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Characteristics of homestead cultivators and their adoption pattern of resource management strategies

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Abstract

Homestead farming has been the means of agricultural productivity and income in a sustainable manner. But, poor risk management in homestead farming leads to a decline in farmers' earnings and further leads them to resort to inefficient resource management strategies. The study aims to understand the characteristics of cultivators and their adoption pattern of resource management strategies. The study was conducted in six panchayats of Kannur district and had a sample size of 150 homesteads. Along with the sociodemographic profile, the adoption of resource management strategies, which were grouped into management of changes in land use, soil and water management practices, nutrient management practices, pest and disease management practices, and practices for maintaining biodiversity within the homestead, was analysed using the adoption percentage and total adoption rate. The study revealed that the majority of farmers were old, with an education of high school, and had an annual income of up to one lakh. Most of the cultivators had fragmented land but higher farming experience. Agroforestry, contour farming, use of house refuse and animal manure, plant-based preparations as pesticides, and multicropping were the highly adopted strategies among each category. The study concluded that it is essential to bridge the knowledge gap, promote diversification, training, and engaging youth are essential to enhance productivity and promote homestead cultivation.

Keywords: Homestead cultivators, socio-economic characteristics, adoption pattern, resource management practices

Introduction

Agricultural land use in Kerala has been facing significant changes since the land reforms. A significant portion of land has been converted to housing due to homestead allocations, private ownership, and investments from migrants (Gopikuttan, 1990; Raj and Azeez, 2009) [8, 10]. Hence, a renewed focus on homestead cultivation to close the gap between supply and demand has been brought about by the drop in local food production as well as health concerns about pesticide-laden imports (Balakrishnan, 2015) [9]. Homestead is an operational farm unit in which a number of crops are grown with livestock, and/or fish production, mainly to satisfy the household's basic needs (Nair and Sreedharan, 1986) [6]. Homestead farming has been the means of agricultural productivity and income in a sustainable manner (John, 2014) [5]. In Kerala, there has been a structural change in the land-use pattern within agriculture, causing a shift from food to non-food crops aiming for economic benefits (Jaslam *et al*., 2017) [3]. But, in the current scenario, homestead cultivation in Kerala is at a crossroads as these plantation crops have also become non-profitable. Poor risk management in homestead farming also leads to a decline in farmers' earnings and further leads them to resort to inefficient resource management strategies. In this scenario, this study is formulated to fill this gap by understanding the characteristics of homestead cultivators and their adoption pattern towards resource management strategies.

Materials and Methods

The study was conducted in Kannur district of Kerala, as it has the highest net sown area with the three physiographic regions such as, highland, midlands, and lowlands, among the districts of Northern Kerala. Three blocks, namely, Thaliparamba, Iritty, and Payyannur, were randomly selected from the highland, midland, and lowland regions of the district. From each block, two panchayats were randomly selected. Naduvil and Chapparapadavu panchayats from Thaliparamba block, Payam and Ulikkal panchayats from Iritty block, and Cheruthazham and Kunhimangalam panchayats from Payyannur block were selected, forming a total of six panchayats as the study area. 25 households with a minimum landholding of 30 cents were purposively selected from each of the selected panchayats, forming a total sample size of 150 homesteads. The primary data was collected using a well-structured

interview schedule. Secondary data was collected from government reports, research studies, and other published data sources. The various resource management strategies were identified through a thorough literature review and were classified into different groups, such as management of changes in land use, soil and water management practices, nutrient management practices, pest and disease management practices, and practices for maintaining biodiversity within the homestead. The collected data was analysed using MS-Excel and SPSS software. Farmers' responses were classified into three groups: adopted, partially adopted, and not adopted, with corresponding scores of 2, 1, and 0 assigned to each category. Resource management strategies that homestead cultivators have implemented in full are classified as adopted, those applied selectively, occasionally, or limited to specific farm components are classified as partially adopted, and those not implemented at all are classified as not adopted. The adoption of each of the management practices by the homestead cultivators was calculated by using the adoption percentage. The management practices under each group were ranked based on the total adoption rate. The adoption percentage for each management practice was calculated by using the following formula.

$$\text{Adoption percentage} = \frac{\text{Number of cultivators who adopted the practice}}{\text{Total number of cultivators}} \times 100$$

And, the total adoption rate of each of the management strategies was calculated using the following formula:

$$\text{Total adoption rate} = \frac{\Sigma\ (\text{No. of cultivators in each adoption category} \times \text{adoption score})}{\text{Total possible adoption score}} \times 100$$

