



A Study on Adoption of Indigenous Technical Knowledge Practices among Tribal Farmers in Kolli Hills

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Objectives: To make a quantitative study of Indigenous Technical Knowledge (ITK) practices pertinent to crops grown in Kolli hills tribes in the Namakkal district of Tamil Nadu, India.

Methods: The attempt was made to study the adoption level of the interpreted ITKs among Kolli hills tribes. The Kolli hill was picked purposively for its uniqueness in continuing their traditions age old practices in farming practices by the tribes. The present study has been carried out in the Namakkal district of Tamil Nadu state. The Namakkal district was administratively divided into seven taluks and fifteen blocks. Among these seven taluks and fifteen blocks, higher populations of tribes were seen at Kolli hills. For the selection of the respondents based on the proportionate random sampling technique and the data were collected from each respondent through personal interview method. The study was carried during 2019 with 150 respondents in highly populated villages of Kolli hills. The Adoption index was used to analyse the adoption level of the ITK's by the tribes.

Findings: More than half of the respondents (55.56 per cent) had a medium level of knowledge followed by high (25.10 per cent) and low (19.34 per cent) levels of knowledge on indigenous cultivation practices.

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Conclusion: Indigenous technical knowledge has a substantial heritage in agrarian civilization. The findings highlight the effectiveness of indigenous technical knowledge above its modern equivalent. Thus, extension workers should identify and incorporate them in the technology transfer action in order to ensure long-term or sustainable agricultural development.

Keywords: Adoption; tribes; ITK and cultivation practices.

1. INTRODUCTION

Indigenous knowledge is the accumulated knowledge of the local people, derived from the direct interaction of human beings and their environment [1]. This knowledge evolves as the generation evolves with more creativity and innovations, adopted biologically and socially to counter the process of what are often harsh and inimical environment and often represent many years of adaptive evolution [2].

Terms that identify tribal communities including 'indigenous peoples'(IPs), 'ethnic groups', 'tribes', are distinguished by their features of inhabiting specific territories from prior to the advent of the modern nation state, known as ancestral land. They have different languages between the various groups. In India, there are more than 53 million tribal people belonging to almost 550 communities that come under 227 linguistic groups (Ministry of Tribal Affairs, 2019-20). Indigenous knowledge or traditional knowledge of the tribal people is the cumulative knowledge evolved over a long period of time, reflection of experience, creative thinking and behaviour of societies to earn a livelihood and compete with the dynamic changes of the environment, socio-economic and cultural system.

People have developed the indigenous Technical Knowledge (ITK) system over decades based on experiences and continual development through spontaneous experiments. These ITKs are interwoven and incorporated into the people's cultural life. ITKs are developed on experiences, are continuously assessed over a long period of time, are suited to local culture and environment, are dynamic and changing, and focus on reducing risks rather than increasing profits. Weather forecasting, local soil and taxonomy, soil fertility, ancient cultivars, intercropping, crop management, irrigation and water management, crop protection, and post-harvest technologies and methodologies are all examples of ITK in agriculture.

2. METHODOLOGY

The study is focused on documenting and analysing the adoption of the rational ITKs pertinent to crops growing in Kolli hills in India. The present study was carried out in Namakkal district of Tamil Nadu state. So Namakkal district has been administratively divided into seven taluks and fifteen blocks. Higher populations of tribes were noticed in Kolli hills from these taluks and blocks. Hence, Kolli hills have been selected for the purpose of study. Kolli hills had sixteen revenue tribal villages and five villages were purposively selected based on their maximum tribal population. The list of farmers' household from each selected village was acquired from the Gram Panchayat office and also from the Department of Agriculture and Horticulture.

