



Conservation and Management of Indigenous Technical Knowledge for Livelihood Upliftment of Small and Marginal Farmers in Rural Areas

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ABSTRACT

Indigenous technical knowledge (ITK) is the basic knowledge of rural people for social upliftment of small and marginal farmers which provide sufficient information that may help in decision making procedures. Rural communities have vast and diverse technical expertise's of several aspects and make them capable to adopt these ITKs on the basis on their necessity to make suitable solution of various local agricultural and socio-cultural problems in managing agricultural activities. ITKs help and co-operate the rural villagers to identify the disease problems in field crops, vegetables, fruits and livestock, their management through their capabilities as evidenced by their ancestors. These practices are largely attributed upon farmers' assumptions, economical profitability, farmers' agreement, indig enous traditional sound knowledge, and effective/reliable outcomes. Indigenous Technical Knowledge is the local knowledge that is unique to a given society. ITK is the experienced based knowledge of a given population. There is no systematic record to describe what they are, what they do and how they can be changed, their operations, and their applications. Villagers in rural areas are more interested to adopt ITKs because of having enough agricultural tools to achieve recent agricultural as well as social developments of rural communities. They can easily adopt the traditional knowledge of agricultural operations that they had learnt since long time from their ancestors to meet national food security of the present generations. A number of ITKs are also occasionally used by the farmers in rural region of India, Out of them, some very popular ones are discussed herewith the general arguments. Hence, there is immense pressure on the people to collect, preserve, validate and adopt ITKs so as to reduce dependence on external inputs, to reduce the cost of cultivation and to propagate eco-friendly agriculture.

Keywords: Indigenous Technical Knowledge, rural welfare, small and marginal farmers

The increasing attention that indigenous knowledge is receiving by academia and development institutions has not yet led to a unanimous perception of the concept of indigenous technical knowledge. ITK is the local knowledge – knowledge that is unique to a given culture or society. It is the basis for local-level decision-making in agriculture, health care, food preparation, education, natural resource management, and several other activities

in rural communities. Indigenous information systems are dynamic and this knowledge system is usually not found in written form and is transmitted from generation to generation through word of mouth (Jardhari, 2007 and Kareem, 2008). All traditional knowledge is not indigenous but all indigenous knowledge is traditional.

Indigenous Technical Knowledge reflects the experiences based on tradition and includes more

recent experiences with modern technologies (Ganeshamurthy, 2000). There is no systematic record to describe what they are, what they do and how they do what they do, how they can be changed, their operations, their boundaries and their applications. It is held in different brains, languages and skills in as many groups, cultures and environments as are available today (Atte, 1989). Hence, there is immense pressure on the people of India to collect, preserve, validate and adopt ITKs so as to reduce dependence on external inputs, to reduce the cost of cultivation and to propagate eco-friendly agriculture (Sundramari and Ranganathan, 2003).

Indigenous Technical Knowledge is the local knowledge – knowledge that is unique to a given culture or society. It contrasts of the international knowledge system generated by universities, research institutions and private firms. Local level decision making in agriculture, health care, food preparation, education natural resource management and a host of other activities in rural communities are influenced by ITK (Warren, 1991). ITK is the information base for a society, which facilitates communication and decision making. Indigenous information systems are dynamic and are continually influenced by internal creativity and experimentation as well as by contact with external systems (Mehta *et al.* 2012). The advent of the concept of sustainable agriculture in late eighties in Indian agricultural scenario has evoked interest on indigenous technical knowledge that has the element of use of natural products to resolve the inconveniences pertaining to agriculture and allied activities. Indian farmers, over centuries have learnt to cultivate crops and to survive in difficult environments, where enriched tradition of ITK has been interrelated with the agricultural practices followed by them. The improvement of the quality of life of the Indians who in great majority live in and depend on agricultural production systems would be impossible by keeping rich tradition of ITK aside.

Indigenous technical knowledge refers to unique, traditional knowledge existing within and developed around specific conditions of women and men indigenous to a particular geographic area (Gremier, 1998). ITK facilitates communication and decision making. Indigenous information systems are

dynamic and are constantly influenced by internal creativity and experimentation as well as by contact with external systems (Ahuja *et al.*, 2005). Indigenous technical knowledge may be denoted mainly as a tacit type of knowledge that has evolved within the local community and has been passed on from one generation to another generation, encompasses not only indigenous knowledge, but also scientific and other knowledge gained from outsiders. In the emerging global knowledge economy a country's ability to build and mobilize knowledge capital, is equally essential for sustainable development as the availability of physical and financial capital (Singh *et al.* 2010).