Results and Discussion

The socio-demographic characteristics of the respondents are given in Table 1. The number of males (77.3%) is much higher than the number of females (22.6%). 74% of the respondents, were above the age of 50, which can affect their productivity and ability to work. Hence, it can be inferred that the majority of the homesteads are maintained by the older age group, as the senior-most family member is typically regarded as the head, while much of the younger generation has migrated from their hometowns and shows little interest in farming. Farming is the only source of income for 56.6% of the respondents. Over half of the respondents (52.6%) have less than 4 members in the family. In terms of farm size, 87.3% of the farmers have less than 2.5 acres of land. Of the respondents, 74.6% of the farmers have farming experience of more than 20 years. The annual household income is less than 1 lakh for 74.6% of the cultivators. In terms of education, 63.3% of the farmers have high school/ higher secondary education.

Table 1: Socio-demographic characteristics of the respondents

Characteristics	Category	Number	Percentage
Sex	Male	116	77.3
	Female	34	22.6
Age	1.<35	1	0.6
	35- 50	38	25.3
	>50	111	74
Source of income	Farming only	85	56.6
	Farming + private sector	29	19.3
	Farming+ business	30	20
	Farming+ agribusiness	0	0
	Farming+ allied sector	2	1.3
	Farming+ government job	4	2.6
Family size	<4	79	52.6
	4-5	67	44.6
	>5	4	2.6
Farm size	< 2.5 acre	131	87.3
	2.5- 5 acre	19	12.6
	5.1- 7.5 acre	0	0
	>7.5 acre	0	0
Farming experience	<5 years	1	0.6
	5-10 years	2	1.3
	11-15 years	13	8.6
	16-20 years	22	14.6
	>20 years	112	74.6
Household income	Up to 1 lakh	112	74.6
	1-2 lakh	32	21.3
	2.1- 5 lakh	5	3.3
	5.1-10 lakh	1	0.6
	>10 lakh	0	0
Education	Primary education	6	4
	High / Higher secondary school	95	63.3
	Degree and above	49	32.6

The information about the adoption of various resource management practices by the homestead cultivators is given hereunder in table 2.

Table 2: Distribution of respondents according to their adoption percentage and total adoption rate of resource management strategies with respect to homestead cultivation

Sl. No.	Practice	Adoption percentage			Total adoption rate	Rank
		Adopted	Partially adopted	Not adopted		
	Management of changes in land use					
1.	Crop Rotation	8.6	44	47.3	30.6	III
2.	Agroforestry	24.6	58.6	16.6	54	I
3.	Fallowing	0	26	74	13	IV
4.	Watershed-based development with focus on whole-farm or systems approach	0.6	15.3	84	8.3	V
5.	Restructuring existing home gardens	9.3	50.6	40	34.6	II
	Soil and water management practices					
1.	Contour farming	61.3	12	26.6	67.3	I
2.	Mulching	24	62.6	13.3	55.3	II
3.	Natural farming	12	65.3	22.6	44.6	III
4.	Growing of cover crop	25.3	36.6	38	43.6	IV
5.	Drip irrigation	18	2	80	19	VI
6.	Sprinkler irrigation	34.6	14.6	50.6	42	V
	Nutrient Management practices					
1.	Use of farm yard manure and compost	76	22.6	1.3	87.3	II
2.	Use of household refuse and animal manure	78.6	21.3	0	89.3	I
3.	Use of biogas slurry	47.3	9.3	43.3	52	V
4.	Incorporation of crop residue	56	41.3	2.6	76.6	III
5.	Use of vermicompost	35.3	24.6	40	47.6	VI
6.	Optimum use of mineral fertilizers	32	58.6	9.3	61.3	IV
7.	Green manuring	12.6	42.6	44.6	34	VII
	Pest and disease management practices					
1.	Use of plant- based preparation	22	53.3	24.6	48.6	I
2.	Growing of trap crops	4.6	36	59.3	22.6	IV
3.	Conservation of natural enemies/predators	0.6	45.3	54	23.3	III
4.	Planting of resistant varieties	17.3	62	20.6	48.3	II
	Practices for maintaining bio-diversity within the homestead					
1.	Multicropping	63.3	31.3	5.3	79	I
2.	Agriculture-livestock integration	49.3	6	44.6	52.3	VII
3.	Agriculture- aquaculture/poultry integration	57.3	6.6	36	60.6	VI
4.	Inter cropping	56.6	31.3	12	72.3	III
5.	Mixed farming	50.6	30.6	18.6	66	IV
6.	Honey bee colonies	38.6	11.3	50	44.3	VIII
7.	Use of indigenous varieties	32	64	4	64	V
8.	Growing of leguminous crop	61.3	35.3	3.3	78.5	II

