



Agroforestry Homegarden Adoption and Food Security and Income Generation Implication among Household of San Pedro, Goa, Camarines Sur, Philippines

Alberto, Egidio Antonio F.

¹Central Bicol State University of Agriculture, Philippines, Email: egidioantonio.alberto@cbsua.edu.ph

*Correspondence: egidioantonioalberto@gmail.com, Tel: +639121564567

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Abstract: San Pedro, Goa is an upland community near the Inside Mount Isarog where subsistence and agroforestry homegardens are practiced yet it is vanishing. This study employed a descriptive research design to assess the adoption of agroforestry homegardens and their subsequent contribution to food security and income generation among resident households in Barangay San Pedro, Goa, Camarines Sur. Data were collected from 90 household respondents on socio-demographic factors, adoption levels, garden productivity, and economic benefits. The analysis revealed that the majority of respondents have successfully adopted agroforestry homegardens. Findings indicated that the adoption rate was largely independent of household characteristics, with the sole exception being the type of dwelling. Crucially, the study established a significant positive correlation between the implementation of Agroforestry home gardens and enhanced food security and family income. Based on these findings, the research recommends the promotion and incentives for agroforestry adopters; it also recommends for BLGU (Barangay Local Government Unit) to provide homegarden materials and inputs to boost the adoption, subsistence farming, for income generation and support through structured training programs, provision of low-interest loans, and the establishment of reliable market mechanisms for homegarden products to ensure continued sustainability and maximize community benefits.

Keywords: Agroforestry; Biodiversity; Livelihood; Conservation; Social.

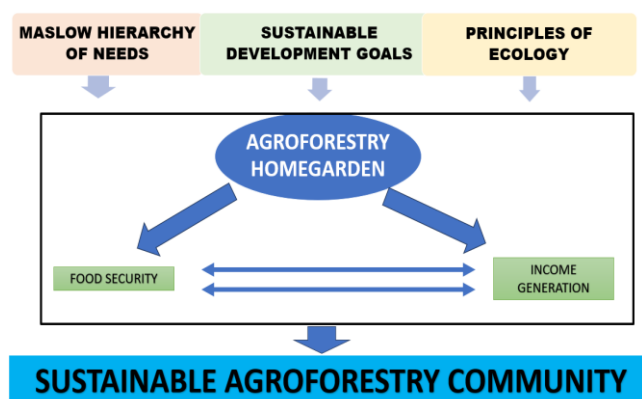
INTRODUCTION

Agroforestry homegardens are identified as a critical intervention against the endemic rural poverty and food insecurity prevalent in the Philippines, where over half of the population resides, often relying on subsistence farming in upland areas characterized by high rates of illiteracy and self-rated poverty (54% in December 2019). The vulnerability and low standard of living among these segments necessitate sustainable solutions. While the term "homegarden" varies in definition, this research adopts the specific concept of an "agroforestry homegarden": an intensively managed, multi-story land-use system within individual house compounds that deliberately combines seasonal/perennial crops, shrubs, multipurpose trees and sometimes livestock, utilizing family labor. Recognized as the "epitome of sustainability" in the uplands, this unique agroforestry system serves as a multi-purpose tool for poverty alleviation by providing direct benefits such as food, income, and fuelwood, while simultaneously offering indirect ecological benefits like biodiversity conservation

and upland protection, which are often compromised by monoculture. Local initiatives in the Philippines, such as the "Food Always in the Home" (FAITH) gardens and the PEACE program, underscore the crucial role of homegardens in maximizing local resources and enhancing household food security and income generation, positioning them as essential components of global efforts to address food needs and rural development.

In San Pedro, Goa, Camarines Sur, the agricultural focus is increasingly on agroforestry, particularly the family-labor intensive Agroforestry Homegarden model. This integrated practice mixes multipurpose trees with staple crops like rice and corn, commercial crops such as abaca and coconut, and often includes livestock. This system is vital for the community as it helps reduce farming risks, ensures food security, and provides environmental conservation by mitigating soil erosion on sloping land. Local efforts and government support, including technical training, aim to address challenges like limited irrigation and poor road access to sustain this diversified approach.

