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# Indigenous Knowledge System Adoption in the Sustainable Cropping, Food Grains and Fishing Management

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**Abstract:**

Indigenous knowledge system is peoples' knowledge through all time experiences and these practices are generally adapted and passed over generation after generation among the different communities. This knowledge system has been significantly applied in farming, cropping systems, storage and processing of food, live-stock management, traditional healing practices, soil and water management, human health and in many other practices. The important knowledge system has often being in a state of hidden nature and further its loss of disappearance leads to proliferation of the problem, questioning the continuation of those sustainable practices. Documentation of indigenous knowledge system is importantly considered. The present study was done with the objective of documenting the indigenous knowledge systems developed and has been practiced by local and indigenous communities on the management of farming, food grains preservation, community fishing and to ascertain the livelihood utilization of bio-resources. The treasure trove of indigenous knowledge system has to be preserved and more scopes for documentation for the provision of additional knowledge to the context of natural resources conservation, essentially important to reach the goal of food grains management through sustainable utilization.

## Introduction

Indigenous knowledge system is the systematic method adapted by communities and it is a kind of peoples' knowledge through all time experiences, their own field trials with a through understanding of the environment. This traditional knowledge system of local community reflects the requirements, experiences of their age-old traditions (Haverkort *et al.*, 1991, Sukumaran *et al.*, 2008). These practices are generally adapted and passed over generation after generation by local indigenous people, tribal population, rural artisans, cattle rangers,

traditional healers, women folks, villagers, traditional farm practioners etc. Traditional ecological knowledge is importantly considered by worldwide communities and also by international institutions. (Mathur, 2007).

Indigenous knowledge of Post-harvesting techniques, seed and grain storage methods, pest and disease management, weed management procedures have been documented (Oladele *et al.,* 2008). Agriculture production is the prime important source of activity in the livelihood development. Multifaceted problems are associated with this activity, viz., natural calamities, resources depletion, water quality; soil fertility, pests and disease are among the major constraints making difficulties upon the livelihood. These constraints eventually have been posing threats to food insecurity and ecological health imbalance. Indigenous knowledge system has the proven value to meet the challenges of the current problems.

The hidden nature of indigenous knowledge, loss or its disappearance is occurring which has further repercussions on the problem once lost; orally based knowledge can not be retrieved. Scientific communities and local communities need to integrate to have a common ground, enabling communication. Documentation of indigenous knowledge system adapted by the local communities is first and foremost important which will help in acquiring the local peoples' knowledge for further use, to adapt the technique by the spatially located people and community, the scientific principle behind such knowledge system and also to improve such knowledge through drawing up and implementing the refined knowledge and skills (Kannan and Annadurai, 2011).

The present work was undertaken with the objective of documenting the indigenous knowledge systems developed and practiced by the local and indigenious communities and their hidden wisdom regarding conservation, adaptation and management of indigenous crop and live-stock management and to ascertain the livelihood utilization of such bio-resources.

## Materials and Methods

### *Description of the Study Area*

Documentation of indigenous knowledge system was carried out through survey which was carried out in 16 villages located in 6 districts viz., Madurai, Theni, Dindigul, Sivagangai,

Ramanathapuram, Nagapattinam of Tamil Nadu, India. The study site details are described below:

Sustainable farming and grains storage and processing through indigenous knowledge system were observed in Karanthamalai Hill Range is located in Natham Taluk of Dindigul district. This mountain range is a part of Sirumalai hills range of south eastern western Ghats. Chinnamalaiyur village, which is located on the Karanthamalai Hills was selected as one of the present study areas. The area of investigation lies between 10º 12' and 10º 25' N Latitude 78º0' and 78º20'E longitude with the elevation of 1688ft MSL, measured at the highest peak. Temperature ranges between $17^0$C (minimum) and $35^0$C (maximum). The forest type is dry deciduous with few number of evergreen trees. Moopan tribe settled since 100 years. Farming and cattle rearing are the major livelihood activities of the community.

Documentation on paddy seed storage and processing for germination using paddy straw basket was observed in Sattyakudi village of Keezhaveloor Taluk of Tanjavur District. Red gram seed balls for the protection and seed treatment was observed in Sadiya Goundan Patty of Sedapatti Block, Madurai District. Community fishing was recorded from Kallanthiri, Appanthirupathi Panchyat, Madurai District.

