

## **Technology Needs Assessment in the Homegarden Systems**

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### **ABSTRACT**

*The study was conducted in four districts of Kerala covering a sample size of 208 homegardens using multi-stage stratified random sampling technique representing the three major agro climatic zones viz. lowland (problem zone), highland and midland. The primary objective of the study was to identify the technology needs of the homegarden farmers. Maximum technology need was reported for unexploited and under exploited horticultural tree crops which was on par with fruit tree crops (mango and jack) and followed by beverage crops. Processing, value addition and storage requirements were immediate technology needs of the homegarden farmers. Drainage and soil amendment technologies were reported to be important for Alappuzha homegarden farmers.*

Technology can be defined as any information which has got some practical utility for the users and which has been tested as feasible, crude, economically viable, socially acceptable and environmentally harmless under user's conditions. The ultimate objective of research in agriculture is to develop technologies that are suitable for users. In Kerala, homegardens forms the basic and important form of agricultural production system covering more than 70 per cent of its land area facilitating the interaction of Tree- crop-animal husbandry-specialized components mix combination in an intensive manner. Evolving new technology is an endeavour in the direction of increasing production efficiency (Swaminathan. 1979). The rapid technology progress and the increased rate of obsolescence of technologies necessitate technology forecasting for any planning process especially to understand the technology needs of homegardens as only a

very little research has been undertaken in this direction. Technology needs can be defined as a probabilistic prediction of technological changes in terms of future characteristics of useful machines, systems or procedures and needs of the clients (Rao, 1998). Keeping in mind the aforesaid facts a research study was undertaken in Southern Kerala for identifying the technology needs of the homegardens.

### **METHODOLOGY**

This study was undertaken in Southern Kerala comprising Thiruvananthapuram, Kollam, Alappuzha and Pathanamthitta districts covering a sample size of 208 homegardens using multi-stage stratified random sampling technique. After the feedback from the farmers during pilot survey and discussion with experts, the researcher came out with some concrete specification

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regarding various technology/ scientific operations and the technology needs of farmers were worked out.

The needs assessment was worked out by using score/rank as stated below.

<b>Score/Rank</b>	<b>Criteria</b>
1	Technology not available (most needed)
2	Technology available but not applicable
3	Technology available but not sustainable
4	Technology available, applicable and sustainable

The technology needs of farmers vary according to the crops they cultivate, the managerial levels in which they operate, the deficits in the demand and supply of the crops they raise with reference to the specificities of the land they engages for cultivation and the agronomic norms the plant demands. It was with these perspectives, grouping of technology needs of the farmers were done and classified into the aforesaid broad categories. The categories are so framed and named so as to accommodate all the crops. The technology needs with reference to all these 14 parameters *viz.*, variety, planting material, selection of intercrops, spacing, irrigation management technologies, soil amendment technologies, nutrient management technologies, pest management technologies, disease management technologies, homegarden machinery,

drainage technologies, storage technologies, processing technologies and value addition technologies were collected in the above said scale for all the categories of crops raised by the homegarden farmer.

Thus technology needs scores of all the 52 farmers of each of the four districts were tabulated and subjected to statistical analysis. The scores assigned being in ordinal scale, the non-parametric test of analysis of variance (Kruskal - Wallis test) was administered. In order to assess the need disparities between the different districts, Chi-Square test was again employed for obtaining the results

## **FINDINGS AND DISCUSSION**

The results for technology needs assessment was made for knowing the category of crops that needed technology for homegarden farmers in their district (Table 1) and technology need for each category of crops with respect to their practices in each district (Tables 2 to 5).

