali yogpeeth, Haridwar (Uttarakhand).

Basavaprabhu, J. and Kumari, N. 2007. Documentation and validation of conventional seed storage methods. Souvenir and Abstracts, National seminar on appropriate

extension strategies for management of rural resources. UAS, Dharwad, held on December 18-20. p166.

Bashir, S.and Gilani, A.H. 2009. Antiurolithic effect of Bergenia ligulata rhizome:An explanation of the underlying mechanisms. *Journal of Ethnopharmacology,* **122**: 106–116.Retrieved from www.elsevier.com/locate/jethpharm on 26 September, 2013 at 4:45 pm.

Basu, D., Banerjee, S. and Goswami, R. 2009. Farmers knowledge and scientists knowledge: Myth, mutualties and synergies. In Indigenous knowledge system and common people's rights(D.Das Gupta ed.) Agrobios(India).pp77-82.

Bhagat, R. 2005. Indigenous and scientific knowledge of the farmers about various uses of neem in Anand taluka of Gujarat. M.Sc. (Agri) Thesis submitted to Anand Agriculture University, Gujarat.

Bhurani, J. R. 2012. Natural benefits of urine therapy. Retrieved from http://urinetherapy.in/Natural%20Benefits%20of%20U.%20T..pdf.pp1-18 on 10 May, 2014 at 8:26 am.

Bright, P. S. 2000. India's alternative therapies: The cure in modern times. *Junoir Science Refresher*, **8**(3) :20-27.

Brouwer . 2003. Perspective on indigenous knowledge systems, development, oral tradition and globalization. Seminar paper presented in vanishing wisdom: Unheard Voices: The Indigenous knowledge system and cultural preservation in the time of globalization. Kolkata: Adaan Foundation.

Butola, J. S. and Vashistha, R .K. 2013. An overview on conservation and utilization of Angelica glauca Edgew in three Himalayan states of India. *Medicinal Plants*, **5**(3): 171-178.

Chadha, S., Rameshwar, A., Saini, J.P. and Paul, Y.S.2012. *Vedic Krishi*: Sustainable livelihood option for small and marginal farmers. *Indian Journal of Traditional Knowledge,***11**(3):480-486.

Carlough, M.1999. A manual on postpartum and newborn care: A self-study manual for trainers of traditional birth attendants and other community-level maternal and child health workers. Retrieved from http://www.prime2.org/prime2/pdf/PP_full_text.pdf.pp19-34 on 8 May, 2014 at 9:24 am

Chanu, L. B., Chhetry, G. K.N. and Sharma, G. D.2001. Sustainable indigenous practices for the management of pest and diseases of upland rice in Manipur, north east India. *Assam University Journal of Science and Technology,* **5**(1):58-62.

Chandola, M., Rathore, S. and Kumar, B. 2011.Indigenous pest management practices prevalent among hill farmers of Uttarakhand. *Indian Journal of Traditional Knowledge,* **10**(2):311-315.

Das, P., Das, S.K., and Mishra, P.K.1999. Validation of indigenous technological knowledge. A validation report of ITK for zone VI,ICAR. Zonal unit, ICAR, Jablpur, Madhya Pradesh, India.

Das, L., Verma, H.N. and Kar, G.2003. Sustainable management of land and water resources through indigenous technological knowledge. *Asian Agri History,***7**(4):313 318.

Devakumar, C. 2005. Role of neem in crop protection and nitrogenous fertilizers. *Indian farming*, **55**(1): 10-14.

De, L. C. and Sarangi, S.K. 2006. Use of indigenous technical/traditional knowledge in organic agriculture. *Indian Farming*, **55**(10):7-14.

Devi, J. and Borgohain, R.2012.Indigenous leafy vegetables of Assam: Sources of nutrition and ethnomedicine. *Asian Agri History,***16**(1):83.

Devi , P. and Kumar, S.P. 2012. Traditional, ethnic and fermented foods of different tribes of Manipur. *Indian Journal of Traditional Knowledge*, **11**(1):70-77.

Dewalt, B.R. 1994. Using indigenous knowledge to improve agriculture and natural resource management. *Human Organisation*, **53**(2): 123-131.

