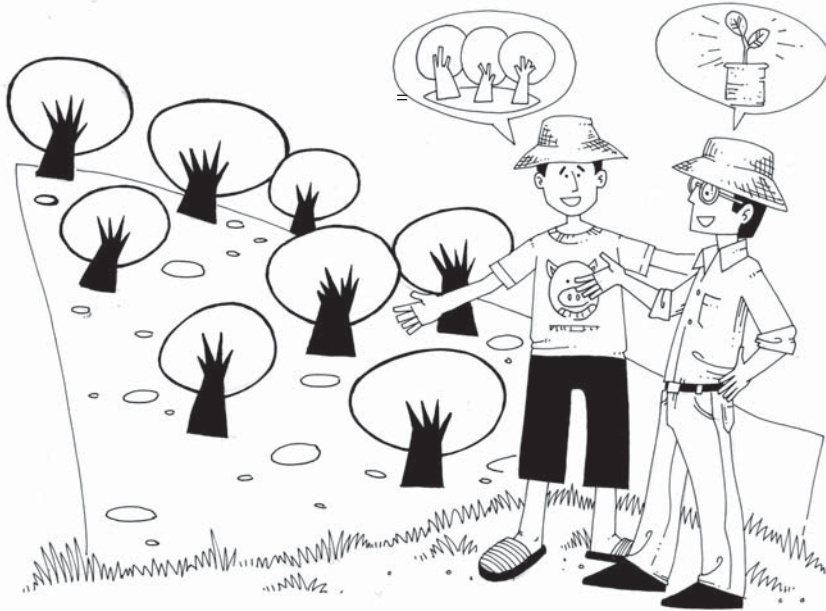


Farmer Demonstration Trials: Promoting Tree Planting and Farmer Innovation in Indonesia



In many areas across Southeast Asia, deforestation has created a scarcity of productive forest resources. This shrinking forest base, combined with a growing human population and an expanding middle class with discretionary income, results in an increased demand for forest and tree products – timber, fruit, spices, medicines, etc. This demand creates incentives for smallholder tree farming. In some communities, smallholder farmers have spontaneously planted or protected trees to provide products for home and market. Farmers see tree farming as a way to diversify production and income; reduce risk; make more efficient use of their limited inputs (labor, time, land, capital); and build assets for the future. Smallholder tree farming is often successful because of the farmers’ self-interest to profit from their efforts. However, these systems are not universal.

In many communities, farmers are adjusting from a situation of ‘open-access forests’ to one where trees are scarce. These farmers lack the tree planting skills necessary to develop viable tree farming systems. Well-intended top-down development efforts to help farmers expand tree resources often achieved little, because species selection, plantation design, and location are often imposed without considering farmers’ objectives or market opportunities. Active farmer participation is essential to develop successful tree farming systems that address the biophysical and socioeconomic conditions faced by farmers.

This paper describes farmer demonstration trials (FDT) and summarizes the experiences in developing FDT with smallholder farmers and non-government organizations (NGOs) in Indonesia.

Farmer Demonstration Trials

Farmer demonstration trials are evaluation trials designed by researchers/extension staff with farmers for establishment and management under farmers' biophysical, socioeconomic, and management conditions intended to:

- ❑ test and demonstrate the advantages of good germplasm (species, provenances, varieties, clones, or seed sources)
- ❑ expand on-farm tree resources
- ❑ inspire farmer/NGO innovation
- ❑ serve as a future source of on-farm seed production

Implementation Team

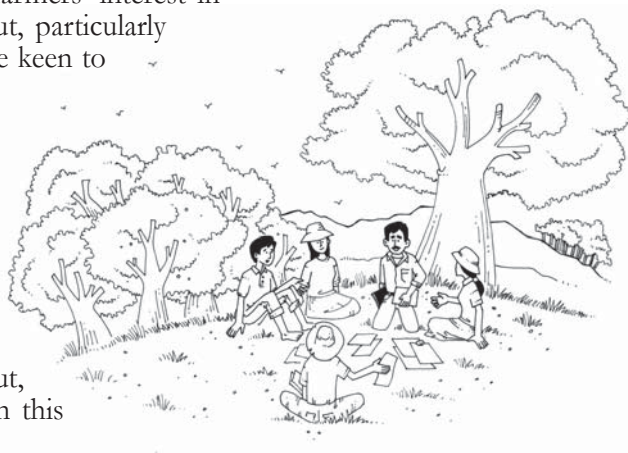
Developing a program on FDT requires an implementation team (IT) of at least two people: a community organizing specialist and a tree specialist. The IT can be larger, or can seek assistance when necessary from social or technical specialists of government agencies, NGOs, or other stakeholders.

