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Rationality of Documented Indigenous Technical Knowledge on Coconut Cultivation in Coastal Farming System of Tamil Nadu

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The study was conducted in all the twelve coastal districts of Tamil Nadu with 240 farmers as respondents. The selection of farm respondents was on the basis of their awareness and adoption of indigenous technologies in agriculture, based on personal interview method. The association of farmers with the development agencies working in the study area was also considered as a criterion for the selection. Twenty farmers representing each block of twelve districts in Tamil Nadu with a total of 240 respondents have been identified and assisted in the collection of information on indigenous agricultural practices. On consultation with an expert committee of extension scientists, the identified items were sent to 60 scientist of Tamil Nadu Agricultural University for testing the rationality. The findings of this study revealed that out of 14 indigenous technologies on coconut cultivation, one was found to be irrational. The rational items had higher awareness and adoption. The identified practices being rooted in the rural culture of Tamil Nadu could be easily disseminated through extension system, which may assist in developing eco-friendly agricultural practices and creation of new farming systems for the benefit of resource poor farmers in coastal areas of Tamil Nadu.

Key words: Rationality, Awareness, Adaption, Indigenous Technical Knowledge (ITK)

India, with its diversified geographical features, agro-climatic conditions, fauna and flora is regarded as one of the bio-diversity hot spots of the world. Utilizing the cradle of biological wealth, intellectual knowledge and spiritual wisdom, a wide range of cereals, millets, pulses and horticultural crops are cultivated to meet out the requirements and needs of local population(Emadi, 1998 and Ganesan, 2000). However, the pre and post independence period witnessed a rise of natural vagaries bringing about massive destruction to the food production systems in India. The raising population also forced the Indian food production system (Ganesamoorthy 2000) to use improved package of practices and high yielding varieties, there by deploying huge quantities of agro chemicals. Institutional mechanisms were created with credit linkages, marketing and training to achieve self sufficiency in the food production systems. However, the increased use of chemicals and high yielding varieties resulted in the creation of several social and ecological problems. So an alternative sustainable food production system involving low cost and eco-friendly inputs is being often suggested by policy planners. Keeping this background, a study was undertaken to document the rationality of indigenous technical knowledge in coconut cultivation practised in the costal zones of Tamil Nadu.

Materials and Method

Tamil Nadu is blessed with a long coastal area of 1013 Kms. Almost 25 per cent of resource poor farmers from most backward sections of the society dwell in this zone. This study was undertaken in 12 coastal districts namely Kanyakumari, Tirunelveli, Tuticorin, Ramanathapuram, Pudukottai, Thiruvarur, Thiruvallur, Thanjavur, Nagapattinam, Cuddalore, Villupuram and Kanchipuram.

In each district a block, where huge quantum of indigenous knowledge is in practice for a long time was selected in consultation and discussion with the extension functionaries of State Department of Agriculture, NGOs and scientists of Agricultural Research Stations of TNAU in the respective district. The blocks identified are highlighted in Fig.1.

Fig.1 Map Showing the Study Area

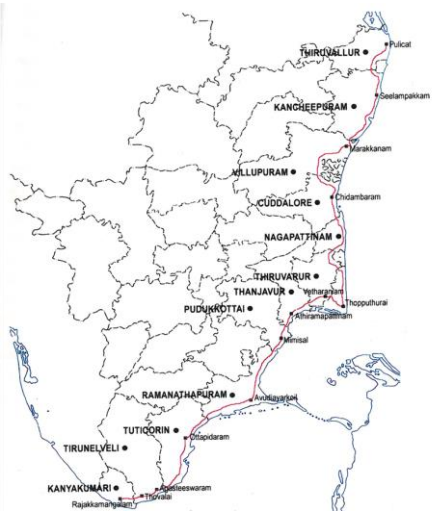

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Table 1. Study area for testing the rationality of ITK on coconut farming

