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Traditional knowledge and indigenous practices still in vogue among rural populace of Garhwal Hills, Uttarakhand, India

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Abstract
The broad topic of ITK could be defined as experiential knowledge of a community, accumulated over a period of time, which the indigenous people practice in their daily lifestyle. In the field of agriculture, ITKs are practices that farmer adopt in cultivation, crop management and pest control. These knowledge sources are very handy in terms of availability and affordability to the farmers of rural area and with emergence of modern agricultural technological developments these ITKs have been going towards its extinction. Such traditional practices involve direct participation of the farmers and continuous learning. Following study explores and discuses some ITKs being practiced and popular among the farmers of Uttarkashi District (Garhwal region) of Uttrakhand. In this study 240 farmers participated and shared their views and experience of some traditional practices they undertake in various aspects of crop cultivation and pest management.

Keywords: Indigenous Technical Knowledge, Garhwal Hills, Uttarakhand

Introduction
With the advent of green revolution, agro chemicals has become a non-separable part of agriculture owing to better yield potential and crop health. Agriculture is mainstay of India's GDP and most of the rural population is engaged in agriculture related activities. Over use of chemical application and its residual effect could be seen in both the terrestrial life and marine life and therefore, food demand must be achieved with better quality food, along with use of less toxic chemicals (Pandey *et al*., 2020) [7]. Preceding mechanization of agriculture, farmers relied on indigenous knowledge for practicing farming. Indigenous pest management practices are still being followed by the farmers of Uttrakhand, and incorporating these indigenous methods into mainstream pest management research will not only be more relevant for the farmers, but also enrich the research process (Chandola *et al*., 2011) [2].
Indigenous traditional Knowledge (ITK) is a system of experience based learning, passed on to next generations within a community. It is dynamic, intuitive and qualitative in nature, and requires holistic approach of integrating & comprehending traditional knowledge in on-farm practice. Integrating ITK in farming system has many advantages for rural farming community *viz* it is a cost effective and on hand available approach. Moreover, it is experience based experimentation and provides empowerment to farming populace, and evading reliance on external source of information like chemical dealers, private NGOs and extension functionaries. Assessment of this precious knowledge resource for its scientific rationality will help in integrating it with mainstream formal research system (Sah *et al*., 2019) [8] and therefore, it will be of great significance to test the scientific rationality of these traditional practices and, then document those in scientific records which are the effective and rational, neglecting the practices which are unreasonable and lacks scientific grounds.
Significantly, farming in hills is still traditional and mostly organic, as penetration of mass media is limited. Indigenous forms and modes of communication are prevalent. It is therefore, more necessary to identify, encourage and disseminate the ITKs, with scientific foundation, among other farming communities of the country with aim to produce quality food, steady source of income and maintain soil health.

Methodology
This following study has been carried out in 6 different blocks of district Uttarkashi (Uttarakhand, India). A total of 12 villages (2 from each block) have been selected, to identify various location specific ITKs from different agro-climatic conditions (valley and mountain,

mid hills). The information was collected from 240 respondents, using Nomination method, with the help of interview schedule, focus group discussion, observation and informal discussions. All the participants in the study were using some form of ITK whether in cultivation, management or storage of food grains.

Results and Discussion

Aged farmers and females of the selected villages were found to be more inclined towards participating and sharing their experiences. Enveloping wide range of rural ITKs in a single study is not possible and therefore, only some popular indigenous on-farm practices were selected to be discussed in this study, which are as below:

1. Application of farmyard manure (FYM) for increasing soil fertility

FYM act as a valuable organic fertilizer in the system of alternate agriculture (like Organic Agriculture, Perma-culture etcetera). Application of FYM is also reported to enhance phosphorus and magnesium in the soil, along with maintain soil fertility (Järvan *et al*., 2017) [3] Maintenance and improvement of soil potential fertility are closely related to the maintenance of soil organic matter and organic carbon balance (Bakšienė *et al*., 2014) [1]. It was found that all the all the farmers of Garhwal region adopt the practice of animal rearing for milk, ploughing and transportation. The excreta (animal waste) is collected at one place and after proper decomposition, it is applied in the fields before ploughing. Many farmers add dried leaves, grasses and biodegradable kitchen waste in the FYM. Farm women carry the decomposed FYM to the fields in *Kilta* (a bin made up of *Ringaal*/Bamboo) and broadcast in the field. This is a cost effective practice as it lessens the dependency on chemical fertilizer, moreover the practice is environmentally safe.