Dhama, K., Rathore, R. and Chauhan, R.S. 2008. Panchgavya (Cowpathy): An overview. *The Indian Cow*, **45**(2):45-68. Retrieved from http://www.

indianjournals.com/ijor.aspx?target=ijor:ic&volume=5&issue=17&article=009&type=pdf on 7 May, 2014 at 3:32 pm

Fernándeza, L., Langaa, S., Martína,V., Maldonadoa, A. Jiméneza, E., Martínd,R. and Rodrígueza, J.M.2013.The human milk microbiota: Origin and potential roles in health and disease. *Pharmacological Research*, **69**:1–10. Retrived from file:///D:/downloads/Fernandez_Pharm%20Res_2013.pdf on 8 May, 2014 at 6:33 pm

Gaidhani. S.N., Singh, A., Kumari, S., Lavekar, G.S., Juvekar, A.S., Sen, S. and Padhi, M.M. 2013. Evaluation of some plant extracts for standardization and anticancer activity. *Indian Journal of Traditional Knowledge*, **12**(4): 682-687.

Gaur, S. 2001.A longitudinal study on maternal nutritional status and longitudinal performance. M.Sc. Thesis submitted to Maharana Pratap University of Agriculture and Technology, Udaipur.

Ghosh, A.K. and Das, P.2011.Agronomy: Facts and approaches. Daya publishing house, New Delhi.

Gogoi, R. and Majumder, D. 2001. Traditional Agricultural Pest Management Practices Followed in Assam. *Asian Agri history*, **5**(3):12:18.

Gowda, K.T., Reddy, Jayarame, G., Musthari, J., Vijayakumari, J., Reddy, N. and Kumar, K. S. 2010. Enhancing food security and income of the rural poor through technological support for improved cultivation of finger millet: A case study from southern Karnataka. Retrieved from http://www.academia.edu/4552290/1407_Minor_millets_in_South_Asia_learnings_from_IFAD-NUS_project_in_India_and_Nepal_MSSRF_IOK.pp47-68 on 8 May, 2014 at 9:7 am

Gupta, R. K. and Rajput, R.P. 2001.Indigenous nutrient management practices in Madhya Pradesh. Indian Institute of Soil Science, Nabibagh , Bhopal.pp205-228.

Gupta, M., Jain, S. and Mandowara, D. 2007. User-friendly storage practices followed by rural women of Rajasthan. *Asian Agri History*, **11**(4):315-319.

Gupta, M., Mandowara, D. and Jain,S. 2009. Indigenous post-delivery foods consumed by women of Rajasthan. *Asian Agri-History*, **13**(1):61-64.

Gurang, G.2008. Practices on immediate care of newborn in the communities of Kailali district. *Nepal Medical College Journal*, **10**(1): 41-44.

*Hannah Krujia(n.d).*Indigenous technical knowledge (ITK) in paddy cultivation. Retrieved from http://www.morungexpress.com/letters_to_the_editor_public_discourse/94371.html on 23 April, 2014 at 11:51 am

Hegdge, S.V. 2001.Suggestion in ayurveda for a women's reproductive health. *Amruth*, **5** (3):1-12.

ICAR. 2006. Handbook of Agriculture. Published by directorate of information and publication of agriculture, Indian Council of Agriculture Research, New Delhi. pp1162-1182.

Jain, K.2000. Indigenous knowledge system of child health and care (0-2 years) prevalent in the rural areas of Bikaner district. MSc. Thesis submitted to Maharana Pratap University of Agriculture and Technology, Udaipur.

Jardhari, V. 2007. Barahnaja In : *Samriddhshaliparmparikkrishivigyan* (In Hindi). Academy of development sciences, Raigarh, Maharashtra, India.pp6–24.

Jasrai, Y.T. and Chaplot, B. B. 2003. Traditional knowledge on plant conservation linked to beliefs and religious rites.*Asian Agri History*, **1**(7): 319-325.

Joseph. N., Unnikrishnan, B., A.N., Vijaya, M.D., Mallapur, M.K., Shashidhar and Nelliyanil, M.2013.Infant rearing practices in south India: A longitudinal study.*Journal of Family Medicine and Primary Care*, **2**(1):37-43.