Theoretical Framework:



MATERIALS AND METHODS

The study utilized a descriptive research design to conduct a systematic assessment of agroforestry homegarden practices in the upland community of Barangay San Pedro (Aroro), Goa, Camarines Sur, during the period of February to April 2020.



Fig.2 Map of Goa Highlighted the study area

A representative sample of 90 households was selected using a Simple Random Sampling without replacement technique, chosen as the statistical minimum required for robust data analysis. Primary data were gathered through comprehensive structured survey questionnaires and interviews, with questions translated into Filipino and Bicol to ensure full comprehension by the household head or member respondents. The nine-part questionnaire collected data on household characteristics, adoption levels, products derived, sustainability status, and associated constraints. Crucially, the contribution to food security was measured based on respondents' perceptions regarding the homegarden's effect on food availability, accessibility, utilization, and stability, while income generation was quantified by multiplying farmers' estimated monthly yields

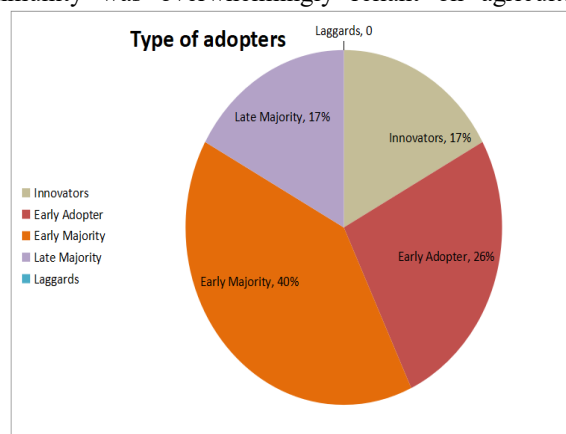
by their value. For data analysis, the collected responses were subjected to statistical treatments, including the use of percentages and frequencies for descriptive summaries, the Chi-square test with contingency tables to determine the statistical significance of socio-demographic factors on adoption levels, and the Likert scale to quantify respondent ratings on sustainability and the significance of the homegardens' contributions.

RESULTS AND DISCUSSIONS

TABLE 1. CHARACTERISTICS OF HOUSEHOLD IN SAN PEDRO, GOA, CAMARINES SUR

CHARACTERISTICS OF HOUSEHOLD	VARIABLE	FREQUENCY	PERCENTAGE
Age Group			
	28-36	30	33
	37-45	18	20
	46-54	15	17
	55-63	9	10
	64-72	15	17
	73-81	3	3
Gender of HH head			
	Male	66	73
	Female	24	27
HH size			
	Small	21	23
	Average	60	67
	Large	9	10
Educational Attainment			
	No formal education	3	3
	elementary	42	47
	high school	36	40
	college	9	10
Religion			
	Roman Catholic	90	100
Type of dwelling			
	Concrete		
	Semi-Concrete	60	67
	Light Material	30	33
source of income			
	Salary	3	3
	Farm Owner	3	3
	Farm Labor	84	94
Land ownership			
	Owner	54	60
	Rent	3	3
	Tenant	33	37

The household respondents surveyed exhibited clear and distinct profiles regarding their demographics, economic dependence, and living conditions. Demographically, the sample was predominantly characterized by male household heads (73%) and a universal adherence to Roman Catholicism (100%). The age distribution showed a concentration in the younger-to-middle adult brackets, with the largest single group (33%) falling between 28 and 36 years old. Economically, the community was overwhelmingly reliant on agricultural



activity, as 94% of respondents listed farm labor as their primary source of income. This agricultural context is further reflected in their land tenure, where the majority (60%) were farm owners, followed by 37% who were tenants. Regarding their housing, two-thirds of the respondents (67%) lived in semi-concrete dwellings, while the remaining third lived in light material dwellings.

FIGURE 1. TYPES OF ADOPTER in San Pedro, Goa, Camarines Sur

The 5 types of adopters and it shows that 40% of the adopting respondents are Early Majority, 26 % were Early adopter while Innovators and Late majority have obtained 17 % of the respondents.