For the selection of the respondents, the simple random sampling technique was followed to select a sample size of one hundred and fifty respondents. For the desire of data collection only the heads of households were introduced. The knowledge level was assessed with help of personal interview using interview schedule. Totally 25 items were selected from the cultivation of four crops for measuring the knowledge level of the respondents. Each item of knowledge test was dichotomized into correct and incorrect responses with the score of two and one. Maximum score suggested indicating high level of knowledge of the respondents. The respondents were categorized into low, medium and high by using cumulative frequency. Further, the adoption index was carried out for practice wise adoption level of the respondents along with documentation.

2.1 Documentation of Tribal Wisdom in ITKs

In conjunction with the elderly tribes and patriarchs of the community ITK relating to farming enterprise were identified from the study area. The tribal farmers were asked to clarify the ITKs practiced by them in the cultivation of four crops tapioca, banana, ragi, rice from preparatory cultivation to storage and

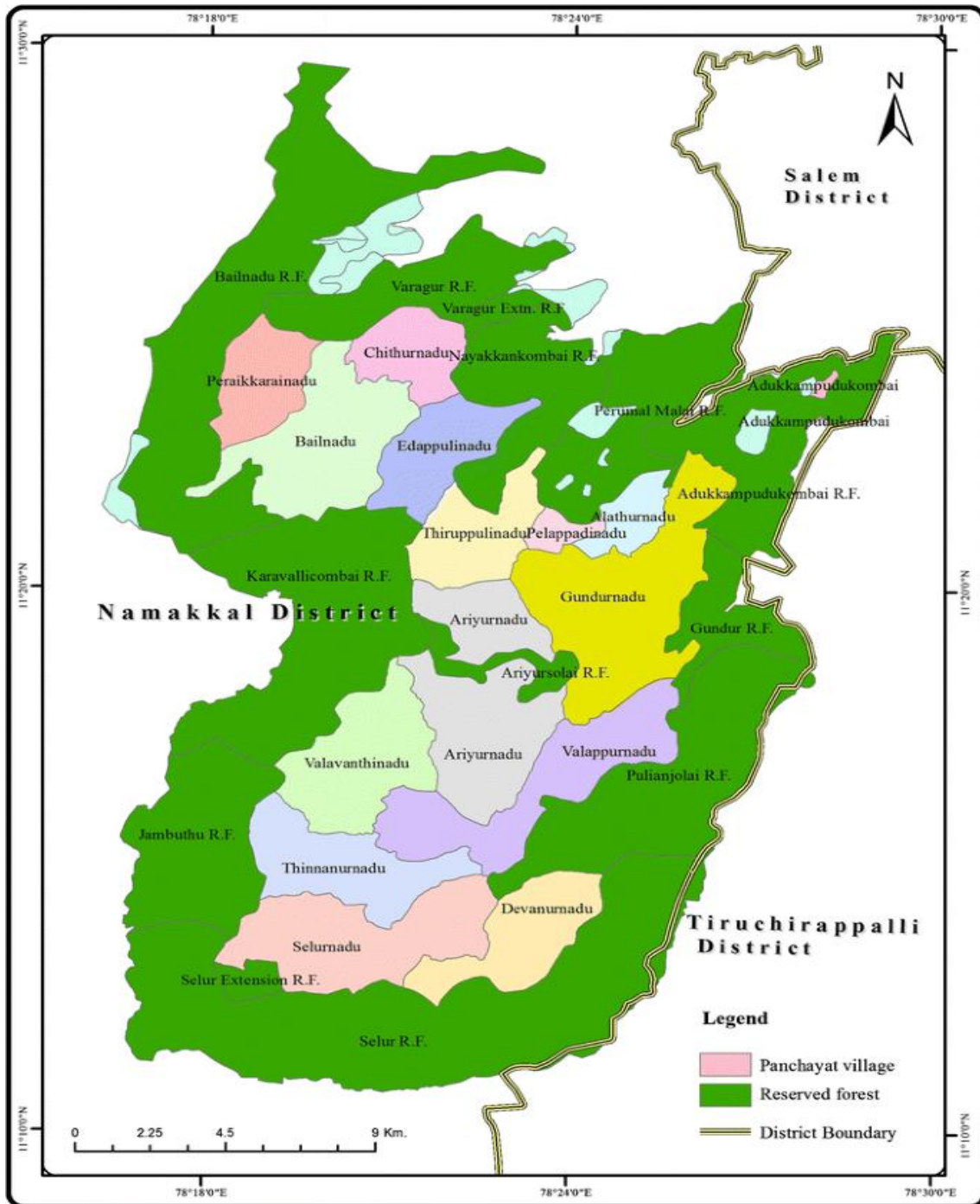


Fig. 1. Map showing the study area – Kolli Hills

processing. The tribal farmers were encouraged to share and express all the ITK by them. The ITK practices expressed by them were recorded in sequentially and appropriately from preparatory cultivation to storage. Besides, detailed discussions were also held with the extension functionaries of the study area to collect and document the ITKs. Thus, a total of 25 ITKs were collected for the study.

3. FINDINGS AND DISCUSSION

3.1 Overall Adoption Level of Respondents on Indigenous Cultivation Practices

The findings on overall adoption level of respondents on indigenous cultivation practices were presented in Table 1.

According to the data in Table.1, about more than half of the respondents (55.56 per cent) had medium level of adoption followed by high level (25.10 per cent) and low (19.34 per cent) levels of adoption on indigenous cultivation practices. Majority of the respondent's have possessed medium to high adoption level, which are passed from their ancestors [3].

3.2 Assessment of Adoption of ITKs in Kolli Hills by Tribal Farmers

There were 150 active tribal respondents interviewed for the study by employing simple random sampling method. Their adoption was assessed with the responses such as 'adopted' and 'not adopted' with scores of 2 and 1 respectively. The scores for all the items were summed up for each respondent against adoption individually. Further, adoption index were carried out using the following formula [2].