METHODOLOGY

In the present agriculture scenario, insecticides, fungicides, herbicides, etc. are being used in large quantities in field crops, vegetables, and orchards. Due to the imbalanced and excessive use of chemicals on large scale, fields are becoming barren and infertile leading to decline in productivity. On the other hand, in the indigenous technique there is no or little use of chemicals because of farmer's eco-friendly attitude; it is less expensive, has subsidiary benefits, results in less insect pest and disease incidence in crops, and leads to long-term sustainability of soil and crop productivity (Sundamari and Ranganathan, 2003). Some of the most popular ITK practices are discussed.

RESULTS AND DISCUSSION

Description of popular ITK practices documented in India

Protection of stored grains from attack of storage pests

Mixing of ash or dry leaves of bakaine, walnut, peach, timur and some amount of 'Natir' is added with grains of barley, rice, soybean and gahat stored in wooden box. Extract is sprayed on stored grains and dried in shade to protect from attack of storage pests especially insects and fungus for 2-3 days.

Control of aphids in oilseeds

Leaves of Rambans (*Agave Americana*) crushed in water and their extracts are used as spray to control the attack of aphids in oilseeds.

Table 1: Differences between Traditional knowledge system and Scientific system

Traditional Knowledge System (TKS)	Scientific System (SS)
Knowledge is transmitted largely through oral media.	Knowledge is transmitted largely through the written word.
Observation and practical experience are the bases of TKS	Knowledge learnt through situation, which is remote from its applied context
Knowledge is intuitive, holistic, practical and qualitative.	Knowledge is essentially, quantitative, reductionist, analytical and theoretical.
Knowledge is generated by resource users in a diachronic (long term) time scale	Knowledge is generated largely by specialist researchers on a synchronic (short term) time scale
The nature and status of particular knowledge is influenced by spiritual beliefs, and is communally held.	The nature and status of particular knowledge is influenced by peer review and individual specialists.
Explanations behind perceived phenomena are often spiritually based on subjective	Explanation behind perceived phenomena are essentially rational and objective
Knowledge is used to make suitable decisions under variable conditions	Knowledge is used to put forward hypothesis and to verify underlying laws and constants

Source: Prakash et al. (2012).

Moisture conservation and weed control

After one month of sowing, the crust formed in rice field is broken with ‘rake’ for moisture conservation and weed control.

Catching fishes in stagnant water

For catching fishes in stagnant water, green leaves of Rambans (*Agave Americana*) are crushed and put in water of fish pond. This causes uneasiness to fishes and forces them to come on top surface of water.

Foot and mouth disease control in cattle

Diseased affected cattles are isolated from the herd and shifted in shady and muddy place. Paste, consisting of mixture of tender leaves of peach, bakain (*Melia azadirach*), few leaves of chilli and heavy clay soil is prepared and applied on a wounded portion. It checks infection caused by insect/bacteria. For control of foot and mouth disease in animals, paste of ‘Geru + turmeric + mustard oil’ is applied on affected portion of the animals. Ash of cow dung cake is applied on the mouth of goats to control the mouth disease within a week.

Prediction of rainfall commencement

Children worship the Gwaldev God along with cow in a temple situated in forest and prepared the food made up of halwa & puri and offered to God and then distributed among people. This gives the proper assurance for early occurrence of rainfall.

Further bushes are burnt and touched on the back of the orphans. Villagers try to fill the tank/kund situated near Vishnu temple for 5-6 times after praying to God. If tank is filled completely then they predict and become sure about rainfall.

Control of white grub (Kurmula) in crops

Leaves of ‘Rambans’ are crushed and its extract is used as spray in roots of the crops @ 62.5 ml in 25 litres of water per *nali*. Mixture of bark powder of ‘Ritha’ in water is also used as spray. Broadcasting of salt on soil surface is used to control white grubs in crops. Somewhere DDVP (Dichlorvos/Nuvan) mixed with salt and water is applied to the field to prevent the white grub infection in field crops.

Treatment of ringworm /dhamari or indigestion in animals

Raw ground kala bhatt grains are fed to animals.

Technique for control of leech from nostrils of animals

Water containing salt and tobacco in copper vessel is provided for drinking to affected animals. While drinking it causes sneezing with pressure outside. This enables to get rid of leeches.

Control of tail shortening in animals

Bark of ‘Sim’ tree is crushed and sieved and fed to the suffering cattles with tail shortening.

Getting relief from toothache in human beings

Whenever person suffering from toothache, the paste of Mandua halwa is applied on the toothache portion and if he eats some halwa and gets relief from it after some time.

Control of insect pest and disease occurrence in vegetables

A grass viz., Mirchiya which grows on moist place (Fig. 1). Its tender shoots and leaves are crushed with some amount of water to make up to dilute extract and its spray is applied on the diseased and insect pest infected portion which helps in controlling insect pest and disease occurrence in vegetables. Generally villagers applied the burnt ash on the seedlings of fenugreek and onion to prevent the insect pest & disease infestation. Crushed leaves of Rambans in equal quantity of water are used as spray in tomato and cauliflower vegetables (Fig. 1.).