### **a. Technology needs of crops in different districts**

From Table 1, it is evident that the highest needs for technology (or the low technology availability) was recorded for under and unexploited horticultural tree crops, which was on par with that of fruit trees (mango and jack) and beverages in Alappuzha district. The lowest need of technology was for rubber and was on par with that of spices. The need for technology of remaining crops in the

**Table 1.**  
**Technology Needs of Crops in Different Districts**

Sl. No.	District Crop	TVM	KLM	ALP	PTA
1	Vegetables	81.500	115.813	135.833	88.318
2	Tubers	129.121	116.087	133.047	144.217
3	Coconut	141.673	130.847	159.510	140.192
4	Spices	183.848	178.125	189.890	182.262
5	Beverages	90.167	38.765	32.790	95.600
6	Fruits	85.355	89.068	88.580	83.453
7	Fruit trees	33.788	37.481	50.670	34.920
8	Under and unexploited horticultural tree crops	14.375	15.375	22.770	13.880
9	Rubber	183.813	183.971	203.160	214.680
10	Cashew	37.250	48.250	69.000	33.143
	Chi	157.711	172.0416	187.3327	191.3079
	C.V.	41.26915	48.886	41.60251	47.76447

decreasing order of need was for cashew, fruits (banana and pineapple), tuber, vegetable and coconut.

For homegarden farmers in Kollam district higher need for technology was again recorded for under and unexploited horticultural tree crops and was on par with that of fruit trees, beverages and cashew. High availability of technology (low need for technology) was recorded for rubber and was on par with that of spices. The technology needs of other crops in the decreasing order of needs were for fruits (banana and pineapple), vegetables, tubers and coconut.

The technology needs for homegarden farmers of Pathanamthitta was also highest

in case of under and unexploited horticultural tree crops, which was on par with that of cashew and fruit trees. The lowest technology need was for rubber that was on par with that of spices. The technology need for other crops as expressed by the homegarden farmers of Pathanamthitta in the decreasing order of needs was for crops like fruits (pineapple/banana), vegetables, beverages, coconut and tubers.

The highest technology need of homegarden farmers of Thiruvananthapuram district was recorded for under and unexploited horticultural tree crops that were on par with that of fruit trees (mango and jack) and cashew. The lowest need of technology was

recorded for spices crops, which was on par with rubber. The need for other crops in the decreasing order of need was for vegetables, fruits (banana/pineapple), beverages, tubers and coconut.

**b. Technology needs specific for crop categories with respect to scientific practices in Thiruvananthapuram, Kollam, Alappuzha and Pathanamthitta districts**

**Table 2.**  
**Technology Needs for Crops with Respect to Different Practices in Thiruvananthapuram District**

Crop/Cultural practices	Variety	Planting material	Selection of intercrop	Spacing	Irrigation management	Soil amendment	Nutrient management	Pest management	Disease management	Home garden machinery	Drainage technology	Storage technology	Processing	Value addition	Chi <sup>2</sup> (C.V)
Vegetables	102	105.292	68.625	105.292	109.33	109.33	109.33	109.33	89.125	58	109.33	36	36	36	80.329 (38.921)
Tuber	290.5	290.5	194.83	256.88	184.03	290.5	290.5	144.81	139.21	99.21	284.90	235.5	111.14	36.5	254.3261 (60.401)
Coconut	509.5	509.5	413.702	344.72	395.85	509.5	509.5	332.52	263.52	163.17	509.5	509.5	66.27	66.27	550.2676 (80.84)
Spices	424.5	424.5	424.5	424.5	393.93	424.5	409.22	363.37	348.09	355.35	393.93	424.5	378.65	164.7	503.6872 (53.808)
Beverages	394.5	394.5	394.5	394.5	394.5	394.5	394.5	394.5	394.5	394.5	394.5	352.83	394.5	352.83	93.9118 (33.74)
Fruit	457	457	332.66	372.48	370.92	478.31	457	428.31	457	202.16	457	62	62	62	2382.225 (62.644)
Fruit trees	498	498	342.02	145.79	443.96	422.35	476.38	374.44	465.58	208.02	498	122.73	52.46	52.4	3127.661 (57.2)
UUHTC	68	164.25	145.875	127.06	127.06	145	131.66	131.66	131.66	76.97	103.88	68	76.97	76.97	70.4187 (44.91)
Rubber	75	75	19.37	75	32.46	75	75	26.5	32.56	75	75	75	75	5	100.4412 (31.826)
Cashew	87	80.83	46.75	33.75	39.92	87	62.33	40.25	46.75	11.5	87	11.5	36.67	11.5	252.518 (27.603)

UUHTC-Un and under exploited horticultural tree crops

A detailed perusal of Tables 2 to 5 indicates that there is significant difference in need for technology among different crops in different districts.