Joshi, P. and Dhawan, V. 2005. Swertia chirayita – an overview.*Current Science*, **89**(4) :34-39.

Joshi, C.P. and Singh, B.B.2006.Indigenous agriculture knowledge in Kumaon hills of Uttaranchal. *Indian Journal of Traditional Knowledge*,**5** (1):19-24.

Joshi, S .R. and Rapsang, G.F.2012. Bacterial diversity associated with *tungtap*, an ethnic traditionally fermented fish product of Meghalaya. *Indian Journal of Traditional Knowledge*, **11**(1): 134-138.

Kala, C.P.2007. Prioritization of cultivated and wild edibles by local people in the Uttaranchal hills of Indian Himalaya. *Indian Journal of Traditional Knowledge*, **6**(1): 239-244.

Kanwar, P.and Sharma, S.2006. Indigenous crop storage practices. *Asian Agri History*, **7**(3):23-28.

Kareem, M.A. 2008. Indigenous technical knowledge: In sustainable agricultural development (PGDAEM-Study material). MANAGE, Hyderabad, India. pp 45–59.

Karthikeyan, C., Veeraragavathatham, D., Karpagam, D. and Ayisha, F.S. 2006. Traditional storage practices in pulses. *Indian Journal of Traditional Knowledge*, **5**(1): 104-107.

Kediyal, K.V. and Dimri. 2009. Traditional methods of rice cultivation and SRI in Uttarakhand hills.*Asian Agri History*, **13**(4):293-306.

Khandagale, S. and Lawande, S.M.2011.A study of Pawra tribe in Nandurbar District, Maharashtra. *Indian Streams Research Journal*, **1**(5):1-6.

Kharde, P.B. and Ahir, M.C.2009-10. Livelihood security through organic finger millet production and processing. *Rahasthan Journal of Extension Education*, **17**(17 &18) and 18: 17-20.

Khare, V., Kushwaha, Verma, S.,Gupta, A., Srivastava, S. and Rawat, A.K.2012. Pharmacognostic evaluation and antioxidant activity of Urtica dioica L. *Chinese Medicine*, **3**:128-135. Retrieved from file:///C:/Users/hp3/Downloads/CM20120300003_95928931.pdf on 10 May, 2014 at 8:23 am.

Khan, Y.M. and Khan, A. 2012. A study on factors influencing the nutritional status of lactating women in Jammu, Kashmir and Ladakh Regions. *International Journal of Advancements in Research and* Technology, **1**(4):2-10.

Kumar, A., Bisht, P.S. and Kumar, V. 2002.Traditional medicinal plants of Uttaranchal Himalyas. *Asian Agri History*. **6**(2): 167-170.

Kumar, K. and Singh, K.K. 2001. Urgent need for preservation of the cultural heritage of ethnobiology. *Current science,* **81**(3):231.

Kumar,S. A. N. and Patil, B. V.2005.Status on indigenous storage technologies for food grains followed in northern Karnatak. *Karnataka Journal of Agriculture Sciences,* **18**(3):824-826.

Kumar, A. , Lavarasan,R. I., Jayachandran ,T., Deecaraman, M., Aravindan, P., Padmanabhan,N. and Krishan, M. R. V.2008. Anti-diabetic activity of Syzygium cumini and its isolated compound against streptozotocin-induced diabetic rats. *Journal of Medicinal Plants Research,* **2**(9): 246-249. Retrieved from http://www.academicjournals.org/JMPR on 26 September, 2013 at 3:46 pm

Lal, B. and Singh K. N. 2008. Indigenous herbal remedies used to cure skin disorders by the natives of Lahaul-Spiti in Himachal Pradesh. *Indian Journal of Traditional Knowledge,* **7**(2): 237-241.

Lal, C. and Verma, L.R. 2010. Use of certain bio-products for insect pest- control. *Indian Journal of Traditional Knowledge,* **5**(1):79-82.

Laloo, R.C., Kharlukhi, L., Jeeva, S. and Mishra, B.P. 2006. Status of medicinal plants in the disturbed and the undisturbed sacred forests of Meghalaya, northeast India: Population structure and regeneration efficacy of some important species. *Current Science,* **90**(2): 225-232.