***Methodology***

The present study was conducted from September 2009 to March 2010 and the information about the currently used system of indigenous knowledge were obtained from farmers of the above-mentioned experimental sites through direct interviews. Information regarding vernacular name, plant parts used and process for the specific activity was collected from the communities viz., *Moopan, Irular* and farming communities. The interview schedule was the major tool used to explore the farmers' wisdom and their perception regarding the indigenous resources use and improved products formation. Information was also collected through participatory field research methods through semi-structured interviews, field inspections and field observations. Plant specimens used in pest management practices were collected and identified with the help of regional and local flora (Gamble and Fisher 1957), while collecting ethnobotanical aspects, standard approaches and methodologies have been followed

(Jain, 1989). Information was mainly gathered from for village chiefs, local old women and farmers.

## Results and Discussion

### *Paddy seed storage technique*

Cow-dung coated paddy straw basket was prepared and it was used to store the paddy seeds by Sattiyakudi farmers. A mound of freshly harvested paddy seeds was prepared using this method. After the paddy harvest was done, some paddy seeds selected for the next cropping season were dried under open sunlight. Then during a midnight time, the freshly cut paddy straw was used to make rope like structure by spinning the straw and again the clean paddy straw was spreaded into this paddy straw coir. Inside this structure, about 55kg (9 '*Marakka'l*; 1 '*Marakkal'* = 4 '*padi*'; about 6 kg) sun dried paddy seeds were kept and tightly closed like a ball, with a hanger like a structure made from the same coir spindle. The outer surface of the mound was covered with freshly prepared cow-dung paste and kept for drying.

After solarization (dried under open sunlight), this ball like paddy seed mounds, (Plate 1) were kept separately in the storing place. This structure facilitated the paddy seeds to maintain a constant temperature and the cow-dung coated over the surface prevents the paddy seeds from the pests and *Callosobruchus chinensis* insect. At the time of sowing the seeds in the motherbed, the entire mound was used to soak under water continuously for 10-12 hours then it was spreaded in the prepared mother bed. This method was found very effective for paddy seed storage.

This practice of using cow-dung coated paddy straw mound was followed until 30 years ago by many of farming communities of the East Tanjore. But now, no such practice has been followed, except a farmer by name Ambigapathi, Sattiyakudi Village of Nagapattinam District, which was based on the combined principles of i) biological and ii) physicochemical procedures. The common practice of solarization, a physiochemical method is commonly adapted by the farmers mainly for seed preservation and seed processing. The most infectitious agents are killed by this practice as it was shown by Lale (1998). Eggs and first instar larvae

*Cryptolestes maculatus* and the first instar larvae of *Cryptolestes subinnatatus* were found effectively destroyed by solarization method (Lale and Vidal, 2000).

The present investigation was carried out to the document the method adapted by an indigenous community was based on biological and physiochemical procedures. Those practices not only help to preserve the paddy seeds using biological method for future cropping; but also enhance their germination potential.

***Red gram seed preservation***

In Sadiya Gaudanpatty village of Sedapatty Block, Madurai District, the farmers adapt a unique method of preserving red gram *(Cajanus cajan* (L.) Millsp. seeds as against pest attack.

After thrashed out the red gram seeds from the pods, the seeds were sun-dried and made into seed balls. It was done by coating the dried red gram seeds with the paste of red clay made by mixing red soil with water. The red earth coated seeds were kept for 3 days and sun dried for an hour. The completely dried seed balls (Plate 2) are kept in jute bags for further use as a seeding material for the next season. This method is found proven to prevent *Callosobruchus chinensi*s insect attack.

In this study, native soil and its use by the indigenous people for seed preservation was explored. In the previous works, neem and *Eucalyptus* leaf powder mixed with mustard oil paste were found highly effective against stainton insect (Patel and Patel 2002).

***Indigenous seed storage methods***

The harvested paddy seeds are stored in a compact, closed room with a small door opening at the front side called *'Chenthi*' has been used by some of the farming community of Poolangulam village, Andarkottaram Panchayat, Madurai District. After harvesting and thrashing out paddy, the seeds were sun dried and stored in the *chenthi* with a dimension of 11 x 8 x 4 ft. About 50 bags of paddy seeds could be stored in that structure. Window of this *Chenth*i is closed during rain, otherwise this is opened at all times.

Neem (*Azadirachta indicia.* A. Juss.), Pongam (*Pongamia glabra* Vent. Jard.), Nochi, (*Vitex negundo* L.*)* leaves were spreaded over the paddy grains, kept inside *Chenthi*. The stored grains are drawn, whenever required for making rice for consumption.

