



Research Article

INDIGENOUS TECHNICAL KNOWLEDGE (ITK) OF TRIBAL WOMEN ON IN SITU AND EX SITU CONSERVATION MEASURES OF AGROBIODIVERSITY

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Abstract: Indigenous knowledge (IK) system is an important instrument in sustainable agricultural production to preserve diversities and sustainability of society. Women play a central role in the conservation, management and use of bio-diversity. The present study was carried out to document the ITK of tribal women in agrobiodiversity conservation. The investigation was carried out in the Nilgiris district of Tamil Nadu State. The habitations namely Kunjappanai and Semmanarai were selected from two villages of Kothagiri taluk of Nilgiris district. A sample of 120 respondents was selected from the identified two habitations following the proportionate and random sampling procedure. Data were collected using interview schedule and analysed with suitable statistical techniques. A total of 67 ITK were reported by the tribal women. The study revealed that 68.66 per cent of ITK pertained to in situ on-farm conservation, and the remaining 31.34 per cent of ITK were related to ex situ conservation. From this study it could be concluded that majority of the ITK were related to in situ on-farm conservation.

Keywords: ITK, Tribal Women, In situ on-farm and Ex situ Conservation, Agrobiodiversity

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Introduction

This district marks the Western extremity of Tamil Nadu situated in the middle of the Western border of Tamil Nadu, its boundaries are, the Coimbatore district in the East and the Kerala state in the South and in the West, and the Karnataka state and Periyar district of Tamil Nadu in the North. The district lies between 11°8' and 11°55' N, and 76°13' and 77°2' E. The area of the Nilgiris district is 2549 sq.km. The Eastern Himalayan and Western Ghats are the two areas recognised as biodiversity hotspots in India out of 18 others spread out all over the world. The NBR which is a part of Western Ghats is the first of the fourteen biosphere reserves of India, established in September 1986. The NBR supports diverse flora and fauna in general and rich agricultural biodiversity in specific due to its habitat diversity. Among the 36 groups of Scheduled Tribes in Tamil Nadu, six groups viz., Todas, Kotas, Kurumbas, Irulas, Paniyas and Kattunaicks have been identified as primitive tribal groups by the Government of India. The Nilgiris is the habitat for these tribal groups, remarkable for their traditional modes of harmonious use of environment.

According to 2001 Census, the percentage of total tribal population to total population of the Nilgiris district was more than other districts of Tamil Nadu.

As Nilgiris supports wide range of bio-diversity and high degree of tribal population; and the primary objective of the study was focussed on agrobiodiversity conservation by tribal women, Nilgiri district was purposively chosen as the study area.

According to one statistical analysis of 135 different societies with various subsistence bases (e.g., agriculture, animal production, hunting, fishing, and gathering), women provide 79 percent of total vegetal food collected.

Srivastava (2008) [1] identified different role of women in biodiversity and food security women perform multifarious role as: Woman the housewife, Woman the gatherer, Woman the gardener, Woman the herbalist, Woman the plant breeder and seed custodian and Women and rights to plant genetic resources.

Nara (2016) [2] revealed the women's indigenous knowledge about use of various plant species for food security. In his study, he mentioned that leaf of plants like Gandhari, Muchari, Khapra Chakor, Siliyari, Pechaki, Sarsa, Chimti, Matha, Sunsuni, Karmi, and Sarla sag were found to be used as vegetable (sag). Bengsag (*Castella asiatica*) as reported by the respondents was of high medicinal value against Jaundicedisease. Similarly, muchari sag (*Lymnophylla conferta*) was found to be used for clearing the mouth during fever as well as increasing the appetite. Respondents reported that Futcal (*Ficus inpectoria*)leaves, Red Kudrum (*Hibicus sabderiffa*), Sanai (*Crotalaria juneca*), Bamboo (*Bambusa arundinacee*),etc were of high medicinal value for liver ailments. Ber (*Zizyphus mauritiana*) ripped fruits are dried and used as vegetable. Ber trees are useful for Lac Cultivation.