District	Block	Village
Thiruvallur	Pulicat	Kattur
Kancheepuram	Seelampakkam	Padur, Thiruporur
Villupuram	Marakkanam	Vellakulam, Mookaiur
Cuddalore	Chidambaram	Nalanputhur, Kollidam
Nagapattinam	Thopputhurai	Vettaikaranputhur, Vaimedu
Thiruvarur	Vetharaniam	Janpavanoodai, Idumbavanam
Thanjavur	Athiramappattinam	Muthaseri, Pallikondan, Santakottai
Pudukkottai	Mimisal	Muyalikadu, Vengadaikulam
Ramanathapuram	Avudiayarkoil	Nainarkoil, Chatrakudi, Pullangudi, Kottampuli, Muthunal
Tuticorin	Ottapidaram	Pasuvanthanai Yavanaiumvendran
Tirunelveli	Thovalai Agasteeswaram	Leepuram, Thirupathisaram
Kanyakumari	Rajakkamangalam	Palavilai Erumbukkadu

The villages were selected with the assistance of field level functionaries like AAOs and VAOs. A participatory appraisal discussion involving NGOs including Swami Vivekananda Sevashram, Vanoli Uzhavar Sangam, Gramabharathi, Village Community Development Society was done at a workshop organised in Vivekananda Kendra, Kanyakumari. In the selected villages, a pre tested interview schedule was distributed to collect information among identified farmers on indigenous knowledge and practice. Secondary information was also collected from extension functionaries, scientists, field staff of NGOs and aged farmers who belong to the local study area.

From the list of farmers practicing ITK, twenty were identified from different villages within a block in each district. The selection of farm respondents was mainly based on personal interview method. The association of farmers with the development agencies working in the study area was also considered as one of the criterion for selection. A total number of 240 respondents have been identified and assisted in the collection of information on indigenous agricultural practices. The documented information was sent to 60 scientist of TNAU for testing the rationality. For assessing the awareness of indigenous knowledge and items the following formula was used.

$$\text{Awarness quotient Number} = \frac{\text{Number of indigenous knowledge and items known}}{\text{Number of indigenous knowledge and items applicable}} 100$$

In assessing the adoption of ITK and practices indigenous knowledge items, the following formula was used.

$$\text{Adoption quotient} = \frac{\text{Number of indigenous agricultural practices adopted}}{\text{Number of indigenous agricultural practices applicable}} \times 100$$

Results and Discussion

Farmers had been continuously undertaking a variety of experiments with nature over centuries, the results of which have accumulated as indigenous knowledge. Even though, they have been followed for generations, it becomes necessary to understand the scientific rationale underlying each of the indigenous agricultural practices, so as to validate and disseminate the information through various extension programmes. Hence, rationality analysis was performed. From the total of 149 indigenous agricultural practices documented, important ones applicable to coconut cultivation (14 items) as presented in table 2 were subjected to rationality analysis.

Table 2. Awareness, adoption and rationality of indigenous knowledge and items on coconut cultivation

Indigenous knowledge	Rationality score	Awareness		Adoption	
		No.	%	No.	%
Java giant or Jafna – an indigenous coconut cultivar gives high yield.	3.66	177	73.75	63	26.25
In coconut pits, common salt is put before transplanting.	3.28	192	80.00	149	62.08
Flooding of coconut fields helps to wash of termites	2.15	110	45.83	86	35.83
Prolonged application of fish waste in coconut fields improves soil fertility and yield.	3.15	189	78.75	173	72.08
Bee hives in coconut fields improve productivity.	2.79	102	42.50	72	30.00
Branches of seemai karuvel (*Prosopis juliflora*) are tried around the coconut trunk to prevent rodent damage	2.59	172	71.66	139	57.91
While planting coconut seedlings one leaf of *Agave* spp is planted in the pit to retain soil moisture and to control termites.	3.13	199	82.91	135	56.25
Cutting coconut fronds reduces the yield of nuts.	3.00	209	87.08	69	28.75
Cultivation of coconut along with arecanut improves yield of coconut trees.	2.28*	42	17.50*	28	11.66*
Cultivation of banana in coconut is highly remunerative.	3.00	126	52.50	99	41.25
Common salt solution is sprayed to avoid button shedding in coconut.	3.03	109	45.41	61	25.41
Green manures like Kolinjil (*Tephrosia purpurea*), *Dhaincha* and *Sesbania* sp. are raised and ploughed along with neem cake in coconut to south of Thanjavur wilt.	3.19	125	52.08	119	49.58
Cultivation of coconut, rubber, arecanut and cocoa in multiple cropping system is highly remunerative.	2.60	43	17.91	25	10.51
After planting, shade is to be provided to coconut seedlings with coconut or palmyrah fronds to enhance survival percentage	3.67	222	92.50	195	81.25

