

# Manual for the Presentation of Breadfruit Agroforestry Information by Extension Agents



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April 2018



United States Department of Agriculture  
National Institute of Food and Agriculture

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**Recommended citation:** Currie, W. James. 2018. “Manual for the Presentation of Breadfruit Agroforestry information by Extension Agents.” Permanent Agriculture Resources, Holualoa, Hawaii. [www.agroforestry.org](http://www.agroforestry.org)

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*This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2016-38640-25383 through the Western Sustainable Agriculture Research and Education program under subaward number EW17-004. USDA is an equal opportunity employer and service provider.”*



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*Disclaimer: This manual is dedicated to the activities necessary for the outreach effort to assist farmers with improvements in Agroforestry systems and is not necessarily applicable to other farm operations or commodities. A list of reference material is provided at the end for further guidance.*

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## List of Abbreviations and Acronyms:

ATTRA	Appropriate Technology Transfer for Rural Areas
CGIAR	Consultative Group on International Agriculture Research
FSM	Federated States of Micronesia
FAO	Food and Agriculture Organization (of the United Nations)
ICRAF	World Agroforestry Centre (CGIAR)
NCD	Non-Communicable Diseases
OCCP	Organic Certification Center of the Philippines
RMI	Republic of the Marshall Islands
SEC	Strategic Extension Campaign
SIDS	Small Island Developing States
SPC	[Secretariat of the] Pacific Community
UOG	University of Guam
UH-CTAHR	University of Hawaii College of Tropical Agriculture and Human Resources
USDA-NIFA	United States Department of Agriculture -National Institute of Food and Agriculture
WSARE	Western Region Sustainable Agriculture Research and Education

# Manual for the Presentation of Breadfruit Agroforestry information by Extension Agents

**Introduction:** Recent evolution in the Pacific Islands has placed new pressures on the indigenous people and the environment to such an extent that change is inevitable. Changes are dominated by climate change and economic demands. These changes affect all cultures and traditions. It is suggested the sustainability of traditions, culture and the environment are possible through the adoption of new techniques and technologies within the traditional practices:

“Pacific Islanders traditionally had abundant, predominantly rural, agroforestry systems that provided a wide array of products for meeting the necessities of life, and conducive environments for the rich Pacific island cultures. In recent years, however, increasing urbanization and accompanying removal of trees and perennial agroforests (“agrodeforestation”) have resulted in the breakdown of these traditional agroforestry systems, accompanied by increasing economic, cultural, nutritional, and environmental problems particularly in the urban areas. A critical analysis of the nature and future prospects of the urban and homegarden agroforestry systems in these rapidly urbanizing islands suggest that intensification and enrichment of these systems could serve as an important foundation for sustainable development. In addition to addressing the nutrition-related health problems, food security, poverty alleviation, and trade deficits, these systems also help protect and enrich the cultural traditions of Pacific peoples who are increasingly out-migrating from rural areas and embracing urban living.” (Thaman, Elevitch and Kennedy, 2006, p. 25)

Agroforestry is a traditional food production system and subsistence practice throughout the Pacific islands. Historically, traditional agroforestry, including varieties of breadfruit, has produced healthy and nutritious food. Each culture adapted system to suit the environmental conditions experienced in their location. New techniques can be introduced to allow for increased demands of families’ dependent on the same area for food production and especially income generation.

Food quality and food security are two of the most troubling issues faced by modern-day islanders. The Pacific island nations are among the most affected by Non-Communicable Diseases due to the diets and lifestyles currently predominant. As much as 95% of purchased food is imported making the islands extremely vulnerable to food insecurity. A proactive, informed, and supported Extension outreach effort to incorporate modern information and techniques into traditional agroforestry practices can offer some improvement to these situations.