Lightfoot, C. 1995. Using indigenous knowledge systems in the design of on-farm experiments- A Philippine case. In the cultural dimension of development: indigenous knowledge system (edited by Warren, Slikkerveer, D.M.,L.J. and Brokensha, D.), International Technology Publication Limited., London, U.K. pp348-353.

Logamadevi, A. 2010. Kitchen Pharmacy. *Kisan World,* **37** (8):57-60.

Majumder, D. Rahman, Z., and Sarma, S.2013. Indigenous technical knowledge practices under rainfed agriculture in Assam. ***Asian Agri History*****, 17(1)43:54.**

Mal, B., Padulosi, S. and Bala,S. R.(editors). 2010. Minor millets in south Asia: Learnings from IFAD-NUS Project in India and Nepal. Bioversity International, Maccarese, Rome, Italy and the M.S. Swaminathan Research Foundation, Chennai, India. Retrieved from http://www.nuscommunity.org/fileadmin/NUS_Docs/documents/publications/books/1407_Minor_millets_in_South_Asia_learnings_from_IFAD-NUS_project_in_India_and_Nepal.pdf. p19 on 10 May, 2014 at 7:43 pm.

Mathur, A. and Joshi, H. 2012. Traditional remedies in Tarai region of Kumaun, Uttarakhand. *Indian Journal of Traditional Knowledge,* **11**(4): 652-657.

Mariappan, N., Srimathi, P. and Suganyadevi, S.2010. Honey tree, Mahuva. *Kisan World*, **37**:58-60.

Maruthamuthu, K. and Yurvarani, R. 2011.Organic cultivation of basmati rice. *Kisan World*, **11**(5): 35-38.

Mathanghi,S. K. and Sudha, K. 2012. Functional and phytochemical properties of finger millet (Eleusine Coracana L.) for health. *International Journal of Pharmaceutical,Chemical and Biological Sciences,* **2(**4):431-438.

Maundu, P.M., Ngugl, G.W. and Kabuye, C.H.S. 1999. Traditional food plants of Kenya, Nairobi: National Museum of Kenya. Retrieved from http://ijals.com/ wp-content/uploads/2013/06/3.-Major-wild-edible-fruits-Dhani-Arya1.pdf.pp83-93 on 8 May 2014 at 10:15 am.

Meena, R. and Dangi, K.L. 2009-10. Traditional wisdom among the tribal and non-tribal farmers in the post-harvest technology of foodgrains. *Rahasthan Journal of Extension Education*, **17 &18**(1): 152-155.

Megharaj, M. and Choudhry, M. 2002. Dietary practices and macro nutrient intake of women at varying periods of lactating. *The Indian Journal of Nutrition and Dietetics*, **39**(6):277-286.

Mehta, P.S. , Negi ,K.S., Rathi, R.S., and Ojha ,S.N.2012.Indigenous methods of seed conservation and protection in Uttarakhand Himalaya. *Indian Journal of Traditional Knowledge*,**11** (2): 279-282.

Ministry of Human Resource Development, Department of Women and Child Development(Food and Nutrition board), Government of India.2004. National guidelined on infant and young children. Retrieved from http://wcd.nic.in/ nationalguidelines.pdf on 8 May, 2014 at 9:33 am

Michaelraj, P. S. J.,and Shanmugam, A. 2013. A study on millets based cultivation and consumption in India. *International Journal of Marketing, Financial Services & Management Research*, **2**(4):45-51.

Misra,S., Maikhuri, R. K. and Dhyani, D. 2008. Indigenous soil management to revive below ground biodiversity - case of Garhwal. Leisa India. Retrieved on http://el.doccentre.info/eldoc1/KICS/080601lei5B.pdf.pp13-14 on 10 May, 2014 at 7:45 am.

Mishra, S., Chaudhary, S.S., Swain , S. and Ray, T. 2009. Multiple cropping system for conservation and sustainable use in Jeypore Tract of Orissa, India. *Asian Agri History*, **13**(1):39-51.