The highest technology needs reported by the homegarden farmers of Thiruvananthapuram district was for value addition irrespective of all crops and the districts of study. The lowest technology needs or the highest technology availability was reported for irrigation management, soil amendment, nutrient management, pest

management and drainage technology, which was on par with planting material, spacing, variety and disease management mainly for vegetables, tubers, coconut, spices, fruits (banana and pineapple) irrespective of the districts of study. However differences were noted in Alappuzha district where, in addition to high technology needs for storage, processing and value addition, technology needs for drainage was felt very important by majority of the homegarden farmers employed with vegetable cultivation.

**Table 3.**  
**The Technology Needs for Crops with Respect to Different Practices in Kollam District**

Crop/ Cultural practices	Variety	Planting material	Selection of intercrop	Spacing	Irrigation manage- ment	Soil amend- ment	Nutrient manage- ment	Pest manage- ment	Disease manage- ment	Home garden machinery	Drainage techno- logy	Storage techno- logy	Proce- ssing	Value addition	Chi <sup>2</sup> (C.V)
Vegetables	73	73	58.75	73	73	73	73	73	62.785	37.375	73	16	16	16	90.7246 (31.826)
Tuber	232	232	152.174	198.478	153.783	232	232	120.261	114.674	74.543	226.413	185.523	78.152	29	205.1919 (53.808)
Coconut	479.5	479.5	389.561	326.316	371.704	479.5	479.5	319.867	245.276	153.663	479.5	479.5	62.806	62.806	517.4835 (78.473)
Spices	412.5	412.5	224.79	365.57	365.57	412.5	412.5	365.57	365.57	298.64	389.04	365.57	365.57	177.86	1572.619 (59.353)
Beverages	411.5	411.5	411.5	394.62	377.44	411.5	411.5	360.85	251.56	223.56	411.5	265.32	348.85	140.03	491.7938 (46.285)
Fruit	403	403	362.43	360.32	375.95	403	403	389.48	375.95	354.11	403	386.70	174.86	44.5	780.5557 (52.629)
Fruit trees	477	477	285.33	319.85	430.81	367	390.71	407	348.42	395.56	477	53.5	53.5	53.5	5404.33 (57.199)
UUHTC	68	164.25	145.88	127.06	127.06	145	131.66	131.66	131.66	76.97	103.88	68	76.97	76.97	70.4518 (44.909)
Rubber	154.5	154.5	47.56	154.5	66.79	154.5	154.5	48.0	110.65	154.5	154.5	154.5	154.5	9.5	202.90 (46.285)
Cashew	47.5	39	30.5	24.5	18.50	47.50	39	24.5	30.50	7.5	47.5	7.5	27.5	7.5	44.980 (22.604)

UUHTC-Un and under exploited horticultural tree crops

For tuber crops a similar pattern of technology needs was observed for the homegarden farmers of Kollam and Pathanamthitta districts except for suitable processing technology and homegarden machinery which was felt to be a highly needed technology requirement for the homegarden farmers of Kollam and Pathanamthitta.

The technology needs of homegarden farmers of all the four districts of study for coconut were following a similar pattern for highest and lowest technology needs except in case of drainage technology which was a felt need by the homegarden farmers of Alappuzha district. The need for technology in other areas for coconut growers were for homegarden suited machineries, pest and disease management technology, spacing,

irrigation management technology and selection of intercrops.