## Definitions

- a) Agroforestry in the Pacific islands is a traditional form of food and fiber production. The produce has been used primarily for family food (or needs) and/or cultural responsibilities. The current demand may include some commercial sales of products especially now as breadfruit flour is becoming a market commodity due to its gluten-free quality.
  - a. *Agroforestry*. (āg'rō-fôr'ī-strē) A system of land use in which harvestable trees or shrubs are grown among or around crops or on pastureland, as a means of preserving or enhancing the productivity of the land.  
[www.dictionary.com/browse/agroforestry](http://www.dictionary.com/browse/agroforestry) (2018)
  - b. *Agroforestry* is a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence.  
[www.fao.org/forestry/agroforestry/80338/en/](http://www.fao.org/forestry/agroforestry/80338/en/) (Oct 23, 2015)
  - c. Agroforestry refers to farming systems that integrate trees, shrubs, and other perennial plants with crops and/or animals in ways that provide economic, environmental, and social benefits. *Breadfruit Agroforestry Guide*. (Elevitch C. et al. 2014)
  
- b) Climate Change: whether a result of human produced factors or a natural process, it is having a major effect on the islands of the Pacific and the resources on which the islanders depend. The oceans are changing, rising and in some cases intruding on land previously used for food production. The extension services have had to respond with advice on ways to react to the effects of a changing climate including changed methods of agroforestry.
  - a. Noun: 1. a long-term change in the earth's climate, especially a change due to an increase in the average atmospheric temperature: (from [www.Dictionary.com](http://www.Dictionary.com) 2018)
  - b. A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels. (from Oxford English Dictionary 2017)
  
- c) Food Security: The diets of the Pacific islands has changed dramatically since the intrusion of colonizing foreigners. Statistics from many countries indicate that up to 95% of purchased food is imported and much of that is of very low nutritional value. Increasing local production improves local food security both from a total economic point but also from the aspect of nutritional value.
  - a. The World Food Summit of 1996 defined food security as existing "*when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life*". Commonly, the concept of food security is defined as including both physical and economic access to food that meets people's

dietary needs as well as their food preferences. Household food security exists when all members, at all times, have access to enough food for an active, healthy life. Food security incorporates a measure of resilience to future disruption or unavailability of critical food supply due to various risk factors including droughts, shipping disruptions, fuel shortages, economic instability, and wars. (Disabled World- towards tomorrow <https://www.disabled-world.com/fitness/nutrition/foodsecurity/> (1996)

- d) Participatory Planning: To reap the full benefits of a community development project or program the community must be involved from the beginning of the identification and planning stages right through to the hand-over of the program for the community to sustain. Extension agents facilitate throughout the process and through provision of information as needed and identified by the community members.
  - a. The Participatory Strategic Planning process is a consensus-building approach that helps a community come together in explaining how they would like their community or organization to develop over the next few years. (Participation Compass: <http://www.participationcompass.org/article/show/150>, February 28, 2018)
  - b. Participatory approaches refer to processes and mechanisms that enable those people who have a direct stake in agriculture and forest resources to be part of decision-making in all aspects of the resource management, from managing the resources to formulating and implementing institutional frameworks. ([Secretariat of the] Pacific Community, Policy Brief 4/2008, 2008)
  
- e) Strategic Extension: Linked closely with Participatory Planning, strategic extension defines the role the extension service must take to engage the total community in development efforts. This is particularly important in breadfruit agroforestry improvement as this encompasses food security, family farms, subsistence living and commercialization opportunities.
  - a. This methodology emphasizes the importance of *people's participation* (i.e., intended beneficiaries such as small farmers) in strategic planning, systematic management, and field implementation of agricultural extension and training programmes. Its extension strategies and messages are specifically developed and tailored based on the results of a *participatory* problem identification process on the causes or reasons for farmers' non-adoption, or inappropriate practices, of a given recommended agricultural technology or innovation. The SEC technology transfer and application approach is needs based and demand driven and has a problem-solving orientation. (Food and Agriculture Organization, Chapter 10, 1997).

### **Traditional Agroforestry in the Pacific Islands**

In Small Island Developing States (SIDS) agroforestry has been standard operating procedure for generations. Historically islanders have planted tree crops with a variety of other crops

interspersed underneath. The Yap farming practices are classic examples of this. In other systems such as on Pohnpei it is common to plant food or other crops under an existing forest cover. Either system maintains cover over the land to protect from erosion and degradation while providing food and fiber.

On atolls, especially, trees are planted both as a productive food source and to grow and protect the limited soil resources. Tree roots hold the soil while limiting the intrusion of salt water onto the land. The selections of trees provide food, fiber, and wood and in addition, provide significant leaf litter for use in taro patches or other compost needs.

Central to many traditional agroforestry systems is the use of Breadfruit, predominantly *Artocarpus altilis*, as the overstory with various other crops in the understory. It is easy to propagate and manage. In addition, it has multiple uses as a source of food for fresh and processed use, traditional storage through fermentation, animal feed for excess production, timber, epoxy, shade, and compostable leaves. It is also used as a support structure for climbing crops. Including numerous varieties in the agroforest mix allows for almost year-round production.

