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Scientific Rationality and Adoption of Indigenous Soil and Water Conservation in Kolli Hills, Tamil Nadu, India

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***Abstract*:** The tribal farmers of Kolli hills of Namakkal district in Tamil Nadu have unique insight in ITAPs (Indigenous Tribal Agricultural Practices) on soil and water conservation, that can be amalgamated with latest know-how for sustained agricultural development. There is a need to assemble, record, justify and refine those ITAPs before they antiquate. Hence, a study was performed by analyzing the rationality and the extent of adoption of the first-line selected ITAPs. About 9 ITAPs on soil and water conservation, in cluster villages of Kolli hills were recorded. The rationality was assessed by referring the selected nine ITAPs to the agricultural engineering scientists. After rationality analysis, they were test verified for their extent of adoption. All the nine selected ITAPs were found to be scientifically rational. Moreover, out of 9 number of selected ITAPs, 7 ITAPs were used by > 75 per cent and 2 ITAPs used by 50-75 per cent of the tribal farmers. This paper will help in culling out the appropriate indigenous technological package for soil and water conservation, thereby provoking the farmer-scientist interface.

***Keywords*:** Rationality, Adoption, Indigenous Tribal agricultural practices, Soil and water conservation

India, with its long history had been a cradle of biological wealth, intellectual knowledge and spiritual wisdom. There is much indigenous knowledge in India, which are to be provoked. The Indigenous Knowledge is the information acquired over a period of time and transferred on heirloom orally. Warren (1991), rightly pointed out that the use and amalgamation of indigenous knowledge and latest know-how, assures the end user with appropriate need based technology.

In India, more than millions of years, primitive tribes have been living in forests and hills without having more than casual contacts with the populations of the open plains and the center of civilization. Likewise, history of Kolli Hills of Namakkal district of Tamil Nadu, is also closely linked with ancient Tamil literature. There are many legends and interesting myths associated with these hills. *Malayali* tribes relocated from the Kanchipuram (Plains) and settled in Eastern Ghats hill range of the Kolli Hills (Vedavalli et al 2002). The inhabitant *Malayali* tribes, of this area have been contingent towards utilization of various indigenous reserves and resources at least until last twenty years. Their contribution of towards the conservation of local flora and fauna in biological diversity had a significant role as natural resource managers. This local community is most directly involved in soil and water conservation too. But their rigid pattern of social structure and restricted social mobility kept off from scientific progress. Thus, there is an infinite need for the researcher to collate and rationalize the available ITAPs before they totally vanish. In addition, understanding and documenting farmers existing Indigenous knowledge in such farming systems, extent of usage of the ITAPs on soil and water conservation, with tradition/culture will be helpful for directing research towards participatory development and designing appropriate strategies for dissemination of suitable technologies to the farming community. Considering the above fact of indigenous tribal wisdom, a study on scientific rationality analysis and extent of adoption of Indigenous on soil and water conservation was carried out, at Kolli hills.

MATERIAL AND METHODS

This study was performed at Kolli Hills, situated at Namakkal district of Tamil Nadu in India with latitude of 11.248514 longitude of 78.338707 with an elevation of 1121.87 meters MSL. The soil type at Kolli hills is loamy and black soil. This hill is mainly occupied by Malayali tribes (98.8%), who are mainly depended on agriculture and forest resources for food. Kolli hills encompasses with 14 clusters of villages. Out of which seven cluster of villages (Pop.20541 and 3730 ITAP practicing farmers) were sort out for this research based on the geographical operation on agricultural farming systems. Twenty numbers of aged and experienced farmers were selected from each village, and informal interview was facilitated to collect indigenous practices associated with soil and water conservation. Thus, from seven cluster villages, 140 (20 from each cluster of villages) and experienced farmers were contacted. Apart

from the tribal farmers, ITAPs were also gathered secondary sources *viz*., the locally functioning NGO namely M.S.Swaminathan Research Foundation (MSSRF), Agricultural colleges, Department of Agriculture and from earlier research. Finally, 28 ITAPs were considered for further analysis. Then the aggregated ITAPs were categorized systematically encompassing cropping systems and technological dimension. In the second phase, clubbing of cluster distinct practices, led to selection of 9 ITAPs related soil and water conservation. For rationality assessment, the selected 9 ITAPs were referred to the 50 agricultural engineering scientists, and asked to rate them on a four-point continuum ranging from 4 to 1. The rationality of each ITAP was evaluated by using the scoring procedure followed by Sakeer Husain (2010) and Venkatesan et al (2016) (Table 1).

Table 1. Scoring procedure to assess the rationality of indigenous technologies

Responses	Scores
Rational based on scientific evidence	4
Rational based on experience	3
Irrational based on experience	2
Irrational based on scientific evidence	1

The rationality of the individual ITAPs were computed based on the mean score, from the total score specified by all the agricultural engineering scientist. Then the ITAPs were categorized as rational (mean score of 2.5 and above) and irrational (mean score of less than 2.5).