Jasmine *et al.*, (2016) [3] reported that India is rich in Traditional Knowledge especially in agriculture and medicine. It is very essential to protect and preserve traditional knowledge for harnessing its benefit to the Traditional knowledge holding communities.

Tanusree (2017) [4] reported that the women of different states of NE India prepare varieties of ethnic foods from local soybean, bamboo shoots, lai patta etc which are of nutritious and healthy too. This region that lies under eastern Himalayas eco system, is not only rich in plant diversity but also have a great treasure of cultural, social and linguistic variability conserved by tribal people. This region is a storage of indigenous knowledge system pertaining to agriculture, food, medicine and natural resources management. In Mizoram, the Mizo women prepared a soya bean based fermented food called "Bekang" and they market this product. The tribal women of most of the states in NE India prepare delicious and nutritious food from bamboo shoot and plants available in the forest. In Assam also the tribal women belonging to Bodo, Rabha, Karbi, Dimasa and many other communities contribute a lot to conserve biodiversity of their own areas. Bodo women have traditional beliefs and knowledge about plants and forests.

Table-1 Indigenous Technical Knowledge of tribal women on *in situ* on-farm conservation measure of agrobiodiversity conservation

SN	<i>In situ</i> On-farm Conservation
1	Sowing of ragi seeds during April/May months after receiving the rains
2	Stirring of soil by using hand hoe to cover the ragi seeds after sowing
3	Sowing ragi seeds in raised bed nursery made of soil and Farm Yard Manure (FYM) mixture in the corner of the field to keep the seedlings for long time
4	Transplanting the seedlings in the main field after receiving rains
5	Practicing intercropping of ragi with beans or groundnut at 1:1 ratio in irrigated condition
6	Broadcasting of keerai (<i>Amaranthus sp.</i>) seeds inside the ragi field and raising as a mixed crop to get additional income
7	Mixed cropping involving ragi / samai or millets, greens and beans in same field
8	Selection of cabbage plants having profound growth in the field as seed producing plants
9	Raising nursery in the raised beds which is made of soil and cowdung mixture at 1:1 ratio, in the corner of the field on the highest slope
10	Sowing seeds on the raised beds and application of cowdung as a thin layer over and above the seeds
11	Frequent weeding in the cabbage nursery for better establishment of cabbage plants in nursery and main field
12	Transplanting of one month old seedlings and non-preference of younger and old seedlings because of poor establishment at the main field
13	Transplanting of cabbage seedlings with ¾ to 1' spacing with them.
14	Raising beans as an intercrop in the cabbage field at 1 : 10 ratio
15	Cultivation of carrot on the lands having lesser slopes in the hilly regions
16	Crop rotation of carrot with potato, peas to get more income
17	Raising three crops if heavy rain occurs and then artisan will have good and enough water, otherwise raising two crops
18	Sowing seeds in line and covering the soil with the dried leaves
19	Providing life irrigation to the raised bed nursery two days after sowing
20	Water spraying to the 15 days old seedlings
21	Separation of the plants to have 2" spacing between them
22	Crop rotation of potato crop followed by vegetables for the nematode management
23	Mixed cropping of potato with marigold (<i>Tagets sp.</i>) reduces the risk of root nematode
24	Raising black pepper in the coffee plantations as an intercrop at 10' interval
25	Using silver oak or mulmoringa as the standards for the pepper vines
26	Selection of the cuttings with 1' length with 3 buds or ¾' length with two buds
27	Planting the three budded cuttings in the trench of 1 x 1 x 1' formed at a distance of 1' from the standard in such a way two buds are below ground level and one bud is exposed to the air
28	Planting of the small branches of trees around the cuttings for shade during summer season to protect the young established cuttings from hot sun
29	Leaving the Pepper vine for three years for good vine establishment without harvesting to get higher yields during the coming seasons
30	Harvesting two times with 20 days interval (i.e.) harvesting the matured fruits first and then immature fruits after the development
31	Intercropping of coffee variety Kaveri in tea plantation comes up well
32	Tea seedlings raised from seed bears after three years
33	Tea seedlings raised from cuttings bears after two years
34	Growing tea at higher elevation gives good quality
35	Placing the seeds above one layer of sand, covering with one layer of sand and water spraying for three weeks for getting sprouting
36	Placing the sprouted seeds in pockets / trench / pit having sand, soil and cowdung mixture in 1:1:1 ratio and keeping for one year
37	Transplanting of the tea seedlings in 1 x 1 x 1' pit and filling the pit with the top soil at bottom and bottom soil at the top
38	Planting tea seedlings in triangular fashion at 3' gap in between them
39	Raising silver oak (<i>Grevilla robusta</i>) and vagai (<i>Albizia stipulata</i> and <i>A. moluccana</i>) as the best shade tree for tea plantations at higher and lower elevations respectively
40	Pruning when tea plants have well established roots and more number of branches
41	Covering the tea plants by ferns during winter to prevent frost damage
42	Preferring Robusta and Arabica coffee in lower and higher elevations of Nilgiris district respectively
43	Raising silver oak and mulmoringa as best shade trees for Coffee plantation
44	Sowing of seeds in the poly bags filled with the soil from the nearby forest which has black colour & keeping in seedling stage for six months under the protection of shade
45	Covering coffee plants with samai / millets hay during frosty weather conditions
46	While pruning maintaining a maximum of 4 – 5 branches for matured coffee plants and more number of branches for younger plants