Recently agroforestry is being abandoned as local youth search for off-farm employment, leaving family land to regrow to forest or clear-cut the forests for quick cash and plant to a single marketable crop. Extension systems deserve some of the blame for promoting the mono-cropping systems and not recognizing the extended value of multi-cropping and agroforestry. Furthermore, the growing populations of the islands demand greater infrastructure. ‘Modern’ islanders want individual houses, lawns, and road areas that were not expected previously. Schools, hospitals, stores, and businesses all require space. These desires require that forests and productive land give way to ‘infrastructure needs’. Modification of agroforestry gardening can accommodate the need for infrastructure. Examples of mini-gardens and use of roadsides for production has been observed in some crowded island countries. (Thaman et al. 2006, (pg.33).

### **Enhancing Breadfruit and modern techniques through Agroforestry Extension**

Four of the factors above complicate the role of the extension agent in promoting a modernization of agroforestry and the view of agroforestry by the farmers.

1. Agroforestry is an historic system of farming in the islands. Traditional systems are embedded in the culture and every farmer ‘knows how to do it’. Extension efforts to adopt modern techniques and technologies into the traditional systems must complement this cultural history. In Pohnpei it is traditional to use breadfruit trees as support for yam vines to provide more space for yam vines to grow. To convince farmers to prune the breadfruit trees to a manageable height, agents will need to convince farmers that the use of bamboo or similar trellises is just as effective for growing yams.
2. Youth are exploring other options than traditional farming. Making money rather than cultural traditions is more appealing. Farmers are interested in ‘commercialization’ of agriculture. They buy their food at the stores and depend less on their own land to provide food for their families. It will be difficult for the extension agents to convince

this group that both goals are compatible and beneficial. The production of Chinese cabbage, kang kong or kale in the natural hydroponics system under swamp taro in pits or production of vegetables on the slopes of those pits on the atolls would provide a marketable product in addition to food for the family.

3. Extension agents have promoted mono-cropping as an efficient means for food production and now are reversing this doctrine due to recognition of environmental impacts and introduction of newer techniques and technologies. Why should the farmers now believe the agents? Farmers and agents in Pohnpei both accepted that sakau (kava) would grow better at higher altitudes and in cleared areas. This led to severe environmental degradation until it was demonstrated that sakau will grow well under lower forests including breadfruit trees. Coffee and black pepper can similarly benefit from overstory shading.
4. Wealthy people demand better education for their children, better hospitals and roads, stores and businesses. Wealthy people have houses, lawns and landscaped gardens. Overcoming these societal demands by promoting productive yards and gardens that require more physical work will be an on-going challenge for extension. In Hawaii the historic breadfruit forests have been decimated by new arrivals who have subdivided the lands for housing and landscaped yard areas. The extension challenge could be to convince suburban dwellers to include food production in their garden areas.

The most likely method to over-come the list of objections will be through field demonstration of the benefits of modern-day agroforestry. Farmers and homeowners will be most likely to accept the information offered if they can see it in action. Few will accept the expense in dollars and hard labor to convert to or include modern techniques and technologies unless there is proof on the ground that there are benefits that they can realize on their own properties. Including breadfruit in agroforestry is common but introducing new varieties or pruning techniques may be more difficult. Convincing homeowners with limited yard space to include a breadfruit tree with spreading branches, lots of leaf litter and fallen fruit in certain seasons will be challenging. It then requires extension systems (agents) to develop demonstration units at local facilities and with leading community farmers to provide the examples for other farmers and homeowners to observe and copy.

### **Participatory Approach to Agroforestry**

Conventional extension systems tend to create the illusion that the agents – as representatives of the administration - know everything or can find out everything and solve all problems. It also assumes the farmers know little and should accept what the agents tell them to do. Such a system also excludes certain sectors of the population since there is an expectation that working with the wealthiest farmers and farmers who are best connected will give the most impact. Goals and objectives are set by the extension administration and funding sources and the farm community is expected to react in the planned way. (FAO, 1997, Chapters 7 & 10; Blackburn, 1994)

That model is changing. In the developed world and to a lesser extent in the developing nations, internet access and education is allowing farmers to access as much

information as is available to the agents. The extension services are expected to respond to the needs of the community, not the other way around. The new system or paradigm for extension includes the community from the start of the planning process. In the islands, most land is communally owned. This lends itself to Participatory Action. Particularly in the case of Agroforestry the agent's role could start with assisting the community to understand the diverse benefits of agroforestry and assist them to compare agroforestry to other potential land uses.