Mishra, O.P., Singh, A.K. and Kumar, S. 2011. Indigenous knowledge of Bihar farmers. *Journal of Community Mobilization and Sustainable Development*, **6**(1):046-049.

Mishra, P.K. and Rai, S.C.2013.Use of indigenous soil and water conservation practices among farmers in Sikkim Himalaya. *Indian Journal of Traditional Knowledge*, **12**(3): 454-464.

Motamarri, S. N, Karthikeyan. M, Kannan, M. and Rajasekar, S. 2012. Terminalia belerica. Roxb-A phytopharmacological review. *International Journal of Research in Pharmaceutical and Biomedical Sciences*, **3**(1):96:99.

Muthuraman, P. and Meera, S.N. 2012. Indigenous technical knowledge in rice cultivation. http://www.rkmp.co.in.

Nagnur, S., Sandhya, J., and Hosamani, V. 2010. Ghutti- A nourishing drop. *Asian Agri History*, **14**(3): 285-290.

Naraina, S., Dubey, G.V. K. and Gupta, S. L. 2003. Methodologies for tapping and documenting indigenous technologies. Paper presented at National seminar on Indigenous technologies for sustainable agriculture in March,1993.pp23-25.

Negi, V. S., Maikhuri, R. K. and Vashishtha, D. P. 2011. Traditional healthcare practices among the villages of Rawain valley, Uttarkashi, Uttarakhand, India. *Indian Journal of Traditional Knowledge,* **10** (3): 533-537.

Nene, Y. L. 2007. Crop Disease Management practices in ancient, medieval and pre-morden India. *Asian Agri History*, **7**(3): 185-201.

NIN. 2002. A report on social attitude towards maternity care in rural Indian community. National Institute of Nutrition, Hyderabad,**6**(3): 96.

Odhiambo, T. and Johan, R.K.1990. "You cannot fix indigenous knowledge". ILEIA Newsletter.

Pant, S., Samant, S.S. and Arya, S. C. 2009. Diversity and indigenous household remedies of the inhabitants surrounding mornaula reserve forest in west himalaya.*Indian Journal of Traditional Knowledge*, **8**(4): 606-610.

Patil, S., Chaudhary, S. and Aher, A. 2010. Medicinal Plants used by Pawara and Bhil Tribes of Satpura ranges in Maharasthra. *Asian Agri-History*, **14**(2):199-206.

Parvathi, S. 2014.Millets- The future food and farming of India. *Kisan World*, **41**(4).64.

Prasad, R.C., Upreti, R.P., Thapa, S., Jirel, L.B., Shakya, P.R. and Mandal, D.N. .2010. Food security and income generation of rural people through the cultivation of finger millet in Nepal. Retrieved from http://www.academia.edu/4552290/1407_Minor_millets_in_South_Asia_learnings_from_IFAD-NUS_project_in_India_and_Nepal_MSSRF_IOK.pp197-146 on 8 May at 9:10 am

Raghavan, K., Pal, A., Khanum, F. and Bawa, A.S. 2010. Nutritional, medicinal and industrial uses of sesame (Sesamum indicum L.) seeds - An overview. *Agriculturae Conspectus Scientificus,***75**(4):159-168. Retrieved from

http://www.agr.unizg.hr/smotra/pdf_75/acs75_23.pdf on 10 May, 2014 at 8:37 pm

Rajendra, R. 2010. Aloe Vera: For hale and healthy life. *Kisan World*, **37** (6):17-18.

Ramakrishnan, P. S., Saxena, K. G. and Chandrashekara U. M. (eds.). 1998. Conserving the sacred for biodiversity management. Oxford and IBH Publishing, New Delhi.pp34-43.

Rapsang, G.F and Joshi, S. R. 2012. Bacterial diversity associated with *tungtap*, an ethnic traditionally fermented fish product of Meghalaya. *Indian Journal of Traditional Knowledge*, **11**(1): 134-138.

Rathore, S.S., Krose, N., Naro, M., Shekhawat, K. and Bhatt, B.P. 2012. Weed management through salt application: An indigenous method from shifting cultivation areas, Eastern Himalaya, India. *Indian Journal of Traditional Knowledge*, **11**(2): 354-357.