$$\text{Adoption Index} = \frac{\text{Total Adoption score obtained by a respondent}}{\text{Possible maximum score}} \times 100$$

Finally, the respondents were categorized into low, medium and high based on the index value using cumulative frequency method. Item wise percentage analysis was also done for meaningful interpretation of the results.

3.3 Practice Wise Adoption Level of Respondents ITK Practices in Tapioca

In order to have an in depth idea about practice wise knowledge level of the respondents, the indigenous cultivation practices in tapioca was worked out and the results are presented in Table 2.

From Table 2, it could be observed that, the majority of the respondents had high level of knowledge on indigenous cultivation practices on tapioca. The determined percentage of the practices is followed by descending order and the farmers cultivate banana as a inter crop between the rows (83.33 per cent). Inter crop gives additional income to the farmers and also reduces the weed population in the field. Thus the farmers have more knowledge of banana cultivation as an intercrop. Spraying of neem oil mixed with soap solution to control the pest and disease (82.00 percent). This may be due to the more conventional knowledge of the farmer about neem oil and its utilization as the insect

repellent and also used for some medicinal purpose. Tubers are cut and sun dried for a week and preserved with 16 per cent of moisture content (80.00 per cent). Sun drying is simple post harvest process to make use of the tuber for a long period. Tapioca is one of the essential food supplements for the people of Kolli hills. So mostly all the farmers are aware of sun drying for long storage of tubers. Using latex of mango, calotropis and jatropa mixed with hot water (100°C) are used to control aphids and white flies in cassava (70.66 per cent). Calotropis and jatropa are widely available in this area itself and should be considered as eco-friendly pest management with minimum efforts. Selection of setts with shorter internodes for planting (62.00 per cent) and application of pig manure for increased tuber size (60.67 per cent) [4].

3.4 Practice Wise Adoption Level of Respondents on ITK Practices in Ragi

In order to have an in depth idea about practice wise knowledge level of respondents, the indigenous cultivation practices adopted in ragi was established and the results are presented in Table 3.