Participation encourages all levels of the target community to get involved to identify the situation to be addressed, the objectives, the resources available, the process of intervention and means of assessment. It is meant to include those disenfranchised groups such as the resource-poor farmers, the youth and women when the local culture normally excludes them. The agent should observe and take advantage of the groups already formed in the community to assist. Groups such as farmers organizations, church and community groups, family groups are common.

The Participatory approach is a democratic method of planning extension efforts. The paradigm establishes the extension agent and system as facilitators to respond to the needs of the community. Interventions are based on the needs identified by the community to benefit and build on the resources the community possesses including physical resources as well as intellectual capacity. This way of approaching the community is politically and ethically sound since people need to feel like they are participating and have ownership of the actions. The participatory approach is also economically rewarding since community ownership gives encouragement to success and sustainability results from the people-centered focus. (FAO, 1997, Chapter 10)

Any change of approach or paradigm can cause a ripple effect to take place in the system. Factors that may change as the Participatory Approach takes effect could include: (FAO, 1997, Chapter 10; Blackburn, 1994)

- An adaptation in the structure and management of the extension service to facilitate different planning and communication needs.
- Communication channels, techniques and technologies of the extension services may need to adapt to the new system.
- As people in the target community realize the ownership of the projects, they may change their attitudes and acceptance of the extension service intervention. There is risk of some social upheaval in traditional cultures where hierarchy is strong.
- Members of the target community are experienced with traditional agroforestry and have certain intellectual capacity – understanding of local conditions, soils, weather patterns, traditional needs and who in the community can perform certain roles and what training is needed.
- The agents **must** continue their roles as facilitator; accept the input from the community; react to the changing focus of the community; actively approach and include the 'excluded' portions if the communities (the poor, the youth, the disabled,

and women for instance); establish advisory committees and accept their input on plans.

In the context of an agroforestry program, the agent needs to understand the following:

- This is a traditional farming method and the farmers possess a wealth of knowledge of
  - The local soils
  - Weather patterns
  - Local history of typhoons, fires, diseases and pests
  - Additional cultural demands for produce
  - Preferred varieties of crops
  - Family needs
  - Local ‘likes’ and ‘dislikes’ of production
  - Influential citizens such as traditional leaders and chief systems
- Not all members of the community will have the same objectives for their land/project
- Some participants may put more emphasis on food production for their family/community while others will focus on the commercial potentials.
- The agent is not teaching how to do agroforestry but how to improve the existing knowledge with new or different techniques.
- The agent is not “planning for” but is now “planning with” the community.

### **Problem Trees and Objective Trees**

A technique, which may assist in the planning stage, could be the development of Problem Trees and Objective Trees such as the following example provided by USAID Project Starter guideline (Figure 1).

The purpose of such a diagram is to allow participants of the group to identify why they want to change their current practices. They first identify what the problems are that need to be addressed and the cause and effect of those problems. This analysis will allow the group to understand how the problem (whatever it is) developed and the sequence of corrections that need to be made. For instance, if there is a danger of landslides that could destroy a village, knowing the history of how the problem developed may point to the solutions. Forest clearing to provide for cash from lumber or from future crops may have been the problem.

The participatory group could then focus on how to address the problem to satisfy the identified needs of the community. These might include security from landslides, but the reactions taken might also need to include the original reasons for the forest clearing. The need to provide food security and/or cash income still remains. Agroforestry development under breadfruit trees may become the preferred response. The extension agent guides the group through the steps needed to complete the problem tree and the objective tree which includes the desired outcomes, resources available and timelines desired and possible.

The community develops the plan under guidance of the extension agent and the agent provides the techniques and helps identify the technologies necessary to accomplish the desired results.

