Traditional Knowledge of the Nilgiri Tribals in Environmental Conservation

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Abstract: Indigenous wisdom is the treasured knowledge of a community and transferred from generation to generation. The present study is an effort to document traditional practices of tribal respondents in the Western Ghats of the Nilgiris district. The data collection was done using well-structured interview schedule and participatory methods. Totally, 42 indigenous practices followed by the tribal respondents in environmental conservation were documented. Results revealed that six indigenous practices were used for conserving soil moisture, six indigenous practices were used for natural vegetation, seven practices were used for organic soil fertility management, eight practices were used for plant protection and 15 practices were used for common cultural practices. The tribal respondents following various indigenous practices ranged from 65.56 % to 95.00 % in conserving soil moisture, 70.56 % to 86.11 % in management of natural vegetation, 66.11 % to 93.89 % in organic soil fertility management, 62.22 % to 92.78 % in plant protection and 59.44 % to 92.78 % in common cultural practices. The research study was undertaken during 2017-2021.

1 INTRODUCTION

"Nature is an essential partnership". It puts greater focus on reducing risks when compared to profit maximization. India has the largest concentration of tribal people in the entire world. They live with unique culture, customs and lead a different way of life. They are scattered all over India. Their habitat usually lies in the hilly areas. (Gavit et.al. 2013). The indigenous wisdom focuses on prevention for long term. (Sindhu et.al. 2020). Indigenous ecofriendly practices help in sustaining agricultural development. Therefore, this wisdom should be taken utmost care, conserved and utilized to the fullest extent in order for the next generation. In the current scenario, it is vital to document the indigenous knowledge in agriculture, before they are extinct. Further, validation of the indigenous practices has to be made by rationalizing each practice which would be of high value. (Hussain et.al. 2018). Scientists had recognized that indigenous people have maintained and protected their environment for generations, without causing damage to their localities. (Lenka et.al. 2020).

There has been a large-scale extinction of very useful species like medicinal plants, food crops, animal species, birds, farm-friendly insects' microorganism, forest trees etc. among the tribes. Application of chemical inputs such as insecticides, pesticides and manure etc. in cultivation led to loss of several species in the soil such as beneficial worms, nematodes, predators, parasites, birds, micro-organisms etc. (Fageria, 2007). With these facts, this study attempts to document and validate the indigenous practices followed by tribal respondents for environmental conservation and assess the adoption of indigenous practices in environmental conservation by tribal respondents. The results of the empirical approaches could be used to make necessary changes in the Agro-biodiversity conservation and livelihood sustainability among the tribal women.

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2 METHODOLOGY

One of the districts in Tamil Nadu, the Western Ghats of the Nilgiris was purposively chosen for the study. Nilgiris comprised of four blocks - Kotagiri, Udhagamandalam, Gudalur and Coonoor. Kotagiri and Udhagamandalam blocks were purposively selected due to highest percent of tribal respondents. Three villages from each block – Pudu Kotagiri, Tiruchigedi and Kozhikkarai from Kotagiri and Muthunadmund, Munjakalmund and Kodanaad from Udhagamandalam were randomly selected for this study thus comprising six villages. From the selected villages of Kotagiri block, 60 respondents belonging to irulas and 60 respondents belonging to kotas tribal communities were randomly selected and from the selected villages of Udhagamandalam block, 60 respondents belonging to toda tribal community were selected randomly comprising 180 respondents as sample size for the study. Simple Random Sampling Method was administered. Data collection was completed using well-structured interview schedule and participatory tools. Documentation and validation of the indigenous practices was completed.

To assess adoption behavior of each of the indigenous practices, each tribal respondent was requested to mention those practices in the documented check list, which the respondents practiced during the last five years. The indigenous practices adopted by less than 20 percent and more than 80 percent of the tribal respondents were removed from the analysis. The adoption of the indigenous practices by the tribal respondents was analyzed using percentage analysis for each indigenous practice.

