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Research Paper

Agriculture

Technology Dimensions of Kerala Homegardens

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ABSTRACT

Homegardens of Kerala presents a traditional agroforestry system designed to meet the food, fodder, fuel wood and timber requirement of the farm households and to generate supplementary income through the sale of surplus The structural and functional diversity of this farming system makes it a unique one and it is the predominant type of agricultural production system in the state of Kerala. This study was undertaken in the Southern Kerala comprising Thiruvananthapuram, Kollam, Alappuzha and Pathanamthitta districts covering a sample size of 208 homegardens using multi-stage stratified random sampling technique which, examines the different dimension of technology suited for homegarden systems. There has been interplay of several institutions that have led to development of technologies cutting across different crops. Irrespective of the inclusion of crops in homegardens, these technologies have been disseminated by extension systems considering crops in isolation. But, since these crops are only components of a larger system such as a homegarden, the relevance or otherwise of the technologies generated / disseminated need to be thoroughly probed. Technologies that have permeated into the homegardens alone would be relevant to their sustainability. Thus, the identification of such technologies and its dimensions is an important part of the study. On delineation of dimensions of technologies as perceived by homegarden farmers, agricultural officers and scientists, twenty-four dimensions were felt important by all categories of respondents. Additional nine dimensions perceived by the farmers were found to fall out of the ambit of extension and scientific community revealing that there is a major requirement either overlooked by the scientific/extension system, which is yet to be bridged.

KEYWORDS: Homegardens, Technology, Dimensions, Sustainability, Agroecosystems, Attributes

Introduction

Homegarden is one of the oldest forms of agro-ecosystems present with high diversity of useful plants and animals per unit area where its interaction through intervention by man results in a unique combination by high levels of productivity, stability and sustainability. This type of farming enables the farmers to utilise the available land around their house for growing a variety of annuals/seasonal or perennial crops and any other specialized components like sericulture, apiculture and/or fish farming of their best choice based on home requirement and market preferences if surplus is produced subject to the extent of land and resource availability. (Thomas, 2004). There has been interplay of several institutions that have led to development of technologies cutting across different crops. The relevance of technologies generated / disseminated and its dimensions need to be thoroughly probed. Hence, this study envisages delineating the dimensions of technology suited for homegardens.

Materials and methods

Selection of homegardens

Four homegardens, each representing the four categories of holding size (< 25 cents; 25-75 cents; 75 to 125 cents and >125 cents) were selected from 52 panchayats covering the entire region of South Kerala using multistage random stratified sampling technique which made a total sample size of 208 homegardens for the study.

Identifying the dimensions of technology in the homegardens

Based on the review of literature and detailed discussion with experts, a list of dimensions that appeared to be related with homegarden technologies was prepared. The list of attributes/dimensions was subjected to examination by the homegarden respondents, agricultural officers and scientists/experts. They were asked to examine the dimensions critically and also to include additional attributes/dimensions if found necessary. The judges were requested to rate the relevancy of each dimension on a 11-point continuum ranging from most relevant to least relevant with the weightages of 'zero' to 10 respectively. The response from all the homegarden respondents, 50 agricultural officers and 35 scientists / experts were collected. The selection of the final dimensions of technology in homegardens was based on 'cluster analysis' of the data collected. Cluster analysis or pattern analysis or typology analysis is the procedure by which the entities are objectively grouped together on the basis of their nearness (natural association) based on their proximity values and means.

Results

The dimensions of technology in homegarden systems perceived to be important by the homegarden farmers, Agricultural officers and Scientists

The dimensions of technology in homegarden systems perceived to be important by the farmers of all the districts, the agricultural officers in the area of study and scientists / experts of subject matter related to homegarden are dealt separately and presented under the following heads.

a. The important dimensions of technology in homegarden systems as expressed by the homegarden farmers

Forty-eight dimensions of technology under each category for the homegarden farmers were used for hierarcheal clustering. The dendrogram analysis using average linkage method is given in Fig. 1 a

Grouping was done at 12.5 point rescaled distance cluster combine. It was seen that the 48 dimensions segregated itself into four cluster groups and it is presented in Table 1.