From the Table.3, Most of the respondents had high level of adoption on indigenous cultivation practices on ragi. The calculated percentage of the practices are followed by descending order were ragi seeds are treated with cow urine at 1:10 ratio with water improves germination (92.00 per cent). It may be due to most of the farmers aware the important of cow urine and its use in treatment with ragi seeds. It may raise the germination and also minimize the outbreaks of pest and disease. Inter cropping with mustard, beans and banana (84.00 per cent) at often. Ragi grown as mixed crop with some other crops can increase the income of cultivation and also increase land use efficiency. Thus farmers aware about mixed crop cultivation of ragi. Using neem leaves and thumbai leaves for storage of pest control (85.34 per cent). Availability of thumbai, neem leaves and other insect repellent plant is more common in hill areas. The knowledge of these leaves continued from their forefathers and ancestors. Spraying of goat milk on the crop to control wilt in ragi (83.34 per cent), when a sample of dried finger millet grain is chewed, metallic sound shows its dryness (71.33 per cent) and ragi is grown in uplands with low water holding capacity (69.33 per cent) [5].

3.5 Practice Wise Adoption Level of Respondents on ITK Practices in Banana

In order to have an in depth idea about practice wise knowledge level of respondents, the indigenous cultivation practices in banana was worked out and the results are presented in Table 4.

It could be observed that Table 4, most of the respondents had more knowledge level on indigenous cultivation practices on banana [6]. The calculated percentage of the practices are followed by descending order were the fruits to be ripened are kept in dark room and covered by neem leaves (92.00 per cent), followed by hill banana is grown as an inter crop in tapioca or ragi (85.33 per cent), hill banana is grown as ratoon crop (73.34 per cent), for quick ripening of

banana fruits, bunches are stacked in bigger earthen pots (82.66 per cent), red banana is native land race possessing a very good aromatic flavour is cultivated in Kolli hills (76.66 per cent), suckers are trimmed before planting in order to prevent root born diseases and nematodes (72.00 per cent) and side suckers are uprooted (de-suckering) at monthly interval with long iron rods (70.67 per cent) [7]. Generally farmers of this area have more knowledge about the banana and its various indigenous cultivation practices on fruit ripening, ratoon crop method, inter crop, pest and disease control method and storage of fruits. Since they were followed the cultivation of banana in generation to generation with their ideology. Red banana and hill banana (Malaivazhai) are delicious and highly medicinal fruits than other varieties of banana. Kolli hills are an optimal climate place for the above varieties [8].

Table 1. Distribution of respondents according to their overall adoption of ITK practices (N=150)

S. No	Category	Number	Percentage
1.	Low	29	19.34
2.	Medium	83	55.56
3.	High	38	25.10
Total		150	100

Table 2. Practice wise adoption level on ITK practices in Tapioca (n = 150)

S. No	Indigenous Practices	Number	Percentage
1.	Selection of setts with shorter internodes for planting	93	62.00
2.	The farmers cultivate banana as a inter crop between the rows	125	83.33
3.	Application of pig manure for increased tuber size	91	60.67
4.	Tuber are cut and sundried for a week and stored with 16 per cent of moisture content	120	80.00
5.	Spraying of neem oil mixed with soap solution to control the pest and diseases	123	82.00
6.	Using latex of mango, calotropis and jatropaha mixed with hot water (100°C) is used to control aphids and white flies in cassava	106	70.66

Table 3. Practice wise adoption level on ITK practices in Ragi (n = 150)

S. No	Indigenous practices	Number	Percentage
1.	Ragi is grown in uplands with low water holding capacity	104	69.33
2.	Sometimes mixed cropping with mustard, beans and banana	126	84.00
3.	Ragi seeds are treated with cow urine at 1:10 ratio with water enhances germination	138	92.00
4.	When a sample of dried finger millet grain is chewed, metallic sound indicates its dryness	107	71.33
5.	Use neem leaves and thumbai leaves for storage of pest control	128	85.34
6.	Spraying of goat milk on the crop to control wilt in ragi	125	83.34