3 RESULTS AND DISCUSSION

The results are categorized in Table 1. The tribal respondents followed 42 indigenous practices in the field of environmental conservation. Six indigenous practices were used in soil moisture conservation, six practices in natural vegetation, seven indigenous practices in organic soil fertility management, eight practices in plant protection and 15 practices in common cultural practices.

Table 1. Rationalized Technologies in Environmental Conservation (n=180).

S. No	Rationalized Technologies	Reason	Frequency (%)	
			No	%
I	Soil moisture conservation			
1.	Constructing raised bund	Creates stability of existing subsoils	158	87.78
2.	Ratooning of crops	Allow the plants to recover and produce a fresh crop in the next season.	126	70.00
3.	Contour bunding	Helps to capture and hold rainfall before it can become runoff.	171	95.00
4.	Holding the runoff in the low-lying areas	To prevent soil erosion	148	82.22
5.	Ploughing across upland slopes	Enhances soil fertility and crop productivity	123	68.33
6.	Deep ploughing	Modify the soil water retention parameters over long term	118	65.56
II	Natural vegetation management			
1.	Planting grasses for controlling soil erosion in the land sliding areas	Reduces and conserve rainfall runoff	127	70.56
2.	Planting of agave in the hill slides	Root systems stabilize soil and help the tribal respondents with better land for agriculture	141	78.33
3.	Growing of shade loving trees in the tea and coffee plantations	Improved birds' habitat, soil erosion is controlled, naturally controlling the pests and enhanced pollination.	133	73.89
4.	Growing of trees in the degraded farm lands	Prevents soil erosion and landslides.	155	86.11
5.	Natural vegetative fence	Windbreaks to protect against damage caused due to wind.	149	82.78

6.	The burning of dry leaves, weeds and wastes from tress	Utilized for mulching	136	75.56
III	Organic soil fertility management			
1.	Incorporation of green leaf manure from leaves and branches of leguminous trees	Mulching	119	66.11
2.	Mulching using farm residues for soil conservation	Reduce the amount of water that evaporates from soil	141	78.33
3.	Crop rotation	Increases soil fertility, soil nutrients and crop yield	147	81.67
4.	Application of locally available green manure	Increases organic matter and soil humus	164	91.11
5.	In situ ploughing of crop residues, stubbles and residuals of the hedges	Increases the soil organic matter which would enhance soil fertility	148	82.22
6.	Vermicomposting	Plant growth, reducing the occurrence of diseases in plants, enhance porosity as well as microbial activities in the soil	137	76.11
7.	Goat and sheep droppings are powdered and broadcasted in the field	Enriches compost value and also it decomposes faster	169	93.89
IV	Plant protection practices			
1.	Trap crops for controlling the pest incidence of the main agricultural crop	Attracts insects and protect the crops from pest attack	116	64.44
2.	Spraying the leaf extraction of a herbal plant named 'Paragram'	Beneficial against leaf eating caterpillars, grubs, locusts	125	69.44
3.	Use of bio-pesticides in the place of chemicals	Bio-pesticides decompose quickly resulting in lower exposures and largely avoiding the pollution problems caused by conventional pesticides.	112	62.22
4.	Neem leaf extract for management of pests	Repellent against several insects such as weevils, flour beetles, bean-seed beetles and potato moths	147	81.67
5.	Storing of pulse grains with red earth	Red soil helps to shield the grains so that the insects cannot feed or lay eggs	155	86.11
6.	Storing of pulse grain with vegetable oil	Vegetable oils are easy to apply and also possess insecticidal properties	158	87.78
7.	Storing together potato and onion in home kitchen	Prevents pest attack	167	92.78
8.	Hanging a basket of onion in the kitchen's high shelf	Prevent perishability	164	91.11
V	Common cultural practices			
1.	Rain forecasting based on the flying behavior of dragonfly	The wings of Dragonfly are attached with sensors that help them navigate using the information on the airflow and strain in the wings.	133	73.89
2.	Seed treatment with Farm Yard Manure	Aids water and nutrient availability and a natural source of available nitrogen.	107	59.44
3.	Storing vegetable seeds in cow dung cake	Improves the germination and viability of the seeds	138	76.67