In case of spice growing homegarden farmers of Pathanamthitta district, highest needs for technology was reported for homegarden machinery whereas the highest needs for technologies in Alappuzha district was reported for drainage technology and was on par with that of homegarden machinery, value addition and pest management. Unlike other crops for Beverages the highest technology needs for homegarden farmers in Thiruvananthapuram districts was for value addition which was on par with all other technology needs like varieties, planting material selection, selection of intercrops, soil amendment, nutrient management, homegarden machinery, disease management, storage, processing and pest management

**Table 4.**  
**The Technology Need for Crops with Respect to Different Practices in Alappuzha District**

Crop/ Cultural practices	Variety	Planting material	Selection of intercrop	Spacing	Irrigation manage- ment	Soil amend- ment	Nutrient manage- ment	Pest manage- ment	Disease manage- ment	Home garden machinery	Drainage techno- logy	Storage techno- logy	Proce- ssing	Value addition	Chi <sup>2</sup> (C.V)
Rice	58.5	58.5	6.58	23	58.5	58.5	58.5	52.58	58.5	21.17	23	52.58	58.5	6.58	77.9066 (27.60)
Vegetables	137	137	129.97	137	137	137	137	137	132.07	129.97	31.5	31.5	31.5	31.5	197.8943 (43.49)
Tuber	215	215	156	204.48	157.12	215	215	125.55	115.02	105	34.5	189.21	83.62	34.5	199.608 (51.42)
Coconut	512.5	512.5	421.56	347.6	404.41	512.5	512.5	340.07	266.11	168.54	364.66	512.5	64.75	64.75	513.4261 (80.07)
Spices	82.5	82.5	70.83	70.83	82.5	82.5	82.5	41.67	82.5	13.11	11.0	76.67	76.67	33.22	96.32 (33.74)
Beverages	88.12	196	77.21	192.79	189.59	196	157.47	125.41	125.41	65	65	65	65	65	185.7103 (46.28)
Fruit	463	463	388.95	409.45	314.91	463	463	463	463	232.7	83	83	83	83	5693.702 (64.42)
Fruit trees	504.5	504.5	255.67	161.60	289.05	449.88	504.5	477.19	419.53	504.5	504.5	59.5	59.5	59.5	20155.07 (60.40)
Rubber	492.5	492.5	455.95	236.95	173.41	221	356.14	433.32	492.5	474.5	402.5	402.5	492.5	492.5	2573.357 (52.62)
UUHTC	154	154	51.41	154	66.06	154	154	53.5	110.03	154	53.5	154	154	8.5	195.1737 (44.91)
Cashew	47.5	39	30.50	24.5	18.5	47.5	39	24.5	30.5	7.5	47.5	7.5	27.5	7.5	44.98 (22.60)

UUHTC-Un and under exploited horticultural tree crops

technologies which signifies the necessity of focusing on almost all technology needs.

The district wise analysis for fruit trees (Mango and jack) and under and unexploited horticultural tree crops showed a more or less similar pattern in technology needs. Highest technology needs for the under and unexploited horticultural tree crops in Thiruvananthapuram was for storage technologies and variety, which was on par with that of homegarden machinery, processing, value addition and drainage technologies. Lowest technology need was for planting material, which was on par with that of selection of intercrops, soil amendments, nutrient management, pest management, disease management, spacing and irrigation management. In case of Kollam homegarden

farmers there was a noted difference where the farmers felt high need for suitable intercropping technologies.

Except in case of Alappuzha district the results were the same like that of other crops in case of all other districts of study when it comes to homegarden rubber growers. However, in Alappuzha district the highest needs of technology was reported for irrigation management which was on par with the needs for soil amendment technologies.

In case of cashew based homegardens, the highest technology needs reported by the homegarden farmers of Thiruvananthapuram district was for value addition, storage and homegarden machinery, which were on par with spacing and processing. Lowest need for technology was for variety, soil amendment