Level of Adoption

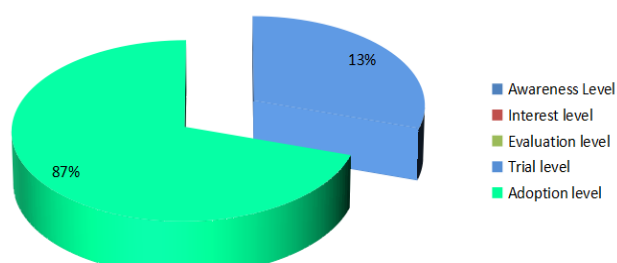


Figure 2. Level of Adoption

The study revealed a remarkably high rate of **adoption** of agroforestry homegardens within the surveyed community, with an overwhelming 87% of respondents reporting they had already integrated the practice and were actively enjoying its associated benefits. This near-universal implementation means that the intermediate stages of adoption—specifically the interest, evaluation, and trial levels—were recorded as zero. The households were thus split into two

full adoption stage, and the remaining 13% who were simply aware of the agroforestry homegarden concept but were not yet interested in pursuing the practice. This finding clearly underscores the widespread acceptance and successful integration of agroforestry homegardening into the community's livelihood system.

In Table 2, the study found a striking lack of statistical association between the level of agroforestry homegarden adoption and six primary household characteristics: age, gender, household size, educational attainment, source of income, and land ownership. The significance values for these variables indicated they were not predictors of whether a household adopted the practice.

However, the analysis isolated one crucial exception: the type of dwelling was found to be statistically associated with the level of adoption. Specifically, respondents with certain dwelling types expressed hesitation in planting woody perennials (trees and shrubs). This suggests that the structural material or permanence of the home influences the household's long-term commitment and willingness to integrate tree components into the homegarden, likely due to concerns about proximity, shade, or future construction needs.

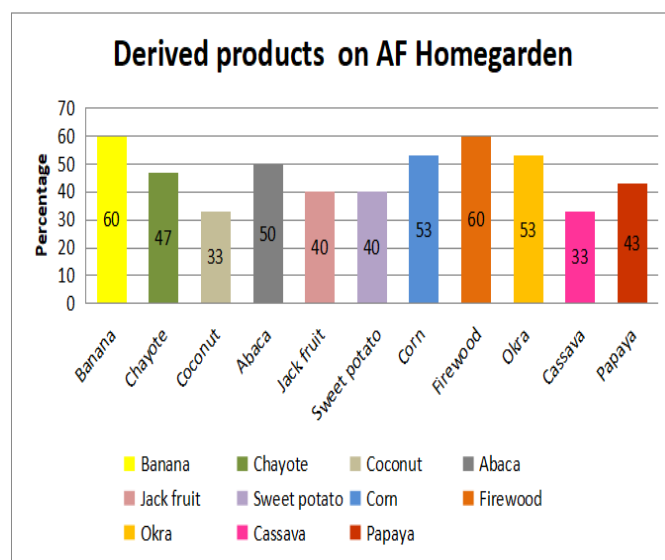


Figure 3. Derived products on Agroforestry Homegarden.

Table 2. Association of the level of adoption to household characteristics

Characteristics of HH	Degree of Freedom	Significance Level	Critical Value	Chi-Squared	Remarks
Age	6	0.1	10.645	3.65	Not Associated
Gender	1	0.1	2.706	1.59	Not Associated
HH size	2	0.1	4.605	2.22	Not Associated
Ed. Attainment	3	0.1	6.251	1.82	Not Associated
Type of dwelling	1	0.1	2.706	2.85	Associated
Income	2	0.1	4.605	2.41	Not Associated
Land ownership	2	0.1	4.605	1.31	Not Associated

clear categories: the majority who had already moved to the

The agroforestry homegardens demonstrated substantial productivity, yielding a diverse portfolio of eleven key products essential for both subsistence and commerce, as detailed in Table 6. Banana and Firewood were the two most frequently derived products, signifying their primary role in meeting immediate household food and domestic energy needs. Following these, over half of the respondents also reported deriving Corn and Okra (53%) and Abaca (50%). The remaining diversified yields included Chayote (47%), Papaya (43%), Jack Fruit and Sweet Potato (both 40%), and Coconut and Cassava (both 33%). This specific selection of crops and tree products is strategically cultivated by the households because, according to the respondents, these items are the easiest to grow successfully in their local environment and are readily sold in the nearby market,

thus optimizing the homegarden for both food security and sustained income generation.