It is observed from the above table that nearly 24.6% of the respondents have adopted agroforestry to its full extent as a measure to manage changes in land use. Agroforestry is preferred in homesteads, especially those in highland and midland regions, as it effectively utilizes sloping land and conserves soil and water. Most of the farmers are not aware of practices like fallowing and watershed-based development with a focus on whole-farm or systems approach. It is mainly because of small and fragmented landholdings and a preference for year-round cropping and perennial crops like coconut, arecanut, and other fruit trees.

Results revealed that 67.3% of the homestead cultivators follow contour farming mainly in the highland and midland regions due to physiographical constraints like undulating terrain and sloping land characteristics. Sprinkler irrigation is adopted fully by 34.6% of the farmers and drip irrigation is also being practiced these days. There is a high percentage of adoption of soil and water management practices and nutrient management practices among the farmers. This may be due to the traditional nature of these management strategies. Similar findings were reported by Bite *et al.*(2014) [2]. Use of household refuse and animal manure (89.33%) and use of farmyard manure and compost (87.3%) are the most adopted resource management practices by farmers. This result is supported by the findings of Bekunda and Woomer (1996) [1] and Wezel and Haigis (2002) [7]. This can be due to the tradition of agriculture-livestock integration and agroforestry practices. The number of farmers who adopted the use of vermicompost and mineral fertilizers is relatively less, and similar results were reported by Jayawardana (2007) [4]. A relatively small number of farmers have fully adopted green manuring (12.6%). The adoption of practices like green manuring, vermicomposting, etc., is low mainly due to the existence of limited landholding and predominance of perennial crops, which reduces the necessity and practical scope for implementing these practices.

It was observed that 48.6% of the farmers use plant-based

preparations to manage pests and diseases. Plant-based preparations are preferred by the homestead cultivators as they are easily available, low-cost, safe for the environment, and align with the traditional homestead farming practices. Resistant varieties were adopted by 48.3% of respondents and were ranked second. However, trap cropping and conservation of natural enemies had very low adoption levels, with 59.3% and 54% of respondents, respectively, reporting non-adoption. Most of the farmers are unaware of practices like conservation of natural enemies and the use of trap crops due to limited exposure to integrated pest management concepts, lack of training or demonstrations, and the predominance of traditional pest control methods in homestead farming.

The majority of the farmers practice multicropping (79%), and growing of leguminous crops (78.5%) as a strategy for maintaining biodiversity within homesteads. Multicropping is highly adopted as different species of crops, including annuals, biennials, and perennials, are grown together in homesteads. This result is supported by the findings of Bite *et al.* (2014) [2]. It was observed that most of the farmers have stopped continuing various resource management strategies due to their poor health. Moderate adoption was observed for intercropping (72.33%) and mixed farming (66%). The least adopted practice among the practices to maintain biodiversity was the agriculture-livestock integration (52.33%) and the use of honey bee colonies (44.33%). It may be due to farmers' preference for high-yielding or commercially popular crop varieties, lack of awareness about their ecological benefits, and inadequate knowledge or technical support for beekeeping.

Conclusion

The study was formulated to understand the characteristics of the homestead cultivators and their adoption pattern of resource management strategies in light of the increased risk faced in homestead cultivation. The findings revealed that the homestead cultivators of the study area exhibit comparatively higher adoption of traditional soil, water, and nutrient management practices like contour farming, use of household refuse, animal manure, compost etc. But at the same time, there is a limited uptake of knowledge-intensive or more specialised strategies like conservation of natural enemies and predators, watershed-based development, natural farming, etc. This bias may be due to socio-demographic characteristics of farmers, such as small landholdings, limited household income, age of the farmers etc. Reliance on the traditional approach also indicates cultural continuity and resource unavailability. Limited adoption of ecologically sound practices such as natural enemy or predator conservation, natural farming, biogas, whole farm approach, green manuring, etc. are missed opportunity for sustainability and resilience in the long run. Targeted interventions like sealing the knowledge gap, training and engaging youth, encouraging diversification, etc, have to be undertaken to enhance productivity and resilience to risk and thereby promoting homestead cultivation.

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