Getting Started

Farmer interest should be gauged under informal conditions. Most often, FDTs are conducted where the IT is active. Pre-existing linkages provide easy access to communities. Contact key farmer leaders and ask if they could discuss tree farming with you. Adjust time to fit farmers' schedules. Be ready to discuss the issue during the preliminary contact, but realize farmers are busy and it may be best to return a few days later.

Initial Discussion

Tell farmers you are interested in learning about their tree farming systems. Avoid mentioning trials or tree-planting support until after you have gauged their interest. Start by asking farmers about their current tree resources, tree management methods, and the tree products collected from forests. The discussion should lead to farmers' tree problems and priorities. If not, steer the conversation to those topics and farmers' interest in tree planting. Record farmers' input, particularly their priority species. If farmers are keen to plant trees, mention FDTs and schedule a follow-up meeting (farmer workshop). Even a little interest is enough to get started. However, if farmers are not interested, do not push the issue. Forcing a community to plant trees is a sure formula for failure. Choose another community. In order to obtain representative input, 10-20 farmers should participate in this initial discussion.



Germplasm and Markets

Germplasm and markets are crucial elements to any successful tree-planting activity. Before the workshop, conduct a rapid reconnaissance of the local area to determine tree germplasm (seed or seedlings) availability and tree product marketability. Farmer priority species for which germplasm is available and strong markets exist for their products, can be considered 'best bet' species on which FDTs should focus. Germplasm availability is evaluated by visiting tree nurseries, tree seed dealers, and seed sources. Whether seedlings should be produced or purchased depends on the existence of village tree nurseries and the time remaining before the planting season.

'Best bet' species are species for which sufficient evidence indicates strong value to both household and market economies, making those species a priority for smallholder tree-domestication activities and FDTs.



In the first year of a FDT program, it may be easier to purchase, rather than produce seedlings. Marketable tree products are identified by visiting local markets and market agents. Farmer leaders can assist in this process. Betser (2000) provides a framework for rapid market surveys. Although the framework is more detailed than what is needed here, it provides insight on ways to identify marketable tree products. More thorough market analysis and germplasm evaluation can be conducted as the FDT program progresses.

Farmer Workshop

The farmer workshop is held in the village. Its purpose is to confirm farmer interest, build partnership, and develop a work plan. Start the workshop by reviewing farmers' and IT's interest in tree farming and the FDT concept. A short review may be sufficient, but be prepared to discuss FDTs in detail. To facilitate this process, invite other specialists (a forester or horticulturist) to complement the skills of the IT during the workshop.

To provide visual examples of possible FDTs, the workshop should include a field visit to timber, fruit tree, or mixed plantations – whichever is appropriate. Contact the landowner or manager prior to the visit and ask them to present a site summary. The IT should point out key aspects of the tree system that are relevant to farmers. Farmers will benefit greatly from the field visit.

Designing Farmer Demonstration Trials

Following the field visit, the farmers are ready to design FDTs, with the assistance of the IT. The key aspects of a FDT design are objectives, species, tree spacing and management. Draft designs should be completed during the workshop.

CAUTION: Field trips: Do not visit sites that are not relevant to farmers or that are beyond the IT's capacity to adapt to farmers' conditions.

Objectives

The objectives should be simple and clear. For example, to introduce x new species and test their survival and growth rates (during the first two years) under local

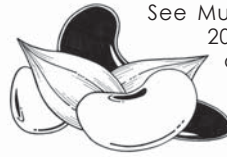
biophysical conditions or to compare the survival and growth rates (during the first 2 years) of x species under local biophysical conditions. The species included in the FDT should be specified by common and botanical name. Farmer and IT objectives could differ, but should be complementary. The IT should avoid imposing their objectives to farmers!