4.	Storing vegetable seeds in air tight containers	Prevents spoilage and pest attack	119	66.11
5.	In-situ burning of crop wastes in the field	Soil sterilization and enriching soil with natural potash	113	62.78
6.	Deeper ploughing before planting	Increases in-situ moisture conservation	112	62.22
7.	Summer ploughing	Soil structure will be improved due to alternate cooling and drying. Soil aeration will also be improved which aids in the multiplication of micro-organisms.	125	69.44
8.	The Selection of a suitable crop for sowing	Favours profitability and marketability	131	72.78
9.	Use of traditional implements alone for cropping	Self-sustenance	148	82.22
10.	Rain forecasting based on the farm animal behavior while grazing	Animals can sense the humidity of the atmosphere	156	86.67
11.	Ploughing using wooden plough and bullocks	Loosen or turn the soil in preparation for sowing	167	92.78
12.	Storage of grains inside a wooden box that is attached under the wooden cot	Keeps the grains safer because of prolonged temperature control and ventilation system that guarantees the maintenance of the grain in better conditions	164	91.11
13.	Bamboo based wooden storage structure to store harvested produce of potato, ginger etc.	The versatile quality of bamboo makes it a good material for storage	153	85.00
14.	Rain forecasting based on the crowded movement of ant	Ants are equipped with a full array of senses that could give them clues on the incidence of rainfall.	128	71.11
15.	Applying neem leaves	Effective Pest control	116	64.44

3.1 Soil Moisture Conservation

There were six rationalized ITKs under soil moisture conservation. With reference to the adoption of indigenous practices, most of the respondents (95.00%) have raised contour bunding across the slopes which promote water holding capacity as well as prevents soil erosion. The majority of the respondents (87.78%) had raised bunds to prevent soil erosion and to maintain more water in the field. Most of the respondents (82.22%) had adopted the retention of runoff in low-lying areas for usage of the water in upland areas and to the farm pond which attracts the birds and animals for biodiversity conservation. A vast majority (70.00%) followed the crop ratooning to make efficient use of the growing seasons and facilitates crop intensification, for improving agricultural productivity. A good majority of the respondents (68.33%) have adopted the practice of ploughing across the slope in the upland for water conservation. Around 65.56 percentage of tribal respondents have followed ploughing the field deeply for moisture conservation.

3.2 Management of Natural Vegetation

There were six rationalized ITKs under the management of natural vegetation. As regard the adoption of technologies, most of the respondents (86.11%) have adopted the practice of growing trees in the degraded farm lands to give real life to the soil and to increase soil biomass. Most of the respondents (82.78%) were growing natural vegetative fence to control the runoff issues. Most of the respondents (78.33%) were found adopting the practice of planting agave in the hilly slopes to arrest landslides during the rainy season. A good majority of the respondents (75.56%) were adopting the practice of burning dried leaves, weeds and tree wastes for sterilizing the soil. Nearly three fourth of respondents (73.89%) have adopted the practice of growing of shade trees in tea and coffee plantations to maintain micro-environment in tea as well as

coffee plantations. Further, most of the respondents (70.56%) had planted grass in the narrow land slip areas to protect the soil erosion during the time of landslides as well as biological drainage holes in the areas that are prone to landslides.

3.3 Soil Fertility Management

There were seven rationalized indigenous practices under organic soil fertility management. In regard to the adoption of rationalized indigenous practices, an overwhelming majority of the respondents (93.89%) had adopted the practice of broadcasting powdered droppings of goat and sheep in the field. Most of the respondents (91.11%) used green manure that was available near their residence to improve soil health. Most of the respondents (82.22%) have gone for in situ ploughing of crop residues to increase the organic matter in the soil. More than three-fourth of the respondents (81.67%) had adopted crop rotation to improve soil fertility. Most of the respondents (78.33%) had adopted the practice of mulching with farm residues to promote the growth of beneficial soil microbes and to maintain soil health. A good majority of the respondents (76.11%) had adopted vermicompost method to improve the soil's organic content and also to enrich the soil. Most of the respondents (66.11%) had incorporated green leaf manure of unwanted leguminous trees for incorporating soil amendments.