Following the “Problem/ Objective” trees diagram is another planning tool that may be more familiar for the agents of the region. The “logic model” has been used extensively to plan extension programs, list objectives, barriers, resource needs and objectives in short, medium

and long-term forms. The model can include as many columns and as much information as the group and the agent wish to include. The form helps to clarify the situation as it exists, how it will change and the expected outcome of those changes. It also lays out the goals against which the project changes can be evaluated.... **If it is used regularly.** The danger is, the form is developed, the group agrees, and then it is filed away. The logic model is a living document. It needs to be reviewed, updated and changed as circumstances of the project change. The goals and objectives may include such things as increased food security, increased income from produce sales, reduced risk of environmental damage, improved assets and infrastructure. This depends on the community to identify their needs. This also is a responsibility of the facilitator (extension agent) to help the community members identify and prioritize their needs.

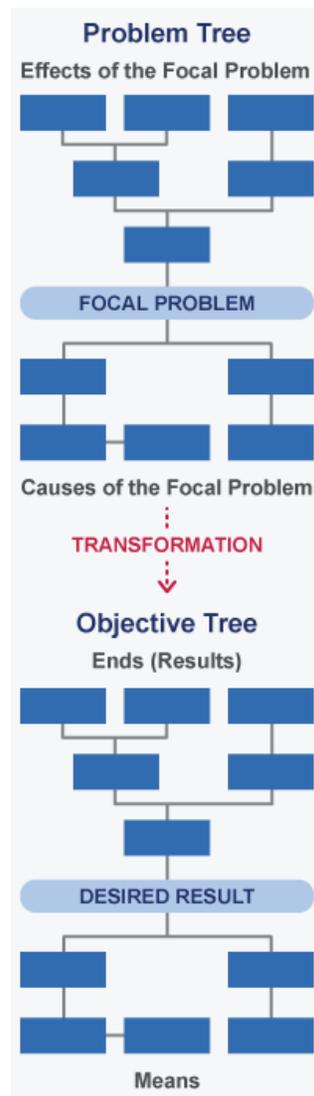


Figure 1: **Problem Trees and Objective Trees** by USAID Project Starter guideline ([www.USAID.com](http://www.USAID.com)).

Another model with which the local agents may be more familiar is the use of a ‘Logic Model’ such as the following example (Table 1). Adapted from: Ohio State University, [https:// www.pde.osu.edu/programs-resources/extension-programs-logic-model](https://www.pde.osu.edu/programs-resources/extension-programs-logic-model) (2018)

**Table 1: Agroforestry Logic Model**

Vertical level	Objective	Activity	Resource Needed	Short term Outcomes	Long term outcomes	Review Date	Degree Complete (0-5)	Comments
over-story	Food-Sale-Culture-	Plant Breadfruit	Root cuttings	Have 6 trees on plot	Fruit for home, sale and processing			
	Food – Oil-Drink-	Plant coconut	Seed nuts	Have 8 trees on plot	Drinking and home food			
under-story crops	Cook-Fresh-Sale-	banana	corms	6 mats of three varieties				
	Sale	Coffee	plants	n/a				
	Sale	Black pepper	Cuttings	50 plants				
	Food-Sale-	Papaya	seeds	10 plants				
Ground level crops	Home-Sale	Taro (varieties)	starts	100 taro of two varieties				
	Home	Vegetables (varieties)	seeds	Chinese cabbage, green onions and okra				
	Home-culture	Yams (varieties)	Seed tubers	24 yams (4 per breadfruit tree				

## **Group formation and outreach**

With current financial limitations and the size of populations to be assisted, the agent cannot possibly reach everyone or treat all constituents equally. The tendency is to focus on those who are influential or most likely to accept the directions proposed by the agent and thus satisfy the objectives as established by the extension system administration and funding sources. Extension gets more ‘bang for the buck’ by dealing with groups. In the islands, most land is communally owned. This lends itself to Participatory Action. Groups tend to form around extended families, local church groups, under the hierarchy of the traditional/ cultural system. A group may also be identified as participants of a farm organization such as a cooperative or farmer’s association. Agents should recognize these natural groupings and work within them whenever possible.

For the agents to move toward a Participatory Approach to extension, there is a need to form “groups” to formulate the required projects, establish objectives and assess accomplishments. The agent cannot form groups by him/herself. The agent can help the process within the target community and try to ensure that all constituents of the target community are represented. Often the poorest members of the community depend most on agroforestry for subsistence living.

Participatory Approach means the community participates. The participants identify the people to be involved (the agent tries to ensure inclusion of all), the roles each can – and are capable of playing; the objectives and the resources for the efforts. The agent is a facilitator and helps to ensure inclusion of all participants. Groups tend to form around the most influential person or the loudest and exclude those less comfortable about expressing themselves. The agent must draw these people into the discussion. As a facilitator, the agent concentrates in the beginning on including the less aggressive members so they develop confidence and desire to participate. Politically this can be difficult in societies that are stratified and hierarchical.