Best Bet Species

A list of best bet species will result from the rapid reconnaissance. It may include local species (as a control), new provenances or varieties of local species, and new species. With concurrence of farmers, the IT may add species to the best bet list that may fit farmers' priorities. Species may be timber, fruits or multiple-purpose trees. Each of these species groups has a different function. If more than one species group is included in a FDT, the objective is not to directly compare their performance, but to evaluate their compatibility. It is wise to start with species that serve both a household use and meet a market demand.

Tree Seed

Most farmers and NGOs involved with tree planting activities face annual shortages of tree seeds. To meet their needs, they use whatever seed is available regardless of quality. Studies indicate that over 75% of the seed used is collected locally. Establishing quality on-farm seed sources is a viable way to improve the quality of the tree seed used by farmers and NGOs. See Mulawarman *et al.*, 2003 for information on seed source establishment and management.



Trial Design of FDTs

In the beginning, particularly with farmers who have limited tree-planting experience, the design and objectives of FDTs should be made simple. One standard design and set of objectives will suffice for all participating farmers.

Tree Spacing and Management

Tree spacing and management greatly effect FDT success. Farmers with limited tree-planting experience will require strong guidance. FDTs are intended to address farmers' needs. Listen to farmers' concerns and use their input to develop the design. Sometimes farmer input is not technically sound. For example, many farmers want to plant at dense spacing without thinning trees. They initially ignore that trees need additional space as they grow larger. Politely explain the limits of their design and suggest alternatives. Most farmers will appreciate the comments and quickly grasp the reason.

The idea is not to dictate a management regime, but rather provide a range of options, which farmers can adapt to their conditions. Intercropping with annual crops during the first 1-3 years should be

Examples of Trial Design

A simple design could have the objective to compare growth and survival of five timber species, each planted in two blocks of 25 trees at spacing of 2 x 4 m (total area approximately 0.2 ha). Such a design will provide farmers the information they seek and targets success. As farmers gain experience, more complicated, farmer-specific designs will develop.

Examples of more complicated designs are alternate rows of short- and long-rotation timber trees, or testing various intensities of branch pruning. More complicated designs require more management and monitoring from the IT and tree specialists. The IT must be ready to provide this input.

encouraged. Farmers will benefit from crop yields, and trees will benefit from management (fertilization, weed control, etc.) of the annual crops. Mulawarman *et al.*, 2003 provides good guidelines of successful tree establishment and management.



Roles and Support

At the onset, it is important to be clear about roles and levels of support. Generally, farmers and the IT design and establish FDTs together. Farmers are responsible for managing the trials, with advice from the IT. However, if farmers wish to alter the management plan – even remove the trees – they are free to do so. Both farmers and the IT conduct monitoring and evaluation (M&E), as each may have different objectives and criteria. Franzel (2000) describes the *bao* game, an evaluation technique the IT can help farmers implement. The IT should clearly state that the trees are farmers' property. The IT has no claim to the trees and nor is the IT responsible for buying the tree products. Discuss the respective roles and responsibilities of farmers and the IT with all participants and document the outcome.

Appropriate support from the IT include the cost of workshops, field visits and trainings; technical information (manuals, leaflets, etc); germplasm; nursery materials; and agricultural inputs (fertilizer, pesticides in case of infestations, etc). Hats and t-shirts are a good promotional tool that build enthusiasm – but they are not necessary. Avoid giving money. Experience indicates money attracts the wrong type of participants; raises unrealistic expectation; hampers self-motivation; and dilutes the focus of the activity. Asking farmers to provide some type of in-kind matching support strengthens partnership and demonstrates farmers' commitment.

It is wise to start a FDT program with a small number of farmers. At one site, only seven farmers in two villages were involved in first year activities. Following the success of those trials, 20 additional local farmers and a few neighboring villages wanted to establish FDTs. Success breeds demand, the IT must gauge its capacity to meet demand before expanding.

Other Stakeholders

Government technical agencies and NGOs have roles to play in developing FDT. Most technical agencies are mandated to serve the needs of the smallholder farming communities, but are ill-equipped to do so. Through involvement in the FDT process, technical agencies will gain participation skills. Experience shows that the staff of technical agencies quickly perceive the advantage of participatory approaches in their own work. While meeting their agency's mission and goal remains a priority, benefiting smallholder communities becomes an important objective. Most NGOs have close linkages with local communities and understand local conditions. Not all NGOs are proficient with tree-planting activities; but their staff is usually motivated and eager to learn. Operating through NGOs can

greatly expand the impact of a FDT program. The planning workshop is modified for an NGO audience; the level of technical intensity can be increased. Each NGO could develop one or a series of FDTs. Roles, responsibilities and levels of support should be specified in a contract.