2. Use of Cow urine against disease and pest management

The farmers reported that they prepare a solution of cow urine with meshed leaves of *Kandali* (Nettle leaves), *Daikan* leaves (wild Azadirachta), *Tulsi* leaves (Holy Basil) and spray it on infected plants. Farmers were very affirmative of this practice owing to its effectiveness and nearly no-cost. Moreover, Korat and Dengale in 2011[4] reported that cow urine shows immunostimulant activity, causing increases the overall crop yield and provides the resistance against pest.

3. Use of Pine leaves for Animal winter Bedding

Since long time, use Pine leaves as a bedding of animals is a customary practice in rural areas, as most of the time its low temperature in the hills of Uttarakhand and therefore, the farmers use readily available pine leave as an alternative and good source of cold repellent for the animals and poultry. The practice is common in other countries too, where pine leaves are utilizing as a bedding material in pet animals because of its anti-microbial property and could be a good litter material for poultry raising (Sharma *et al*., 2015) [9]. The farmer in hills of Uttarkashi also collect the pine leaves from the forest, dry them under the sun and uses as bedding for the animals during severe cold nights.

4. Using wood/ jungle ash as soil amendment and nutrient source for standing crop

Jungles are important source of fodder, fuel wood and timber in rural livelihood, especially for tribal people. Though, knowledge is essential to avoid ash spreading around acid loving plants like rhododendron, parsley and potato. Though, the practice reported to be beneficial for crops like garlic, onion, lettuces, asparagus and stone-fruit trees (News Herald, 2018) [5]. Garhwal mountain ranges have been reported for burning regularly during the last few summers, causing huge loss to vegetation cover. These forest fires generates colossal amount of ash, which local people collect and spread in their farms particularly on tuber crops like potato, onion, garlic, turmeric, etc. Wood/ jungle ash is composed of many major and minor elements that trees need for growth since most of these elements are extracted from the soil and atmosphere during the tree's growth, they are common in our environment and are also essential in production of crops and forages (UGA Cooperative, 2013) [10]. Some respondents also reported that they sometimes mix jungle ash with the FYM and spread it in the fields. Apart from this ash smearing is also a means of protection against frost and various pests (*like* aphid in mustard).

5. Use of dried leaves for storage of food grains

Most commonly farmers in Garhwal hills, put dried leaves of Walnut, *Azadirachta indica*, *Daikan* (a tree of *Azadirachta* family), dry garlic plant or Tun (*Toona ciliata*) in the storage bins along with sun dried grains. This practice is a no-cost way to keep the storage insect pest at bay (at least, for short run and domestic purpose). These natural remedies posses characteristics which are repelling to storage insects and pest, like beetles, weevils and borers. Use of *Azadirachta* and garlic dried plant powders for controlling some stored grains pests has also been reported by Onu *et al*., 2015 [6].

Conclusion

ITK of farmers may contribute through numerous ways in sustaining livelihood of rural India. Most of the practices are low or no-cost, effective, efficient in long run, easily available and doesn't require high technical skills. Use of ITK will also promote organic cultivation by reducing dependency of synthetic agro-chemicals. Documentation, promotion and refinement of agricultural traditions in India, is necessary and thus evinces the role of policy makers and development workers. Integrating ITKs with current conventional practices will be helpful in producing safe and healthy food, for both the consumers and environment. The progressive and literate farmers must be encouraged to apply and integrate this traditional system in their current conventional system to produce healthy and safe food, with less use of chemicals in agriculture. Finally, scientific and research authenticity is needed with all the traditional practices, as all indigenous technologies are not sustainable and safe.

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