The people who identify a problem and form the group tend to select people with whom they are familiar and understand their professional and social positions. This makes the agent’s job less difficult until the identified problems also affect the less connected populations or the response to the identified problems will include those people. If other people will be affected, they should be included. Such is the case with subsistence or family farmers and their reliance on traditional agroforestry. This is where the agent, as facilitator must manage the group to recognize these others. In some cases, all constituents can be included but often a sub-group will form and appoint a representative to the larger group to express and share information.

Particularly in the case of Agroforestry the agent’s role could start with assisting the community to understand the diverse benefits of agroforestry and assist them to compare agroforestry to other potential land uses.

## **On-farm Demonstration sites**

Every extension agent, especially those in the islands, knows that to be taken seriously by the local farmers he or she must walk-the-talk and not just talk-the-talk. Farmers recognize knowledge and ability and reject fast talk and guesses. Agroforestry is an historic method of

farming in the islands. Every farmer has knowledge passed down through their family. The ‘new’ ideas presented by extension must be justified. Another thing that agents must recognize is that most information passes over the fence. Few farmers are ready to invest time, energy, and money into untried practices. Field demonstrations are critical to sharing information, especially when suggesting a change to a traditional practice such as the previously mentioned idea of using bamboo trellises for yam support to allow for breadfruit tree pruning. There are critical areas to which the agent must attend when developing demonstration sites.

- i. Site Identification:* Agroforestry sites are not like demonstrating corn or soybean varieties, however, some guidelines do apply. For instance:
  - a. The demonstration plot must be where people will see it regularly. Sites along a main road or near the extension office where field days can easily be held are good.
  - b. The site must reflect the agroforestry conditions of the majority of farmers, so the information is relevant.
  - c. The site must be easily identified with signs that tell what is happening, give credit to funding sources or to the farmer and/or to the extension service with contact information.
  - d. The site must be kept clean
- ii. Planning:* In addition to the above considerations, the agents who establish demonstration sites must consider the following:
  - a. There may be a central theme to the demonstration plot such as the over-story may be coconuts with breadfruit, but every farmer may want some personal mix below that.
  - b. Not everything can be included in one plot
  - c. It is the concept of multi-story production that is important
  - d. If more than one demonstration site can be established, there should be diversification of crops grown at each level.
  - e. When possible, especially with agroforestry, supporting representative farmers to develop, manage and allow use of their area should be encouraged and provision made for some sort of recognition or reward.
  - f. If extension property is to be used, the agent must budget and be sure of physical help to manage the plot.
- iii. Extension use:* The purpose of demonstration plots is to improve traditional agroforestry by using new techniques and ideas to implement into the traditional systems. In Agroforestry this can be a problem since it is a common practice in the islands and easily dismissed by other farmers. The agent must aggressively use the sites for field days, farmer meetings, or any other reason to gather an audience at the site. The agent should consider the following:
  - a. Seeing is believing
  - b. Touching, feeling, tasting and hearing support seeing
  - c. Every opportunity should be taken to explain

- i. what is happening at the site,
  - ii. why it is being done that way
  - iii. where the information is found and where it is appropriate
  - iv. Who can or should consider using the information
- iv. *Farmer interaction/ support/ compensation*: Individual agents cannot expect to develop an agroforestry site, manage the site, keep it clean and still have time to bring farmers in for field days or go out to help them with individual problems.
  - a. Plan and Budget for help, technicians, students, apprentices and the needed equipment and resources
  - b. Encourage volunteer farmers to develop their own sites and agree to allow use as a demonstration site by providing some resources such as seed and planting materials. Try to stay away from cash awards as this can be interpreted as favoritism.
  - c. Give recognition.

### Monitoring and evaluation

Once a group has formed around an idea – in this case agroforestry improvement, -and all steps in the planning, development and implementation stages have been completed, the agent should develop a rubric template to monitor and evaluate the progress of each farmer toward their desired objectives (Table 2). Following is an example only but the group should agree to the relevant format.