They are influenced by the plants in their socio, cultural and religious life. They have also the knowledge of herbal medicines out of wild plants for healing and caring of ailments. The socio-cultural and religious activity of Bodos has served the purpose of conserving their traditional heritage with plants from long back. From a study conducted by the teachers of biotechnology department, Bodoland University, Assam, it was found that the Bodo women conserve about 48 different plants to use (leaves, stems and tubers) for socio-cultural and religious purposes. They also use some plants for healing wounds/pains and other diseases. Thus, the conservation and using of different plants and their leaves in the name of socio-cultural and religion have significance in today's crisis of biodiversity conservation. In each society, it is observed that the women's contribution to production is centred to biodiversity based on women's indigenous knowledge. They gather these knowledge from generation to generation from grandmother to mother and from mother to daughter and so on. Keeping this in mind, the present study was carried out to document the Indigenous Technical Knowledge (ITK) of tribal women in agrobiodiversity conservation.

Materials and Methods

The investigation was carried out in the Nilgiris district of Tamil Nadu State. The habitations namely Kunjappanai and Semmanarai were selected from two villages (Jakkanarai and Konavakarai respectively) of Kothagiri taluk of Nilgiris district. A sample of 120 respondents with 72 and 48 tribal women was selected from the identified two habitations following the proportionate and random sampling procedure. Data were collected with the help of a well constructed interview schedule and analysed with suitable statistical techniques. The salient findings of the study are as follows.

Statistics

Percentage analysis was used in descriptive analysis for making simple comparisons. For calculating percentages, the frequency of the particular cell was multiplied by 100 and divided by total number of respondents pertaining to particular cell. Percentages were corrected to two decimal places. Percentage was worked out for the practice wise knowledge and adoption.