Table 4. Practice wise adoption level on ITK practices in Banana (n = 150)

S. No	Indigenous practices	Number	Percentage
1.	Red banana is native land race possessing a very good aromatic flavour is cultivated in Kolli hills	115	76.66
2.	Hill banana is grown as ratoon crop	110	73.34
3.	Hill banana grown as an intercrop in tapioca or ragi	128	85.33
4.	Suckers are trimmed before planting in order to prevent root born diseases and nematodes	108	72.00
5.	Side suckers are uprooted (de-suckering) at monthly interval with long iron rods	106	70.67
6.	For quick ripening of banana fruits, bunches are stacked in bigger earthen pots	124	82.66
7.	The fruits to be ripened are kept in dark room and covered by neem leaves	138	92.00

Table 5. Practice wise adoption level on ITK practices in Paddy (n = 150)

S. No	Indigenous practices	Number	Percentage
1.	Soaking of paddy seeds in water for sprouting	134	89.33
2.	Cattle threshing for removal of grains	138	92.00
3.	Twenty-thirty red chillies are kept in one quintal of paddy seeds bag to avoid the storage pests	138	92.00
4.	Parboiling of paddy for improving the edible quality of the rice	127	84.66
5.	Spread of Notchi leaves over the storage container to control rice moths	135	90.00
6.	Paddy seeds are stored in a floor coated with cow dung slurry to avoid insect attack	129	86.00

3.6 Practice Wise Adoption Level of Respondents on ITK Practices in Paddy

In order to get an in depth idea about practice wise knowledge level of respondents, the indigenous cultivation practices in paddy was worked out and the results are given in the Table 5.

It could be observed from Table 5, most of the respondents possessed high level of knowledge on almost all the indigenous cultivation practices in paddy. Cent per cent of the respondents had awareness on drying of paddy seeds per day after soaking and then sowing, maintaining water level for next few days after transplantation and sun drying of harvested paddy bundled for one or two days in the field itself [9]. Traditionally, farmers are well known about the importance of above practices especially paddy seed preservation through drying, effective of application of farm yard manure to the field, water management practices in main field and nursery. The calculated percentage of the remaining practices in the descending order were soaking of paddy seeds in water for sprouting (89.33 per cent) followed by cattle threshing for removal of grains (92.00 per cent), twenty-thirty red chillies are kept in one quintal of paddy

seeds bag to avoid the storage pests (92.00 per cent) [10], parboiling of paddy for improving the edible quality of the rice (84.66 per cent), spread of notchi leaves over the storage container to control rice moths (90.00 per cent) and paddy seeds are stored in a floor coated with cow dung slurry to avoid insect attack (86.00 per cent). Water soaking is inexpensive and best indigenous practices for increasing the germination percentage in paddy. In Kolli hills farmers have high livestock possession they were used the cattle for threshing of grains. The parboiling of paddy improves the quality and boosts the stuffiness of rice [11]. Red chillies and notchi leaves are easily available pest control ingredients in this hill area. Knowledge of the above practices transmitted through traditionally among the farmers of this region [12].

4. CONCLUSION

Indigenous cultivation practices have strong roots in rural culture. The study reveals that there were more than 130 indigenous cultivation practices items available related to paddy, maize, groundnut, wheat, pulses, horticultural crops and weather forecasting in agriculture, which can serve as solutions to modern technologies. The study also reveals that, most respondents had medium to high level of adoption of ITK

practices, which indicates the importance of ITK over their modern counterpart. This could possibly be due to their lack of scientific knowledge and reduced social participation and interaction. Resource availability and labour requirement may also have influenced the adoption of such technologies. Moreover their strong belief in ITKs with earlier years could also have contributed to such a higher adoption.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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