Table 1. The important dimensions of technology in homegarden systems as expressed by the homegarden farmers

Cluster No.	Dimensions	Total No.
I	TC8, TC11, SC1, SC2, SC3, PS1, DM1, DM3	8
II	TM2, TM3, TC1, TC3, TC4, TC7, TC9, TC10, TC12, TC13, EN1, EN3, PS2, HR4, DM2	15
III	EC1, EC2, EC3, EC6, TM1, TM4, TC2, TC5, TC14, TC15, EN2, EN4, EN5, PS3, PS5, HR4	16
IV	EC4, TC6, EN6, PS4, PS6, PS7, HR1, HR2, HR3	9

From Table 1, it was observed that cluster number III was the largest, holding 16 dimensions followed by cluster II with 15 dimensions, cluster IV with 9 dimensions and cluster I with eight dimensions. On careful examination of the association and mean values of the different dimensions it was evident that the dimensions in cluster III, IV and I were perceived to be more important by the homegarden respondents than that of cluster II where the means of its dimensions were relatively low. Thus it could be inferred that 33 dimensions were seen to be important from farmer's point of view. They were initial cost, continuing cost, income generation potential, regularity of returns and employment generation potential under economic dimensions. The homegarden respondents rated sustainability and rapidity of returns under temporal dimensions with high importance. Under technical dimensions the most important dimensions as per the farmers say was efficiency, profitability, suitability, local resource utilisation, followed by communicability, decrease in discomfort, and observability in the order. Resource recycling capacity, availability of raw materials, availability of supplies and services were clustered together in group III with closer association and infrastructural development in cluster IV under environment dimensions indicates that all these dimensions were important for the homegarden farmers. Under psychological dimensions goal orientation in cluster I followed by attitude and level of satisfaction in cluster III and perceived social status, scientific orientation and perception of technology in order were rated to be as important dimensions as perceived by the homegarden farmers themselves. Record keeping dimension and Extension officers influences were rated to be high under decision-making dimensions. Family labour, hired labour and physical labour requirement were falling in the same cluster group IV of human resource dimension where the means of the dimension clearly showed that the most important was family labour.

Hence it could be inferred that the homegarden respondents rated a total of 32 dimensions as important dimensions of technology for homegardens.

b. The important dimensions of technology in homegarden systems as expressed by the Agricultural Officers

The forty eight dimensions that were rated by the farmers were administered to the agricultural officers for hierarchial clustering. The dendrogram results are presented in Fig. 1 b.

When the grouping was attempted at 12.5 rescaled distance cluster combine the 48 dimensions got segregated into three clusters as illustrated in Table 2.

Table 2. The important dimensions of technology in homegarden systems as expressed by the agricultural officers

Cluster No.	Dimensions	Total No.
I	EC 5, TM 2, TC 1, TC 2, TC 3, TC 4, TC 6, TC 8, TC 9, TC 12, TC 13, EN 1, EN 3, EN 6, PS 4, DM 2	16
II	EC 4, TM 3, TC 14, PS 2, HR 2, HR 3	6
III	EC 1, EC 2, EC 3, EC 6, TM 1, TM 4, TC 5, TC 7, TC 10, TC 11, TC 15, EN 2, EN 4, EN 5, SC 1, SC 2, SC 3, PS 1, PS 3, PS 5, PS 6, PS 7, DM 1, DM 3, HR 1, HR 4	26

The agricultural officers rated five out of 15 technical dimensions important and they were profitability, availability, simplicity, observability and local resource utilization. It was observed that three of the six environmental dimensions were felt important for technology in homegarden and were having closer associations. They were resource-recycling capacity, availability of raw materials and availability of supplies and services. All the three socio-cultural dimensions were felt important by the agricultural officers with respect to technology in homegarden. Likewise in case of psychological dimensions except that of aspirations and perceived social status all other dimensions were equally important for the farmers according to the opinion of agricultural officers. Record keeping dimension and extension officers influences were rated to be highly important under decision making dimensions and finally in case of human resource dimensions two dimensions namely family labour and skilled labour requirement were found to be more important dimensions for homegarden farmers in the opinion of agricultural officers. Thus to conclude, a total of 26 out of 48 dimensions were perceived to be important dimensions of technology in the homegarden as rated by the agricultural officers.

c. The important dimensions of technology in homegarden systems as expressed by the Scientists

It was interesting to note from the Fig. 1c that the forty eight dimensions of study clearly clustered into two definite clusters when grouping was done at 12.5 rescaled distance cluster combines and the data are presented in Table 3.