Table-2 Indigenous Technical Knowledge of tribal women on *ex situ* conservation measure of agrobiodiversity conservation

SN	<i>Ex situ</i> Conservation
1	Drying of threshed paddy seeds for one day in hot sun or 2-3 days in cloudy weather condition
2	Storing the paddy grains with "Nochi" (<i>Vitex negundo</i>) and "Pungam" (<i>Pongamia pinnata</i>) leaves in the storage godown called "Vallam" made of mud which is placed in the corner of the house
3	Choosing paddy seeds having heavy weight during winnowing for seed purpose
4	Separating ragi seeds from the earhead by the process of walking over the earheads
5	Keeping the best ragi earhead selected from the own field along with ash in earthen pots in dark place for 3-4 years for seed purpose during next season
6	Using winnowing ban (Beesu / Godu) made of bamboo for winnowing grains
7	Using broad winnowing basket (Mora) for cleaning the grains
8	Using small basket (Bethu goodai) for storing the grains
9	Removal of the pepper seeds from fruits by foot pressing over the fruits
10	Sun drying of the pepper seeds for 2-3 days and storing the pepper in gunny bags over the platform made of bamboo sticks to avoid termite attacks
11	Keeping the plucked tea leaves in the loose sanal bags containing more holes for aeration during transportation
12	Collection of the matured and dried reddish colour seeds in the tea plant for raising seedlings
13	Separating coffee seeds from berries by placing them in a trench, hand crushing using stones or bamboo sticks, washing crushed seeds and sun drying for two days
14	Sun drying of ripened fruits for maximum of 20 days (up to the seeds inside the fruit will produce sound when fruits are shacked)
15	Storing of coffee seeds in gunny bags over the mud platform specially constructed for a maximum period of three months
16	Using storage godown made of big bamboo sticks of 10 to 15' height to store paddy seeds / grains
17	Shade drying of the harvested ragi earheads for 1-2 weeks depending upon the prevailing weather condition
18	Storing the pepper in gunny bags over the platform made of bamboo sticks to avoid termite attack
19	Selection of the seeds for raising coffee seedlings from the Coffee plants which had good yield for more than three years continuously, mixing the selected seeds with ash and keeping for one year before raising seeds
20	Washing crushed seeds and sun drying for two days, as shade drying blackens the coffee seeds and reduces the value of coffee
21	Removing fruit pulp in the coffee seeds by soaking the seeds in water for 3 days and washing

Results

Agrobiodiversity conservation measures include in situ on-farm conservation and ex situ conservation. The tribal women may possess indigenous technical knowledge on in situ on-farm conservation and ex situ conservation measures associated with agrobiodiversity conservation. Such ITK may influence them in carrying out the different conservation measures of agrobiodiversity effectively and efficiently. The in situ on-farm conservation and ex situ conservation wise ITK identified are presented in [Table-1] and [Table-2].

Classification of ITK based on different conservation measures of agrobiodiversity The classification of the ITK based on type of conservation measures would be helpful in identifying the important conservation aspects in which majority of the tribal women have more ITK. The classification based on different conservation measures of agrobiodiversity are presented in [Table-3].

Table-3 *Classification of ITK based on different conservation measures of agrobiodiversity*

SN	Conservation measures	Number of ITK	Per cent
1	<i>In situ</i> on-farm conservation	46	68.66
2	<i>Ex situ</i> conservation	21	31.34
	Total	67	100

Discussion

It could be observed from Table 3 that a total of 67 ITK were reported by the tribal women. The study revealed that 68.66 per cent of ITK pertained to in situ on-farm conservation, and the remaining 31.34 per cent of ITK were related to ex situ conservation. From this study it could be concluded that majority of the ITK were related to in situ on-farm conservation.

Conclusion

The challenge for future generations is to safeguard biodiversity by protecting and promoting the diversity found in integrated ecosystems, which are often managed by women. The maintenance of agro bio-diversity will protect the ability of women farmers to respond to changing conditions, to alleviate risk and to maintain and enhance crop and livestock production, productivity and sustainable biodiversity management.

Application of research: This research finding is s documentation of ITKs possessed by tribal women. The scientific rationality of ITKs may be verified for the use of large population

Research Category: Tribal women, Biodiversity conservation

Abbreviations: ITK-Indigenous Technical Knowledge

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Study area / Sample Collection: Kothagiri taluk of Nilgiris district

Cultivar / Variety / Breed name: Nil

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