Raven J. H., Chen, Q., Tolhurst, R. J. and Garner, P.2007.Traditional beliefs and practices in the postpartum period in Fujian Province, China: a qualitative study. *BMC Pregnancy and Childbirth*, 7-8. Retrieved from http://download. springer.com/static/pdf/180/art%253A10.1186%252F1471-2393-7-8.pdf? auth66=1399861098_7b242320f3646e84095d596af9e6aa6e&ext=.pdf on 10 May, 2014 at 7:48 am

Rawat, D. and Kharwal, A.2013. Traditional herbal pediatrics practices in Jaisinghpur, District Kangra (Himachal Pradesh, India). *Medicinal Plants and Indigenous Medicine*, **2**(4): 219–230.

Rawat, S. and Reetesh, Sah. 2009. Traditional knowledge of water management in Kumaon himalayan. *Indian Journal of Traditional Knowledge*, **8**(2): 249-254.

Rawat, V. S.and Jalal, J. S. 2011. Sustainable utilization of medicinal plants by local community of Uttarkashi District of Garhwal, Himalaya, India. *European Journal of Medicina Plants*, **1**(2): 18-25.

Rizwana and Lyaqet. 2011. Traditional knowledge used in paddy cultivation in Raipur district, Chhattisgarh. *Indian Journal of Traditional Knowledge*, **10** (2): 384-385.

Romano, R. M. 2005. Research summaries of normal birth. *Journal of Perinatal Educatio*, **14**(2): 2090-2096.

Rout, J., Sajem, A. L. and Nath. M.2012. Medicinal plants of North Cachar Hills district of Assam used by the *Dimasa* tribe.*Indian Journal of Traditional Knowledge*, **11**(3):520-527.

Salvi, R. (n.d).Traditional beliefs and practices regarding newborn care among postnatal mothers residing in selected rural areas of Alandi Devachi of Pune District. Retrieved from http://www.ruralhealthgoa2012.org/Documents/event/11Dec.%20Black%20Box/Child%20Health%20Black%20Box/3Rupali%20salvi%20-%20Copy2.pdf on 8 May, 2014 at 8:14 am.

Samal, K., Shah, A., Tiwari, C. Sushil and Agrawal, K.2004. Indigenous health care practices and their linkages with bio resources conservation and socio-economic development in central Himalayan region of India. *Indian Journal of Traditional Knowledge*, **3**(1): 12-26.

Sanadhya, M, Solanki, D. and Dashora, P. K.2002. Indigenous practices in post-harvest management in tribal and non-tribal areas of Rajasthan India.In Y.L. Nene and S.L. Choudhary (Eds.).pp106—110.

Satapathy, C and Mishra, C. 2009. Indigenous technical knowledge of farming system in Orissa. In indigenous knowledge system and common people's rights (D. Das and Gupta ed.) Agrobios (India).pp83-88.

Sellamuthu, K. M. and Selvan, M. 2010.Mulching: An effective water conservative. *Kisan World*, **37**(8): 39-41.

Semwal, D.P., Kala, C. P. and Bhatt, A.B.2010.Medicinal plants and traditional health care knowledge of vaidyas, palsi and others: A case study from Kedarnath valley of Uttarakhand, India. *Medicinal Plants*, **2**(1):51: 57.Retrieved from http://www.indianjournals.com/ijor.aspx?target=ijor:mpijpri&volume=2&issue=1&article=007&type=pdf on 10 May, 2014 at 8:18 am

Sen, D. 2008.Threatened indigenous rice biodiversity of old alluvival region of north and south Dinajpur, West Bengal. *Asian Agri History*, **12**(2):109-127.

Shah, N.C. 2006. Black Soyabean: An ignored nutritious and medicinal food crop from the *Kumaon* region of India. *Asian Agri History*,**10**(1):33-42.

Shah, N.C. 2010. Rauvolfia serpentina (*Sarpagandha*): The forgotten medicinal plant of India. *Asian Agri History*, **14**(2):157-169.

Sharma, B. 2003. Traditional dietary practices followed during pregnancy and lactation by Gaddi tribe in Kangra district (Himachal Pradesh). M.Sc. Thesis submitted to Maharana Pratap University of Agriculture and Technology, Udaipur.