***Baked mud granary***

Another grain storage structure locally named as '*Kulumai*' was spotted in Chinna Malayur village of Karnathamalai tribes settled areas (Plate 3). The height of this structure ranges from 1m to 4m. Those mud pots were made up of clay soil and plant fibres and to harden the storage structure, crop debris such as husk was also mixed during making the '*Kulumai'.* The centre portion is broader with a narrow hard bottom and a narrow opening. This is closed with a lid, made of similar material and precisly made to fit to the size of the mouth of the giant pot, which further protects the grains our of the reach of insects and pests, during storage.

The storage techniques developed by the local community are user-friendly. Scientific reasoning of using such indigenous storage structure for the benefit of grains and also the local community was depicted by Kiruba *et al.,* (2008). Like the '*Kulumai*' structure documented from this study, several modified structures for grain storage were documented by Karthikeyan *et al.,* (2009). There is always the need for adequate and efficient storage facilities to save the excess crop that is produced from deterioration and waste. Storage of food resources is a tripod objective in any human society which ensures steady availability of produce and thereby reducing the seasonal fluctuations of market prices and to eliminate or reduce quantitative or qualitative losses, thereby ensuring the availability of healthy and quality seeds for planting. This practice of using indigenous storage structures is economically beneficial, by making them from the locally available materials. Further this practice enables farmers and producers to self-off their value added produces at strategic times for the best market prices.

***Community fishing***

Fishing is done by the village communities in Kallanthiri tank, Madurai district. This event occurs every year in the drying pond. This activity benefits to 18 villages around this pond. The fresh water fishes caught in this pond is given in the table (1).

On the fishing day, they perform *pooja* in '*Ainthumalai Ayyanar Koil*'. After the *pooja* offered to the deities, the community performs fishing. People use all kinds of materials including towels, shawls, dhothies, bamboo fibre baskets, fishing nets for fishing.

Earlier work on indigenous community practice of combined fishing in Tissa River of Arunachal Pradesh was documented (Battacharjya, 2008). Similar informations are also available (Yadava *et al.*, 1981; Townsley 1993; Goswami, 2000). This method supports the view of communities' cooperation effort in fishing is beneficial; besides this method is found very effective in the deoxygenation of water bodies by continuous mixing through churning of bottom sediments and make the fishes to come out from their hide-outs.

The intellectual knowledge development and practice is a part of traditional lore of the community. It is amazing to note that even in this transitional period, considerable number of traditional methods and practices on food crops preservation are still persisting in some communities. Research and developments are concepts which are not used to those traditional knowledge systems. Conscious measures have to be sought to preserve this tradition to prevent the loss of the valuable asset of the human society.

Documenting traditional knowledge system assists to the present-day living in several ways especially to find strategies to combat the ill-effects of the natural disaster like drought, famine; contributing better to the forestry, wildlife and agriculture management systems. Since the concept of indigenous knowledge is centered on the communities' participation on the environment and biodiversity conservation, this principle contributes and supports to the concept of sustainable life on earth (Mathur, 2007).

Comprehensive and systematic surveys and documentation are required in other unexplored areas and communities to get the valuable information on indigenous food crops management systems before they lost (Kiruba *et al.*, 2008 and Kannan and Annadurai, 2011).

## Conclusion

Traditional knowledge system developed and has been adapted by indigenous community and tribal population for their sustainable livelihood provides enormous benefits even to this modern era. The present study was attempted to undertake the documentation of indigenous

knowledge system developed and practiced by some communities of Tamil Nadu on farming and cattle management. Those advantages are not only limited in providing goods, crop, food substances, medicine, cattle feed and other products; but also provide additional income, economic rehabilitation, stabilization of community, restoration of biodiversity and habitats, knowledge, skills, tools for the sustainable environment and development.

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**Table 1**

**Edible fish varieties caught in Kallanthiri Pond through community fishing**

| S.No | Zoological Name | Local Name |
|---|---|---|
| 1. | *Clarion* sp. | Cat fish |
| 2. | *Catla catla* | Catla |
| 3. | *Channa punctatus* | Kuravai |
| 4. | *Cabeo rohita* | Rohu |
| 5. | *Tilapia mossambica* | Chelappi |

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**Plate 1: Paddy straw mound prepared and used to store paddy seeds**






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**Plate 2: *Cajanus cajan* seeds coated with red soil and dried under sunlight**

**Plate 3: Structure of a '*Kulumai*' used for grains storage by the tribal communities of Chinna Malayur village on Karanthamalai**