Table 3. The important dimensions of technology in homegarden systems as expressed by the scientists

Cluster No.	Dimensions	Total No.
I	EC 4, EC 5, TM 2, TM 3, TC 1, TC 2, TC 3, TC 4, TC 6, TC 8, TC 9, TC 12, TC 13, TC 14, EN 1, EN 3, EN 6, PS 4, DM 2, HR 2, HR 3, HR 4	22
II	EC 1, EC 2, EC 3, EC 6, TM 1, TM 4, TC 6, TC 7, TC 10, TC 11, TC 15, EN 2, EN 4, EN 5, SC 1, SC 2, SC 3, PS 1, PS 2, PS 3, PS 5, PS 6, PS 7, DM 1, DM 3, HR 1	26

From the table it was observed that cluster II was the largest, holding 26 dimensions followed by cluster I with sixteen dimensions and cluster II with only6 dimensions.

From a careful analysis of the cluster group it was interesting to note that all the dimensions falling in cluster II was rated with higher importance than that of dimensions in cluster I

The cluster group II had dimensions that were rated with higher importance and all the category of major dimensions occurred in the cluster namely, economic dimension, temporal dimension, technical dimensions, environmental dimensions, sociocultural dimensions, psychological dimensions, decision making dimensions and human resource dimensions.

Hence from the Table 3 it could be inferred that initial cost, continuing cost, income generation potential and regularity of returns were the most relevant in economic dimensions as per the say of the agricultural scientists. In case of temporal dimensions sustainability followed by time utilization pattern and rapidity of returns were rated of high relevance by the respondents.

A perusal of Table 3 revealed that 26 out of 48 dimensions were clustered in group two and the rest in group one. Good association was observed in both the groups but the superior dimensions were all clustered together in group two and it was the similar pattern as noticed in case of cluster III of agricultural officers rating except for the case where skilled labour requirement under human resource dimension was not considered an important dimension and aspirations of farmers under psychological dimension which was considered important according to the scientist community.

Hence from the above three Tables 1, 2 and 3 it could be inferred that there are common dimensions under different categories which can be construed as the most important dimension of technology for the homegarden farmers. These dimension that came to be common for all the three respondent groups are presented in Fig. 1.

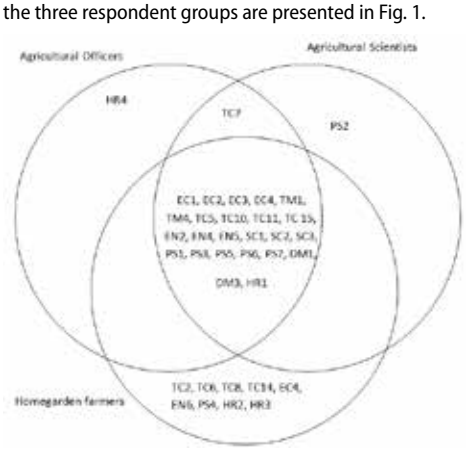


Fig. 1. Perception of homegarden farmers, agricultural officers and scientists on technology dimensions of homegardens

Thus to conclude the dimensions of technology for homegarden farmers identified were

(1) Economical dimensions
1) Initial cost; 2) Continuous cost; 3) Income generation potential; 4) Regularity of returns

(2) Temporal dimensions
1) Sustainability; 2) Rapidity of returns; 3) Availability of supplies and services

(3) Technical dimensions
1) Profitability; 2) Simplicity; 3) Observability; 4) Local resource utilization

(4) Environmental dimensions
1) Resource recycling capacity; 2) Availability of raw materials

(5) Socio-cultural dimensions
1) Social acceptability; 2) Social approval; 3) Cultural compatibility