Sharma, N. and Vema, S. K. 2007. Indigenous postpartum maternal and child care practices among rural folk of Himachal Pradesh. *Asian Agri History*, **11**(3): 217-222.

Sidhu, K. and Kaur, R.2007. Maternal health care through medicinal plants. *Journal of ethno medicine*, **1**(2): 157-160.

Singh, B. D., and Tyagi, S. 2014. Popular ITK practices in Kumaon region of Uttarakhand. *Asian Agri-History*, **18**(1): 43–51.

Singh, H. 2008. Importance of local names of some useful plants in ethnobotanical study. *Indian Journal of Traditional Knowledge*, **7**(2): 365-370.

Sinha, K., Mishra, N. P., Singh, J. and Khanuja, S. P. S. 2004. Tinospora cordifolia (Guduchi), a reservoir plant for therapeutic applications. *Indian Journal of Traditional Knowledge*, **3**(3): 257-270.

Singh, M., Sumarjit, M., Luikham, E., Kunjaraj, M. and Singh, R. 2006. Shifting cultivation in hilly areas of Manipur. *Asian Agri-History*. **10**(3):253-256.

Singh, R. 2003. Indigenous agricultural knowledge: An appraisal of tribal wisdom. *Asian Agri History*,**7(**4):327-332.

Singh, R.D., Bhatt, K.S. and Bisht, K.K.S. 2001. Indigenous nutrient management technologies in central himalayan. Indian Institute of Soil Science, Nabhibagh,

Bhopal.pp165-176. Retrieved from http://www.iiss.nic.in/recommendations1. pdf on 10 May, 2014 at 7:51 am

Singh, R. K., Pyasi, V. K. and Sharma, L. N. 2002. Indigenous knowledge for controlling the pests of soyabean crop: An appraisal of resource-poor farmer's wisdom. *Indian Research Journal of Extension Education*, **2**(1): 8-92.

Singh, R. K. and Singh, A. 2009. Women's wisdom and indigenous human healthcare practices. *Indian Journal of Traditional Knowledge*, **8(**2): 262-269.

Singh, R. 2007. Indigenous agricultural knowledge in rainfed rice fased Farming systems for sustainable agriculture: Learning from Indian farmers. Retrieved from http://www.krepublishers.com/06-Special%20Volume-Journal/S-T%20 &%20T-00-Special%20Volumes/T%20&%20T-SV-01-Africa-Web/T%20&%20T-SV-01-10-101-07-Singh-R-K/T on 8 May 2014 at 10:33 am

Singh, V. and Tulachan, M. P .2002. Marginal farming in mountain areas. *Asian Agri History*, **6**(3):269 280.

Sinha, R. 2004. Traditional infant health care practices prevalent in the tribal areas of Hazaribagh district. MSc. Thesis submitted to Maharana Pratap University of Agriculture and Technology, Udaipur.

Sinha, R. and Lakhra, V. 2006. Edible weeds of tribals of Jharkhand, Orissa and West Bengal. *Indian Journal of Traditional Knowledge*.**, 6**(1):217:222.

Srinivas,V. D. N., Sumalatha, G., Jagannath, P. P. V., Kishore, D. S.,Kiran,P. M. and Jhansi M R.2010. Antinephrolithiatic potential of Macrotyloma uniflorum aqueous extract in rats. *Research Journal of Pharmacognosy and Phytochemistry*, **2**(1): 75-78.

Sundamari, M and Ranganathan, T. T. 2003. Indigenous agricultural practices for sustainable farming. *Agrobios*, **45**(4) :56.

Sundaramari, M.,G., Kannan, S.G.S., Seethalakshmi, M. and Gopalsamy, K. 2012. Indigenous grain storage structures of South Tamil Nadu. *Indian Journal of Traditional Knowledge* ,**10**(2) :380-383.

Suganyadevi, S. 2011. Bael- Tree of enlightment. *Kisan World*, **38** (7):20-25.

Suthar, N. and Kaushik, V. 2012.Traditional Medicines for Treatment of Musculoskeletal Problems. *Asian Agri History*, **16**(1):69.