3.4 Plant Protection

There were eight rationalized ITKs under plant protection. As regard to the adoption of technologies, an overwhelming majority of the respondents (92.78%) were found adopting the practice of storing potato and onion together in their house to control potato scab disease. Most of the respondents (91.11%) hanged a basket with onions in the tall slabs to improve its keeping quality and to protect it from storage pest and disease. Most of the respondents (87.78%) had stored their pulse grains mixed with vegetable oil for pest management. More than three-fourth of the respondents (86.11%) were found adopting the practice of storing pulse grains with red earth for controlling pests and diseases. Most of the respondents (81.67%) were seen adopting the practice of using neem extract to control weeds, pests and diseases in an eco-friendly manner. (Lokanadhan et.al. 2012). Most of the respondents (69.44%) had adopted spraying the leaf extract of herbal plant 'paragram' for the control of pests and diseases. (Varghese et.al. 2012). Most of the respondents (64.44%) used traps in agricultural crop to control the pest and disease incidence. Most of the respondents (62.22%) had adopted the practice of spraying the leaf extraction of a herbal plant called 'Paragram' to control pests and diseases.

3.5 Common Cultural Practices

There were fifteen rationalized ITKs under common cultural practices. With regard to their adoption, an overwhelming majority of the respondents (92.78%) were found adopting the practice of ploughing using wooden plough and bullocks which is found to be effective in hilly areas and also to avoid sub soil compaction due to tractor ploughing. Most of the respondents (91.11%) had stored food grains in a box made of wood that is attached beneath the wooden cot to protect the grains against the attack of rats and moisture in the winter and rainy seasons. Most of the respondents (86.67%) were found adopting the rain forecast based on the farm animal behavior while grazing. Most of the respondents had adopted the practice of using Bamboo based wooden storage structure to store the harvested produce of potato and ginger to improve the keeping quality. More than three-fourth of the respondents (82.22%) had used traditional implements for cropping which helps in the maintenance of soil structure. More than three-fourth of the respondents (76.67%) had stored their vegetable seeds in cow dung cake to protect the seed from pests and disease infestation and also to improve its viability. A vast majority of the respondents (73.89%) were found adopting the rain forecasting based on the flying behavior of dragonfly at ground level. Three-fourth of the respondents (72.78%) had selected appropriate crops for sowing to further avoid the attack from regular pests and disease. Around 71.11 percentage of the respondents had adopted the rain forecast based on the crowded movement of ants which predicts the rainfall. Around 69.44 percentage of the tribal respondents had adopted the summer ploughing to control soil erosion and moisture conservation. Most of the respondents (66.11%) had stored the vegetable seeds in air tight containers which protect the seeds from moisture during the rainy season. Most of the respondents (64.44%) applied neem leaves to maintain soil alkalinity. Around 62.78 percent of the respondents had adopted the practice of in-situ burning of crop wastes in the field for soil sterilization and enriching soil with natural potash to improve soil fertility. A similar percentage of the respondents (62.22%) had adopted deep ploughing before planting for enhancing soil productivity. Around 59.44 percent of the tribal

respondents had followed treating the seeds with farmyard manure to improve the viability of seeds and germination.

4 CONCLUSION

Various indigenous practices followed by the tribal respondents in environmental conservation have been highlighted. It could be concluded that proper documentation and validation using scientific analysis of the traditional indigenous practices of tribal communities would be a strong base for eco-friendly practices in environmental conservation. Indigenous practices are a brilliant alternative when compared with the other chemicals. The results would be helpful to all scientists to develop low-cost, need based, location specific and eco-friendly technologies and to make them readily adopted by the large number of small and marginal farmers.

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