**Table 2: Rubric for Assessment on progress on each objective**

Objectives / Performance	Beginning 1	Developing 2	Accomplished 3	Score
Produce for family food needs	Not capable in producing	Ability to produce a few items for family needs	Produce more than family needs	
Produce for cultural needs	Inadequate production of cultural need	Less than adequate to meet cultural needs	Adequate production of cultural needs	
Produce for market(ing)	Lacks ability to produce for marketing	Produce minimal for marketing	Produce reasonable amount of produce to satisfy market	

## Sources of Agroforestry/ Extension support information

### General extension information for agents to explore

- Modernizing Extension and Advisory Systems (MEAS) <https://meas.illinois.edu>
- Food and Agriculture Organization publications <http://www.fao.org/home/en/>
- Secretariat of the Pacific Community publications <https://www.spc.int/publications/>
- University of Hawaii CTAHR publications <https://www.ctahr.hawaii.edu/site/Info.aspx>
- GFRAS publications can be accessed at <http://www.g-fras.org/en/>
- Journal of Extension (JOE) [www.joe.org](http://www.joe.org)
- Sustainable Agriculture Research and Education <https://www.sare.org/publications/>

### Breadfruit and agroforestry resources

Breadfruit Institute, National Tropical Botanical Garden: [www.breadfruit.org](http://www.breadfruit.org)

Ho‘oulu ka ‘Ulu—Revitalizing Breadfruit: [www.breadfruit.info](http://www.breadfruit.info)

Agroforestry Net: [www.agroforestry.org](http://www.agroforestry.org)

World Agroforestry Center: [www.worldagroforestrycentre.org](http://www.worldagroforestrycentre.org)

### Breadfruit publications

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### **Decision making in Agroforestry**

Agroforestry is probably one of the most complex production methods in which to make a specific decision. There are many factors to consider before a decision is made and only the farmer can make that decision. Again, the Extension agent can only provide information on which the farmer makes the final choice.

Some of the factors, which will determine the farmer's choice, are personal:

- Family food needs and preferences
- Traditional, cultural and community responsibilities (food for sharing)
- Personal preferences of what he (she) likes to grow
- Community preference of what should be grown (are you crazy growing that? It has never been grown here before! Who do you think you are to try something new like that?)
- Is there a market for the crop?
- How long does it take to mature?
- How much work does this take for the return?

Other factors are more physical:

- What weather affects the particular crop?
- What soil is required and what is available?
- How much sunlight/ shade is required?
- What sort of topography is needed/available?
- What equipment is needed for establishment/ maintenance/ harvest?
- How is the harvest made? Are hired people necessary? Is harvest over a short or long period?
- Is this a crop the must be harvested, or can it be delayed without problems?
- Is there a mutual benefit or detriment between companion crops in the plot?
- Is the crop permaculture or must it be re-planted regularly?

The agent can only demonstrate what can be done in the demonstration areas and try to provide the best information available for some of the questions above. The choice will still be personal to the farmer.

Since there are multiple crops being grown on a given area of land, one type of assistance that an agent can offer is called an Enterprise Budget. In this case the agent can describe what is potential for a particular crop in that particular situation. An example of an enterprise budget is given by Craig Chase, extension farm management field specialist (319) 882-4275, [cchase@iastate.edu](mailto:cchase@iastate.edu) in the publication: Using Enterprise Budgets to make Decisions, Iowa State University Extension, May 2006

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## **Conclusions**

The extension effort to encourage improved agroforestry is one of the most important roles an extension agent can play. Islanders are experiencing new and uncomfortable challenges. One way for them to cope with these challenges is to depend on traditional systems and methods. Agroforestry is deeply woven into the traditions and cultures of the islands. This both makes the agents role more challenging and also in some ways makes it easier.

Many of the farmers will have experiences off of the farms and be more open to different ideas. New methods of approaching farmers and helping them to organize to identify problems and solutions are available to the agents. New techniques and ideas have been developed by farmers in other similar areas so sharing and understanding come more easily. Exposure and communication, makes it easier to demonstrate the benefits of (for instance) different varieties of breadfruit that are common in other islands to extend seasons or produce preferred qualities. It is the role of the extension agent to facilitate farmers and groups of farmers to access new knowledge and help to apply the knowledge to the situation being experienced in the community he or she serves.

It is the purpose of this manual to introduce agents to some of the material and ways to further assist your farmers. It is to be used in conjunction with the breadfruit agroforestry guide produced by Elevitch and Ragone (2018) and other relevant guides to improved breadfruit production.

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