Control of storage insect pests in wheat

1 kg dry neem leaves per quintal wheat. Neem leaves (500 g) keep at bottom and 500 g at top of the bag. Somewhere, villagers also put 10 cm thick layer of ripened chillies in the bottom of drum/bin for storage of wheat grains. This practice prevents the wheat grains from the attack of storage pests.

Control of red pumpkin beetle

Ash dusting is practiced in *zaid* vegetables to control the red pumpkin beetle in most area of UP.

Control of rice gandhi bug

Spray of extract of 1 kg garlic + 250 g tobacco + 250 g gur in 200 liter of water to control gandhi bug in rice.

Management of rodents in rice

Four to five plants of *dhatura* per *nali* to be planted outside the main field or on the border portion of the field. As the crop matures, *dhatura* seeds also start shattering and rodents coming in the fields eat the *dhatura* seeds. Since the seeds are very much bitter in taste and poisonous, the rats afraid of and never enter into the fields.

Storage of food grain/pulses

Cake of cow dung and burnt *aakhroat* leaves powder is collected. Now food grains to store are kept in an open space, the above powder is spread over the stored food grains and gently rubbed with grain and stored in the drum. Mouth of the drum must be covered with the paste of soil and cow dung mixture.

Control of weeds and insect pests in transplanted rice

Pirul leaves are spread on the field in mid June and are burnt. Villagers assume that the weed, insect and disease causing organisms will die due to fire.

Enhancement of vegetative growth of rice for fodder

Villagers cut the upper 8-10 cm rice plant with the view to increase the vegetative growth of plant and on the other hand for availability of green fodder.

Fertilization of rice through organic means

Farmers spread the locally available algae in transplanted rice field just up to transplanting. They believed that this will enrich the plant resulting into higher yield.



(a) *Urtica dioica*



(b) *Verbascum sp.*

Fig. 1. Herbs used for pest control

Scarecrow

A scarecrow is a decoy or mannequin, often in the shape of a human. Humanoid scarecrows are usually dressed in old clothes and placed in open fields to discourage birds such as crows or sparrows, blue bulls and wild animals from disturbing and feeding on recently cast seeds and growing crops.

Control of blue bull

Farmers are using blue bull dung (as repellent) for saving their crops from attack of blue bull. They are spraying dung solution around field and border area of crops. Sometimes dusting of bone meal is done in border area of crops.

Protection of maize cobs from birds and monkeys

Birds, monkeys and other wild animals damage the cobs of maize resulting in heavy yield loss. To minimize the problem, farmers cover the cobs with polythene or cloth, etc. after seed setting (Fig. 2). This technique protects the crop from birds and animals.



Fig. 2: Maize cobs covered for protection from birds and animals

Management of wilt disease, stem borer, mosaic, nematodes and caterpillars

Mixed cropping of pigeon pea + sorghum is widely practiced to protect the pigeon pea from wilt disease. Mixed cropping of gram + mustard is widely practiced to protect the wilt disease in gram and after harvesting of mustard, their stalk using as bird purches. Application of buttermilk @ 5 liter per 40 kg seed of pulses *viz.* lentil, arhar, chickpea to protect the crop from wilt disease. Cutting of upper portion of leaves before transplanting of paddy to prevent the attack of stem borer in rice. Planting of marigold after 8-10 lines of tomato or chilli

to protect the crop from mosaic and nematodes. Spreading of cooked rice in field crop attracts the birds that eat hairy caterpillars.

CONCLUSION

The agricultural development process interacts with indigenous technical knowledge while implementing agricultural development programmes. The agricultural development strategy relies entirely or substantially in indigenous technical knowledge. Conclusion is based on determining whether indigenous technical knowledge would contribute to solve existing problems and achieve the intended objectives. To foster rapid transfer of technology, a sound understanding of indigenous technical knowledge is needed. This requires means for the capture and validation, as well as for the eventual exchange, transfer and dissemination of indigenous technical knowledge.

ITK is important for reducing the cost of cultivation, reducing the pollution and also safeguarding the natural resource base. It remains largely inaccessible to development workers and researchers. ITK is the basis for self sufficiency and self determination for at least two reasons i.e. farmers are familiar with indigenous practices and technologies. They can understand, operate and maintain them better than introduced technologies and ITKs are drawn on local resources; farmers are less dependent on outsources supply which can be costly, hardly and irregular availability. Therefore, every effort should be made to document and validate such technology, which is helpful for sustainable agriculture. ITKs can be fed into research system in order to develop low cost and effective technologies for the benefit of the farming community.

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