(6) Psychological dimensions
1) Goal orientation ; 2) Attitude; 3) Level of satisfaction; 4) Scientific orientation; 5) Perception of technology

(7) Decision making dimension
1) Record keeping; 2) Extension officer's influence

(8) Human resource dimension
1) Family labour

Discussion

Homegardens being a small unit but with an array of crop-animal-specialised components mix combine made it necessary that initial cost, continuous cost, income generation potential and regularity of returns to be perceived as the important economic dimensions of technology in the homegarden systems. The evolving nature of homegarden demands needs specific technologies taking into account the perennial nature of crops, its gestation period and practices involved in it. The returns obtained from such crop should form the basis of dimensions to be considered while generating and applying a technology in homegarden. Sustainability and rapidity of returns under temporal dimension; resource recycling capacity, availability of raw materials and availability of supplies and services under environmental dimensions was perceived to be important by all categories of respondents. The homegardens being apparently a climax ecosystem, where ecological succession is consciously manipulated by human beings, the aforesaid dimensions were perceived to be equally important by all the categories of the respondents. High intensity of vertical and horizontal space use, highly dynamic chronological structure and the capacity to perform essential ecological processes makes homegarden ecosystem a sustainable one through the use of resources and resource recycling. The findings of the study are in conformity to the results of Jose and Shanmugaratnam (1994). Profitability, simplicity, observability and local resource utilization was perceived to be important dimensions as there is always the potential to increase homegarden food production and income by launching programmes on technical assistance and effective utility of existing resources. The results of the study reinforce the findings of Dharmasena and Wijeratna (1998). Homegardens presenting a land use system where the different components of homegardens (tree-crop-livestock-specialised component mix) interact and associate should be more as a result of intensive intervention by the family labour. This help the homegarden farmer to place before the homegarden the dimensions of social approval, social acceptability and cultural compatibility. This was evident from the fact that homegarden respondents had a tendency to use the perennial agroforestry tree crops to the outer region of homegarden facilitating income from it to their own garden but effectively utilizing the resources from the neighbouring homegardens, which brings into light the importance of socio-psychological dimensions. The role of extension officers with respect to exertion of their influence and persisting the need for book keeping (record maintenance) on the activity involved in homegardens should be enforced or seen as their duty in order to make homegarden a meaningful agricultural system.

Conclusion

On delineation of dimensions of technologies as perceived by homegarden farmers, agricultural officers and scientists, twenty-four dimensions were felt important by all categories of respondents. Additional nine dimensions perceived by the farmers were found to fall out of the ambit of extension and scientific community revealing that there is a major requirement either overlooked by the scientific/extension system, which is yet to be bridged.

Fig.1. Dendrogram using average linkage for identifying the important dimensions of technology for homegardens as perceived by a) homegarden farmers, b) agricultural officers and c) scientists