Targais,K. T. S., Zulfikar, A., Yadva, A., Korekar, G. and Singh, S. B. 2012.*Chhang* - A barley based alcoholic beverage of Ladakh, India. *Indian Journal of Traditional Knowledge*, **11**(1):190-193.

Thi, L. M., Pasandarntorn ,W and Rauyajin O. Traditional postpartum practices among Vietnamese mothers in Anthi District, HungYen province. Retrieved from http://www.sh.mahidol.ac.th/hssip/theses/3.pdf on 10 May, 2014 at 7:59 am

Tikai, P and Kama, A. 2010. A study of indigenous knowledge and its role to sustainable agriculture in Samoa. *Ozean Journal of Social Sciences*, **3**(1):45-51.

Tilahun-Tadesse, R. Nigussie-Dechassa ,B., Wondimu and G., Setegn. 2013. Effect of hydro-priming and pre-germinating rice seed on the yield and terminal moisture stress mitigation of rain-fed lowland rice. *Agriculture, Forestry and Fisheries*, **2**(2):89-97.

Tiwari, S. C. and Mahanta, D. 2007. Ethnological observations on fermented food products of certain tribes of Arunacl Pradesh. *Indian Journal of Traditional Knowledge*, **6**(3): 106-110.

Thrash, C and Thrash, A. 2001. Allicin in home made products. *Herald of Health*, **92**(4):8-10.

Tofinga, M. 2003. An overview of traditional farming systems in the south pacific islands proceedings of IRETA workshop, 18-22 October 1999. IRETA USP Alafua Campus.

Upadhyay,V., Kambhoja, S., Veeresh, K. and Dhurva, K. 2010. Anthelmintic Activity of the Stem Bark of Juglans regia Linn .*Research Journal of Pharmacognosy and Phytochemistry*, **2**(6):465-467.Retrieved from http://www.indianjournals.com/ijor.aspx?target=ijor:rjpp&volume=2&issue=6&article=009&type=pdf on 6 May, 2014 at 3 pm.

Uniyal, S. K., Singh, K. N., Jamwal, P. and Lal, B. 2006. Traditional use of medicinal plants among the tribal communities of Chhota Bhangal, Western Himalaya. *Journal of Ethnobiology and Ethno medicine*, **2**(3): 14.

Verma, A., Singhal A. and Singh, D.2010. Local health wisdom of rural women using medicinal plants. *Indian Journal of Traditional Knowledge* , **9**(2):289-293.

Verma N., Singh, A.P., Amresh, G., Sahu, P. K. and Rao, C.V. 2011. Protective effect of ethyl acetate fraction of Rhododendron arboreum flowers against carbon tetrachloride-induced hepatotoxicity in experimental models. *Indian Journal of Pharmacology*, **43**(3): 291-295.

Verma, R., Chaudhary, H. S.and Agrawal, R. C. 2011. Evaluation of anticarcinogenic and antimutagenic effect of Tinospora cordifolia in experimental animals. *Journal of Chem. Pharm. Research*, **3(**6):881-887.

Verma, S., Singh, V. P. and Bharti, A. K. 2002.Potential of Cow Urine as Organic Manure and Biopesticides. Symposium held at GBPUA&T, Pantnagar from 30-31 December, 2002.pp33-34.

Verma, T., Roy, S. and Swarnalatha, A. M.2005. Eco friendly grain storage structures in India. *Asian Agri History*, **9**(3):231 241.

Verma, T., Roy, S. and Marry, S. 2007.Eco-friendly grain storage structures in India. In Y.L. Nene(eds).Glimpses of the agriculture of India, Asian Agri History Foundation, Secunderabad. p488.

Warren, D. M.1992. A preliminary analysis of indigenous soil classification and management Systems in four ecozones of Nigeria." NISER, Nigeria.

World Bank. 1999. World development report 1998/1999: Knowledge for development. Retrieved from http: //www.worldbank.org/afr/ik/ikrept.pdf on April 30, 2014.

Yadav, V. P., Behla, S.L. and Kumar, R. 2003.Indigenous grain storage practices adopted by farm women. *Indian Research environment Education*, **3**(1): 7-8.