**Table 5.**  
**Technology Needs for Crops with Respect to Different Practices in**  
**Pathanamthitta District**

Crop/ Cultural practices	Variety	Planting material	Selection of intercrop	Spacing	Irrigation manage- ment	Soil amend- ment	Nutrient manage- ment	Pest manage- ment	Disease manage- ment	Home garden machinery	Drainage techn- ology	Storage techn- ology	Proce- ssing	Value addition	Chi <sup>2</sup> (C.V)
Vegetables	95.27	98.23	61.41	98.23	102.64	102.64	102.64	102.64	80.59	51.09	102.64	29	29	29	90.3685 (37.27)
Tuber	293	293	214	258.5	183.75	293	293	149.25	143.50	64	293	281.5	154.5	33	284.1808 (61.431)
Coconut	509.5	509.5	413.70	344.70	395.85	509.5	509.5	332.52	263.52	163.17	509.5	509.5	66.27	66.27	550.2676 (80.837)
Spices	422.5	422.5	422.5	422.50	422.5	422.5	388.98	305.17	321.93	209.55	422.5	355.45	422.5	369.36	641.7358 (51.423)
Beverages	397	397	397	397	397	397	397	397	397	397	397	359.4	321.6	287.45	114.3375 (35.551)
Fruit	451.28	460.5	322.22	338.53	349.88	451.28	460.5	432.84	460.50	88.31	460.5	63.5	63.5	63.5	2845.583 (63.441)
Fruit trees	494	494	367.84	140.92	393.7	425.84	448.56	436	430.92	263.90	494	317	51.5	51.5	2587.379 (56.092)
UUHTC	72.5	176.15	157.97	136.76	132.59	159.68	137.24	137.24	137.24	83.82	115.29	72.5	81.53	72.5	80.069 (46.29)
Rubber	410.5	410.5	410.5	399.59	370.21	410.5	410.5	248.49	360.13	410.50	400.43	400.43	410.5	41.09	1463.419 (65.389)
Cashew	401	401	401	401	401	401	401	401	401	293.15	344.64	401	347.07	21.07	55.2508 (29.789)

UUHTC-Un and under exploited horticultural tree crops

and drainage technologies, which was on par with that of planting material and nutrient management. The technology needs of other practices in the decreasing order of need were for irrigation management, pest management, disease management and selection of intercrops.

Homegardens with rice cultivation was found in Alappuzha district and hence the technology needs assessment was done only for Alappuzha district. The highest needs for technology were for value addition and selection of intercrop and were on par with that of disease management, spacing and drainage technologies. The lowest need for technologies were for variety, planting material, irrigation management, soil amendments, nutrient management, disease management and processing and was on par

with that of storage and pest management technologies.

Generalizing the results, it was interesting to note that the technology needs of farmers for different crop categories were recorded maximum for value addition, processing and storage unlike the perceived traditional requirements. Hence it could be concluded that farmers had definite technology needs with respect to different crop categories, different practices and it also varied in terms of districts.

## CONCLUSION

The overall study evidently proved that the maximum technology needs was reported for unexploited and under exploited horticultural tree crop components which was on par with

that of fruit tree crops (mango and jack) followed by beverages and cashew irrespective of respondents from all the districts. Also for various categories of crops, it was seen that farmers required more technologies for processing, value addition and storage irrespective of all crop categories and the different areas of study except in case of Alappuzha district where respondents clearly indicated the need for drainage and soil amendment technologies. GOK (2013) emphasis on creation of a food chain starting from the homegarden gate to retail outlets is inevitable for farmers to earn a greater share of the product sale revenue after adding value to their own produce. Homegardens suited technologies/machineries and irrigation technologies were also to be developed as it was reflected in the results of the study. Technology requirement worked out based actual homegarden situation thus provides a

holistic approach to enhance the functional diversity of homegardens enabling farmers to derive better returns from the different components in the homegardens fulfilling the objectives set forth in the technology assessment of homegarden systems.

## REFERENCES

- Barkema, A and Drabentstott, M. 1995. The Many Paths of Vertical Coordination: Structural Implications for the US Food Systems. *Agric business*, 11(5):483-492
- GOK (Government of Kerala) 2013. Draft Agricultural Development Policy of Kerala State. 381p.
- Rao, K.R. 1998. Export Oriented Floriculture- The Future. *Indian Hort.* 34:5-9
- Swaminathan, M.S. 1979. Improved Agronomic Practices for Dryland Crops in India. All India Co-ordinated Research Project for Dryland Agriculture, Hyderabad, 175p.