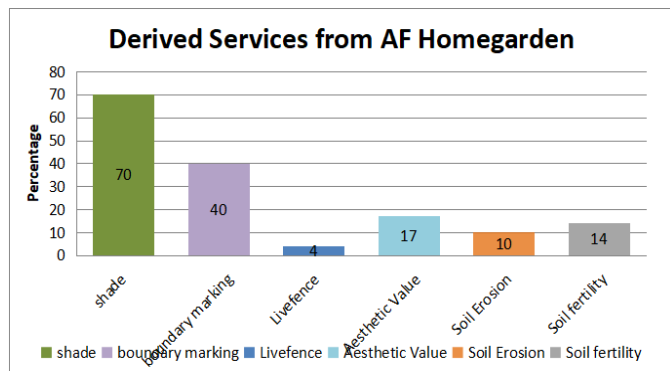


Figure 4. Derived Services from Agroforestry Homegarden.

The most common services derived from the AF Homegarden in the study area. Shade (70%), Boundary Marking, Aesthetic Value (17%), soil fertility (14%), Soil erosion service, and Livefence (4%) were the most enjoyed services obtained from AF homegarden. This implied that Woody perennials components are crops chosen to obtain the desired Environmental services. Probably due to changing climatic patterns households intentionally plant woody perennial to enjoyed shade from the woody components. Boundary marking is useful to have privacy while aesthetic services bring a good ambiance in the homestead.

SUSTAINABILITY OF AGROFORESTRY IN SAN PEDRO, GOA, CAMARINES SUR

STATEMENT ON SUSTAINABILITY	MEAN	INTERPRETATION
AF HOMEGARDEN PROCIDE AVAILABLE FOOD WHOLE YEAR	4.6	STRONGLY AGREE
AF HOMEGARDEN HELP AID IN FOOD SHORTAGES	4.6	STRONGLY AGREE
AF HOMEGARDEN PROVIDE INCOME TO ACCESS FOOD	3.9	AGREE
AF HOME GARDEN PROVIDES SAFE, AND NUTRITIOUS FOOD	4.6	STRONGLY AGREE

The perception on agroforestry Homegarden significantly contributes to Household food supply, household income and helps in the times of scarcity. It also showed that most of the household either consume or sell their produce to obtained food security and generate income. Contribution to food supply and food scarcity has obtained the highest mean this proves that agroforestry homegarden is sustenance farming, however, it also contributes to economic aspect of the households.

CONCLUSION

The typical respondent profile is characterized by a male household head (73%), aged 28-36, whose primary income (94%) is derived from farm labor, and who generally owns their land and lives in a semi-concrete dwelling. Analysis established a high rate of AFH

implementation, with 70% of households reaching the full adoption level. Crucially, the level of adoption was found to be statistically independent of most socio-demographic factors, with the type of dwelling being the single characteristic associated with adoption, primarily due to homeowner hesitation in planting woody perennials near light-material structures. The AFH system is ranked as sustainable and provides significant resources, led by the most common derived products: Banana and Firewood, followed by Corn, Okra, and Abaca fiber, with the most valued services being shade and boundary marking. The practice was proven to significantly contribute to food supply, income generation, and mitigating food scarcity. While households face minor challenges—such as neighborhood issues, pest/disease, and lack of technical know-how—farmers successfully cope through self-initiated mechanisms like attending training and availing credit.

The key recommendations are proposed: Policymakers should immediately pursue the enactment of the Food Forest Gardening Act to nationalize and institutionalize AFH as a sustainable land-use system. Local Government Units (LGUs) and the Department of Agriculture must strengthen extension services in Barangay San Pedro by providing expert training and offering direct incentives to motivate households, specifically through low-to-zero interest agricultural loans, affordable farm inputs, and secure market access for their produce. Finally, future research is recommended to assess the formal classification of homegardens within the broader agroforestry system, their specific impacts on agroecology, and the gender roles inherent in their management.

Conflict of Interest

The authors state that there are no conflicts of interest related to the publication of this paper.

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