Indigenous Technical Knowledge, Custom and Belief Prevailing in Lac Production System of Jharkhand

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Bulletin (Extension) 08/2014

Published by

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Correct Citation :

Ghosal S and Prasad N (eds.) 2014. Indigenous Technical Knowledge, Custom and Belief Prevailing in Lac Production System of Jharkhand, ICAR-IINRG, Ranchi.

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November 2014

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 a host of other activities in rural communities. The basic component of any country's knowledge system is its indigenous knowledge. It encompasses the skills, experiences and insights of people, applied to maintain or improve their livelihood.

Indigenous knowledge is developed and adapted continuously to gradually changing environments and passed down from generation to generation and closely interwoven with people's cultural values. Indigenous knowledge is also the social capital of the poor, their main asset to invest in the struggle for survival, to produce food, to provide for shelter or to achieve control of their own lives.

Lac is cultivated by people of Jharkhand state from time immemorial. The commodity plays an important role in holding livelihood of tribal community and strengthening rural economy. Many rituals performed in their culture require this commodity; therefore, cultivation of lac has been attached firmly with the socio-economic culture of the community.

Since lac cultivation is an age old practice, some novel techniques as experienced by the farmers from time to time have assumed a position in the lac cultivation system within the farming community. Some of the farmers sometimes observe special cause for variations in input-output ratio, performance of trees depending on its genotypic or phenotype variation, pest management technique and other related things in its cultivation. These observations become traditional knowledge and handed over from generation to generation without any proper documentation. Recently efforts are being made to document these observations if it has proper scientific base and justification.

There is amalgamation of myths and facts in the beliefs and operations of lac cultivation practices. Some practices followed by the community

do not have direct relation with lac cultivation, but indirectly contribute significantly and therefore of great importance. It has been observed that few valuable facts are confined to limited number of people in the remote area, sometimes regarded as family knowledge. These are called Indigenous Technical Knowledge (ITK). The farmers sometimes do not want to disseminate that among people. Sometimes by accident or by keen observation, one finds something new which becomes valuable findings and adds special attributes in the agricultural practices or the other works they do.

Besides ITK, some customs, beliefs and resources existing in the lac production system also play crucial role in maximizing profitability of farmers. Some of these were also collected in this document, which will help the researcher to conduct research in wider field, involving larger number of factors.

Following are some observations based on their history of age old lac cultivation, which may have some scientific basis. Probable justification has been discussed item wise under different subheads.

Indigenous Technical Knowledge

1. Characteristics of good lac yielding *kusum* tree

Some farmers are of the view that good lac yielder *kusum* trees can be easily identified by its soft texture of shoot. According to them, trees with soft shoots which breaks easily (only by hand) yield more in comparison to trees with shoots of hard texture.

Soft shoots are expected to be more succulent than hard shoots and shoot succulence is positively correlated to increased lac yield on *ber*. Thus hardness of shoot can be a measure to identify good hosts. There is wide variation in texture and lac yielding potential of *kusum* trees. It is very difficult to visually assess a good lac yielding *kusum* tree from a bad one. But this ITK can give some direction to identify good lac hosts.

2. Protection of plantation from grazing animals

In the villages of Ranchi and Khunti districts, there are some practices, which don't have any scientific background, but have proved to be friendly for the farming community. Most of the villagers hang leaves and straw from top of a bamboo post erected at the middle of a field to indicate that some standing crop or plantation is there. Purpose of putting the pole is to make cattle owners aware so that they may adopt precautionary measures for preventing their cattle to get into the demarcated field. There is consensus among the farmers of the area to save their standing crop/ plantation of lac host by putting such symbolic poles. This is an age-old practice and farmers have adopted this for mutual benefit. This practice plays an important role in mitigating grazing problem in some areas. Lac hosts like *ber, semialata and kusum* are prone to grazing particularly during initial period of raising plantation. The aforesaid practice is believed to help farmers in successful raising of plantation.

3. Use of live posts for making fences

To minimize the cost of fencing, farmers use live posts i.e. *gamhar*/ *sendwar* shrubs to which pruned materials/ twigs or *Lantana camera* shoots are tied to make the fence.

Farmers maintain livestock for additional income. Usually cattle are left free to graze throughout the year except in rainy season. Therefore cultivators of the other seasons particularly vegetable growers face great problems due to grazing.