*IR – Irrational

Rationality, awareness and adoption of ITK on coconut cultivation

The rationality, awareness and adoption level of 14 different indigenous agricultural practices are presented in Table 2.

With regard to item 1 Java giant or Jaffna as an indigenous coconut cultivar giving high yield was ranked with a rationality score of 3.66. Largely, restricted to coastal areas of Tamil Nadu, this variety takes about 8-10 years to attain bearing with large sized nuts. It has the capacity to withstand storms and cyclones and is highly beneficial to coastal farmers. About 73.75 per cent of the farmers were aware of this cultivar and 26.25 per cent raised it in their fields. The reason for lower level of adoption attributes to the adoption of newer varieties of coconut released by TNAU and private nursery normally with a bearing period of 2-3 years. Though these varieties are vulnerable to pest and disease incidence and natural vagaries, farmers raise them for reaping short term benefits.

Placing of common salt in coconut pits before transplanting is advocated to reduce nutrient deficiency. This practice is mostly advocated in areas away from sea shore, which might experience sodium deficiency. About 80.00 per cent of the farmers were aware of this and only 62.08 per cent used. The reason for low adoption attributes to the presence of more sodium ions in coastal areas nearer sea shore. Hence the respondents of the survey did not adopt the practice.

The third item is flooding of coconut fields to wash off termites. This conventional practice carried out as a low cost measure for termite control was known to 43.08 per cent of coastal farmers. However, 35.83 per cent of the farmers only adopted it in their fields as coastal areas do not suffer much from termites. Mainly due to clay, alluvial and silt composition and higher degree of salinity and alkalinity unlike sandy soils the fields might not have colonized by termites. Only in few places away from coastal areas with sandy soil the problem persisted. The category farmers who were aware of the indigenous knowledge adopted the technique in their coconut fields.

The coastal areas rich in fish resource, also generate large quantities of fish waste rich in nutritional status. This waste is placed in coconut fields as a low cost measure to improve the organic content of soil thereby, increasing soil fertility and productivity. About 78.75 per cent of farmers who had coconut fields near to sea were aware of this and 72.08 per cent adopted it in their respective fields.

Bee hives in coconut fields improve productivity is a common belief in coastal areas. The tribals are allowed to place their bee hives (made up off conventional materials) thereby, the land owners get few bottles of honey as remuneration. Tirunelveli and Kanyakumari farmers adopt this practice in regions, little away from coastal areas as the breeze restricts the activity of honey bees. This sort of awareness is available with 42.50 per cent of coastal farmers and 30.00 per cent of them adopted the technology.

The sixth item is branches of seemai karuvel *(Prosopis julifera)* are tied around the trunk of coconut trees to prevent rodent damage. This physical method of rodent control also acts as a measure of controlling coconut theft. Almost, 71.66 per cent of the farmers are aware of the knowledge and farmers 57.91 per cent of them adopted the idea.