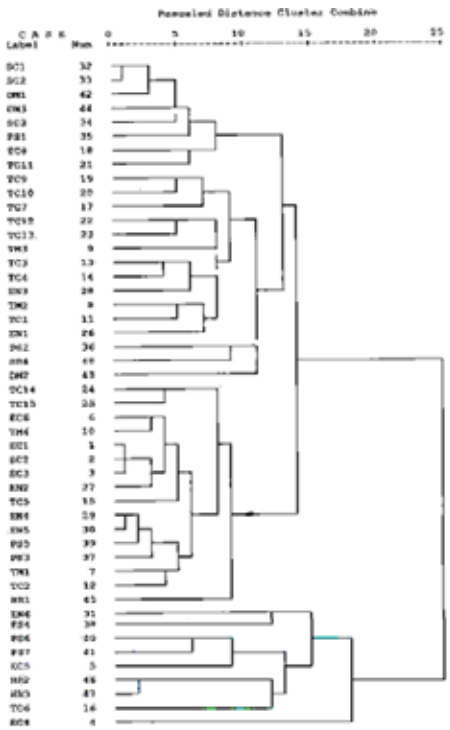


Fig. 1a. Homegarden farmers

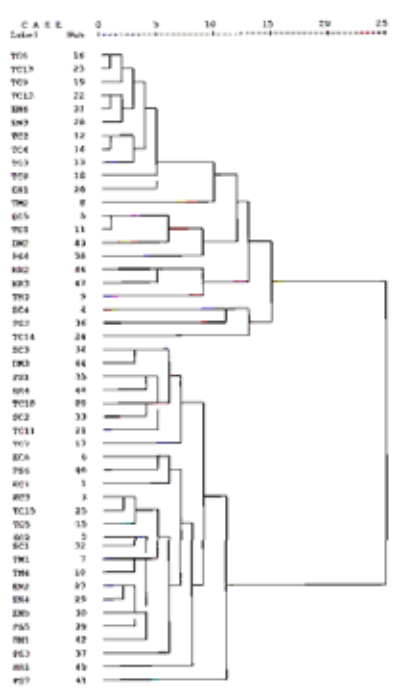


Fig. 1b. Agricultural Officers

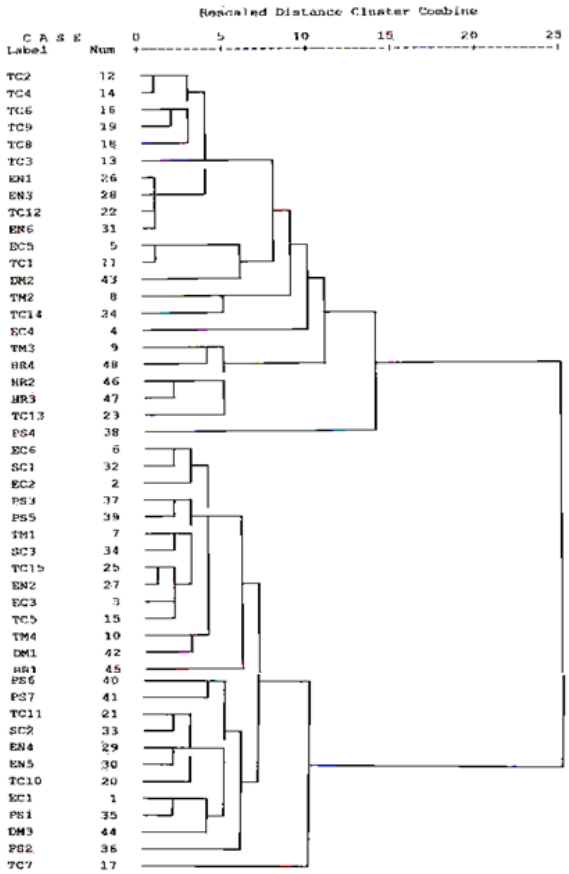


Fig. 1c. Scientists

A. Economical dimensions- Ec1. Initial cost; Ec2.Continuing cost; Ec3.Income generation potential; Ec4.Employment generation potential; Ec5.Commercialization; Ec6. Regularity of returns. **B. Temporal dimensions-** Td1. Sustainability; Td2.Time saving; Td3. Time utilization pattern; Td4. Rapidity of returns; Td5. Availability of supplies and services. **C. Technical dimensions-** Tc1. Physical compatibility; Tc2. Efficiency; Tc3. Trialability; Tc4. Complexity; Tc5. Profitability; Tc6. Communicability; Tc7. Availability; Tc8. Decrease in discomfort; Tc9. Flexibility; Tc10. Simplicity; Tc11. Observability; Tc12. Viability; Tc13. Desirability; Tc14. Suitability; Tc15. Local resource utilization. **D. Environmental dimensions-** Ed1. Energy saving potential; Ed2. Resource recycling capacity; Ed3. Spatial threshold; Ed4. Availability of raw materials; Ed5. Infrastructure development. **E. Socio-Cultural dimensions-** Sc1. Social acceptability; Sc2. Social approval; Sc3. Cultural compatibility. **F. Psycho-logical dimensions.** Ps1. Goals orientation; Ps2. Aspirations; Ps3. Attitudes; Ps4. Perceived social status; Ps5. Level of satisfaction; Ps6. Scientific orientation; Ps7. Perceptions of technology

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