The fence is very useful and cost effective for general crops as well as for fast growing lac host plant *F. semialata.* Farmers who are not capable of making costly fences by adopting trench method or barbed wire, can go for it. Raising of this live fence is very easy. Farmers fix live branches of above mentioned shrubs by digging pits and covering

it with soil. The shoots are fixed at regular interval around the periphery of the field. Since it is a hardy plant, most of the branches put forth new shoots after some time and works as live fence. The gap between two such poles is filled temporarily by placing some thorny bushy shoots.

4. Novel lac cultivation methodology on *kusum* trees

Some farmers in Khunti district are of the view that lac cultivation on *kusum* trees should be confined to the lower half of a tree. The upper half is used for *kusum* seed production. They have come up with a method of production of both seed and lac on the same tree, keeping in mind the uncertainty of lac production in the earlier days, when scientific intervention in lac cultivation was not in practice. Thus, in the year of low production of lac due to unfavourable weather, they can at least expect *kusum* seeds for its use in many domestic purposes and some earning through its sale. During favourable year of lac production, due to its positional effect, sooty mold developed on honey dew secreted by lac insect cannot affect photosynthesis on upper branches and subsequently the growth of seed also remains satisfactory.

5. Characteristics of good lac yielding *ber* trees

Few beneficiary farmers under NAIP expressed about existence of some *ber* trees, shoots of which become hollow after drying, produce very good lac.

Ber trees are rich in diversity, both in terms of morphological characteristics and lac production potential. Formation of hollow at the centre of the shoot diameter after drying indicates that shoot of that particular tree is more succulent. Lac yield improves due to lesser dry matter percent in shoot *i.e.* more shoot succulence. Therefore, there could be some truth in the observation of the farmers.

Fig 1: View of a potential lac yielding tree at farmers field

6. Broodlac cutting instrument devised by the farmers

Fig 2: Indigenously developed broodlac cutting instrument

The farmers of some of the villages of Ranchi district have come up with a specialized type of implement ideally suited for cutting broodlac to fit in a particular size. It works like secateurs. But, more mechanical advantage can be derived from this implement due to its special shape. It can be handled being seated on ground. In this instrument, support of leg provides additional mechanical advantage. It is especially suited for the ladies. Therefore, the device is quite popular in some pockets of the district.

7. Snake moults strung on *ber* trees protects the lac crop from rats and squirrels

Some farmers are of the view that if moults of snake are strung on the lac bearing tree, damage of lac crop by rats and squirrels is significantly minimized. If moults are not found in sufficient number,

then white plastic sheets made to fit similar shape can work.

Rats and squirrels have been reported to damage lac crop (Fig 3 & 4) in lac growing villages of Ranchi and Khunti districts. Quantum of damage varies from season to season. The practice can prove to be a boon all throughout the growing area.

Fig 3: Damage of lac insect by squirrel

Fig 4: Detached lac encrustation fallen under the tree

Custom/belief

8. Variations in rest period of *kusum* tree before inoculation

Lac growers of the region follow the custom of giving a rest period of one year to *kusum* trees which are not in operation since a long period of time. For trees under regular operation, they give a rest period of one and half year.

Lac insect feed on phloem sap of lac hosts. Trees which are in regular operation under lac cultivation become exhausted due to continuous withdrawal of cell sap, if proper nutrition is not supplied. Therefore, it requires enough rest before using it for the second time. Normally, rest period is 18 months for *kusum* trees. Photosynthate produced during the period are stored in plant body and subsequently used by the lac insect. It is quite possible that sufficient food material is not stored,

if lac cultivation is done after one year in case of regular operation. But the trees which are brought to lac cultivation for the first time, have enough food material to support growth to lac insect. It could be the reason behind the observation of the farmer. In scientific lac cultivation, *kusum* trees are pruned and subsequently inoculated after one and half year of pruning. Keeping this in mind, available *kusum* trees are grouped into three to five coupes, so that the turn of lac cultivation comes to each coupe at an interval of 1.5 years.

9. Production of paddy and winter season *kusmi* lac crop in a year are inversely correlated

Experienced lac growers have noticed that the year favourable for paddy cultivation doesnot prove to be favourable for lac crop. Observation of farmer can be explained in the light of science as follows.