After rationality analysis, ITAPs were further analyzed for extent of adoption, from the sample of thirty farmers, who were proportionately selected by random sampling from seven clusters of villages of Kolli hills. The ITAPs selected were depicted to thirty farmer respondents, one after another, with an enquiry about its adoption in the previous years. A score of one was allocated for the response 'Yes' and a zero score was allocated for the response 'No'. The adoption score was arrived by summing the score obtained for all the ITAPs, and the adoption quotient, which was calculated (Sundaramari et al 2003, Venkatesan et al 2016).

$$\text{Adoption Quotient} = \frac{\text{Number of ITAPs on soil and water conservation adopted}}{\text{Number of ITAPs on soil and water conservation applicable}} \times 100$$

With the adoption quotient, adoption of rational and irrational ITAPs by thirty farmer respondents were calculated. This methodology may help in further validation of

Table 2. Scientific rationality and adoption pattern of ITAPs on soil and water conservation

(n=30)

ITAPs on general agricultural practices	Rationality score	Adoption	
		No.	%
Length of the bench terraces in the upland area was determined based on the sloppiness of the field. Steeper the slope, the length of the terraces was smaller and conversely. The stone-bunds were raised along the rough contour lines and ploughing was done across the slope in the terraced bed, reduced soil erosion and thereby helped conservation of moisture.	3.54 R	28	93.33
Grasses like *Andropogan sp*. and *Chrysopogon zizanioides* (Vetiver) are grown on the bunds of the fields to check erosion. These grasses facilitate soil conservation. In addition, excessive growths of such grasses are fed to the cattle.	3.70 R	26	86.67
Agave sp. and *Euphorbia tirucali* are planted on the bunds and borders to check erosion. They serve to conserve soil and act as wind breaks.	3.56 R	20	66.67
Crops like Coconut (*Cocus nucifera*), Banana (*Musa sp.*), Jack (*Artocarpus heterophyla*) and Mango (*Mangifera indica*), are also grown on the bunds of wet and garden lands. In addition to conservation, the trees also give additional profit. Mixed cropping also serves to conserve soil and water.	3.20 R	26	86.67
Bench terracing was done by transforming relatively steep land into a series of level strips across the slope of the land. The field is prepared with a series of benches, burrowing the soil from upper part of the terrace and thereby filling the lower part. A good soil depth avoids exposure of unproductive soil during leveling.	3.53 R	25	83.33
Soil bunds and stone bunds are raised to a height of about 1 to 2 meters. Soil bunds are raised in red soil areas. The prime purpose of the soil bunds is conservation of soil and moisture.	3.51 R	24	80.00
Ditches are dug for the purpose of holding impounded water. This enriches the ground water and compensates the evaporation loss. Such conservation ditches also provide water for drinking purposes for both the tribes and their livestock. Trees and shrubs are grown around these ditches for the creation of micro-climate.	3.65 R	25	83.33
Heaping, minimum tillage and contour ploughing are also practiced for soil and water conservation.	3.70 R	24	80.00
Agave sp. serves for soil conservation due to soil binding characteristics.	3.65 R	17	56.67

indigenous knowledge of the farmers in soil and water conservation aspects.

RESULTS AND DISCUSSION

Out of 9 selected ITAPs on soil & water conservation,7 ITAPs on (1,2,4,5,6,7 and 8) and 2 ITAPs (3 and 9) were adopted by >75 per cent and 50-75 per cent of the tribal farmers respectively (Table 2). Moreover, all the selected ITAPs on soil and water conservation were found to be scientifically rational. The ITAP 1 was adopted by 93.33 per cent of the farmers, to prevent soil erosion and to conserve moisture in their own holding. ITAP 2 and ITAP 4 were followed by 86.67 per cent of the farmers, as both do have good scientific rationality. ITAP 5, on *bench terracing* and ITAP 7 on *digging ditches* were with the adoption of 83.33 per cent. Likewise, ITAP 6, on soil bunds and stone bunds and ITAP 8, on *Contour ploughing* were with the adoption of 80 per cent since they are the test verified and scientifically proven soil and water conservation methods followed in sloppy land. The finding is in accordance with earlier researchers (Ranjay et al 2008, Mihale et al 2009, Dey et al 2011, Sanjay Arora 2022).

CONCLUSION

The Indigenous Tribal Agricultural Practices on soil and water conservation was rationale and was adopted by more than 50 per cent of the tribal farmers. Hence there should be further research in the validation of those. The rich knowledge by the tribes in soil and water conservation should be amalgamated with scientific knowledge and diffused among other areas, with same edaphic and climatic factors.

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