The practice of planting coconut seedling along with a leaf of *Agave* spp to retain soil moisture and also controls termite as commonly believed in coastal areas. Fresh water being a scarce resource, effective utilisation holds coconut cultivation at pace. To make use of it and to hold rain water agave is planted in coconut fields. This method is locally known as a no cost technology. It is also known to exhibit termite control and about 82.91 per cent farmers in coastal areas are aware of it a while 56.25 per cent adopted the idea. This ITK was accorded with a rationality score of 3.13 (Table.2)

The cutting of coconut fronds may reduce the yield of coconut is an ITK which received a rationality score of 3.00. About 87.08 per cent of coastal farmers are aware of it and 28.75 per cent of them adopted it. Due to scarcity of labour, the harvesting operation is to be undertaken within a short time. So labourers in hurry cut some times the younger fronds of coconut there by bringing about yield reduction. The young fronds in coconut play an important role in the photosynthesis and reproduction activity. So cutting the young fronts reduces the physiological activity and reduces the bearing capacity of the coconut trees resulting in less yield.

In coastal areas it is commonly believed that cultivation of coconut along with arecanut improves the yield of coconut. It is rated as irrational and assigned with a score of 2.28. Though there is no scientific evidence to prove this statement, a small proportion of coastal farmers belonging to Kanyakumari and Tirnelveli district are aware of this indigenous knowledge (17.50 per cent) and a few adopt it (11.66 per cent) in their field as it fetches them some remuneration from the sale of both coconut and arecanut.

The tenth indigenous item is cultivation of banana in coconut farm giving high remuneration. Raised during the early stages of coconut crop periodical irrigation, application of manures and fertilizers and weeding operations carried out in coconut fields would benefit banana crop also. This has been accorded with a rationality score of 3.00. About 52.50 per cent farmers, mostly belonging to Kanyakumari, Tirunelveli and Ramanathapuram districts are aware of this cultivation practice and around 41.25 per cent of them adopted the technology.

The next item is spraying of salt solution to avoid button shedding in coconut (with rationality score of

3.09). Being used to correct sodium deficiency in coconut fields about 45.41 per cent of in land farmers adjacent to coastal areas are aware of this method and only 25.41 per cent of them adopted it.

In situ ploughing of green manures like *Tephrosia purpurea* and *Sesbania* spp along with neem cake in coconut fields help to control Thanjavur wilt affecting coconut. It has been referred as a rational practice with a score of 3.19. About 52.08 per cent of the farmers are aware of this indigenous knowledge and 49.58 per cent of them adopt it as a control measure against Ganoderma wilt. Mostly, farmers of Thanjavur, Pattukottai, Thiruvarur and Chidambaram of northern Tamil Nadu practice this idea.

It is believed that cultivation of coconut, rubber, arecanut and cocoa together in a multiple cropping system will be highly remunerative and is normally practiced in few coastal districts like Kanyakumari and Tirunelveli. Being recommended as a method of inter cultivation, it is found to be rational by the scientists with mean of 2.60. About 17.91 per cent of the farmers belonging to these two districts are aware of this practice and 10.41 per cent adopt it as a method of raising multiple crops.

The last item of ITK in coconut cultivation is providing shade to coconut seedlings with coconut or palmyrah fronds after transplanting in the main field from coconut nursery. This practice received a rationality score of 3.67 as it could protect the coconut seedlings from scorching due to sun light, thereby improving the germinability assiting in the estabilishment of a good crop stand. Being a low cost technology utilizing the available resources, about 92.50 per cent of the farmers are aware of the technique and 81.25 per cent of them adopted this practice during planting of coconut seedlings Gupta Anil (2000), Sundanamari (2003) and Sujatha et al., (2008) also insisted the importance of ITK and practices in sustainable agricultural production.

Conclusion

The findings of the study reveal that out of the indentified 14 indigenous technologies on coconut cultivation, majority are found to be rational and only one was found to be irrational. Knowledge being accumulated over years of farm experience, the awareness of ITK is high among the resource poor coastal farmers. However adoption of few of this technologies depends on their need, availability of resources like labour in their respective farms. However, most of the identified technologies are eco friendly in nature and found to be rationale by the scientific community. Hence, these T.K and practices can be disseminated though extension functionaries towards creation of new farming systems benefitting the coastal zone coconut farmers of Tamil Nadu.

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