Heavy rain is good for paddy crop because stagnant water in the field is required for its better growth. In the year of good rainfall, it is supposed that average RH during the rainy season would be higher coupled with lesser average sunshine hours. Water stagnation in the field is caused when intensity of rainfall is higher than infiltration capacity of the soil. This leads to maintaining of high RH in the atmosphere. Similar condition when coincides with 90 days of lac crop age proves to be very detrimental to lac crop. Lac insect is photophilic in nature; it requires warmth during winter season. This could be the reason why poor lac yield is obtained from trees with dense canopy, where penetration of sunshine is much less. Therefore, lesser lac production is correlated to the year of high rainfall, due to lesser sunshine hours with high RH, as it influences the growth of lac insect negatively.

In general, total lac production is positively correlated to the total rainfall received in a year. But, higher rainfall received after sexual

maturity has been found to affect lac production in the winter season. This could be the reason why reverse trend of correlation was noticed in between rainfall received in October (i.e. after sexual maturity) at Ranchi and winter season lac production in corresponding years. This analysis also proves that higher rainfall in rainy season affects winter season *kusmi* lac production. Thus higher rainfall which can promote paddy cultivation positively, may affect lac production negatively. Effect is expected to be more pronounced when production figures of more number of years can be involved and such estimate is done using broodlac production figures.

Year	Winter (*aghani*) lac production in Ranchi (tons)	Rainfall of Ranchi in October (mm)	Correlation coefficient
2011-12	1000	76.4	-0.28
2010-11	500	76	
2009-10	250	64	
2008-09	350	0	
2007-08	600	29	
2006-07	700	25	

(Source: Lac Statistics at a Glance, IINRG publication)

10. Local method of broodlac inoculation

Many farmers place broodlac on the junction of branches of lac hosts during inoculation instead of the recommended practice of tying on both ends. Success of the process depends on the strength of anchorage of broodlac with the host branch, as the broodlac can fall off due to blowing wind. This method can save tying material and labour charges for tying and inoculating broodlac. A good percentage of insects may fall down on the ground or even piece of broodlac may fall down by heavy wind etc. which may lead to less production of crop. But, it finds its relevance during period of labour scarcity, as inoculation operation in the month of June-July always coincides with peak agricultural field operations for *kharif* season.

11. Cause of abundance of *ber* trees in Khunti area

Khunti and its adjoining areas of Jharkhand are rich in population of *ber* trees. One farmer of Mangubandh described how the area became so rich in *ber* trees. According to him their forefathers were interested in *ber* due to two reasons (i) collection of ripened fruits used to serve as food material during hard times particularly rainy season, when employment opportunity used to be restricted. Farmers of village Beradih told that even today they process the dry fruit, separate the pulp portion and store it after grinding. Eating a handful of the ground dry pulp is sufficient to satisfy food requirement for three to four hours during day time. (ii) Goats eat the *ber* fruits either in pre-ripened or in ripened stage. Since farmers of the area rear goats by and large, they were interested to collect *ber* fruits regularly. They were also of the view that chewed up *ber* seeds germinate well. Research publication has authenticated that chewed up seeds of *ber* gives higher germination percentage. Due to economic importance of the trees, the farmers tried to spread the tree where ever it was possible. After collecting the seeds, they spread it on barren fields or unused places in their premises. Subsequently the seed germinated and the area became dominant in *ber* trees.

Fig 5: Cattle and goats feeding on ber leaves during harvesting of lac

12. Use of *kusum* oil

Many farmers reported that they use the oil from the *kusum* seed for massaging on body to remove bodyache.

13. An ideal plot of land in Khunti district where *rangeeni* lac insect does not face mortality.

There is a plot of land at village Bara Salga in Khunti district where *rangeeni* lac is being cultivated since generations. As the owner of the plot claims, *palas* trees located in that area seldom fail to produce *rangeeni* lac.

Modern research has documented that soil potassium and calcium carbonate level plays an important role in lac crop production. Higher potassium level increases lac production; while higher $CaCO_3$ content of soil influences lac production negatively. Soil sample from the plot was analyzed and it was found that soil potassium level was 112 kg/ha (medium) but $CaCO_3$ level was very low i.e. 0.3%; this might have favoured lac production on that plot.

Conclusion

From survey carried out in Ranchi and Khunti districts of Jharkhand, it was found that the growers have several ITK which they practice in lac production and related activities. There is need to document these ITKs, so that these are used in lac cultivation and related activities for the benefit of the lac growers in the growing areas.

Acknowledgement

Authors are thankfull to Dr R Ramani, Director for his inspitation & motivation and Dr K K Sharma, Head L P Division & Dr Md Monobrullah, PS for their keen interest in this publication. Sincere thanks are due to Sri Manoj Kumar for his assistance in collecting information.