Timeframe and Planning

Implementing a FDT program should take 3-12 months. To facilitate planning, initial contact with farmers should be three months before the planting season – at least 4 -5 months if a nursery is to be established and seedlings are to be produced. Ample nursery management guidelines exist and need not be discussed here. Any forestry office and many NGOs can provide advice regarding nurseries. The farmer or NGO workshop may take 1-3 days.

A three-day workshop would have the following agenda:

- Day 1 – Discuss local tree farming systems, farmer tree needs, and FDT concept
- Day 2 – Field Visit
- Day 3 – Design of FDTs

As with any tree planting activity, FDT establishment must be preceded by thorough land preparation and planned to coincide with the beginning of the rainy season. Most FDTs are established on fallow or marginal agricultural land. Control of grass and other herbaceous vegetation is a priority during the first year.

Follow-up meetings every 3-6 months should be held to visit FDTs and identify tree-related problems and opportunities. If the implementing organization is active in the community, FDTs should be one component of a wider development program.

Research or Development?

FDTs are primarily a development tool, working examples intended to develop on-farm tree resources; help farmers gain tree-farming experience; and generate information that is immediately applicable to farmers' conditions. Research applications are of secondary importance. FDTs are generally good to evaluate farmer acceptability and profitability of the species and designs tested, and to identify farmer innovation. Because replication, randomization and treatments are not strictly applied,

FDTs have limited potential to evaluate biophysical parameters. If biophysical evaluation is desired, parallel researcher-controlled trials can be established nearby on farms or research stations. Franzel (1999) provides a comparison of researcher and farmer trials, which is illustrative to people interested in developing FDTs.



Limitations and Related Issues

There are a number of technical, policy and socioeconomic issues that may limit the potential of FDTs. Key technical issues include germplasm collection and management, tree propagation and nursery management, tree management, fire management and intercrop management. Farmer training in these areas will enhance FDT success and sustainability. Policy concerns include land tenure, market access, and tree utilization. Inadequate rights in these areas restrict farmers' ability to benefit from tree farming. Parallel activities by interdisciplinary teams to address policy issues can enhance farmers' tree-farming rights and thus the relevance of FDTs.

Jealousy, competition and favoritism within the community can limit the success and impact of any development activity. Participation in a FDT program should be transparent and equitable, including as many community sub-groups as possible. The potential public benefits and impacts of the FDT process should be articulated to the entire community. Jealousy within the community can be reduced by producing (or purchasing) extra seedlings for distribution to interested farmers. At distribution, the IT records the name of the farmer, species/number of seedlings distributed and objective/plan for planting the seedling. Farmers are reassured that the seedlings are their private property and the IT has no claim on the trees or their products.

Tree product marketing, postharvest processing, and enterprise development are often identified as holding great promise for smallholders, as these issues have received little attention to date. Certainly the development of smallholder marketing linkages should be prioritized. Postharvest processing and enterprise development are much more complicated. Undertaking these activities requires a lot of new information, planning, skills, capital and cooperation among farmers; timely delivery of products; and entails significant financial risk. It is not likely that most farmers or farmer groups are prepared to assume such new challenges. Thorough assessment of the individual and institutional capacities within a community is required before promoting these activities.

Postharvest processing and enterprise development can not be considered an easy first step towards expanding local economic capacity. Farmers would be better served to first focus on establishing permanent market linkages, thoroughly understanding market demand, and developing their capacity to produce reliable quantities of high-quality tree products that meet market specifications.



Application Domain

FDTs are relevant to all rural populations, particularly those with a paucity of forest resources and close proximity to market centers. They are flexible and easily integrated into existing farming systems, particularly where landholdings are small (2 ha or less); marginal soils do not support continuous annual crop production; household labor and capital are limited; and need dictates the production of multiple crops (annual and perennial) for multiple purposes (timber, fuel, fruit, shade, soil conservation, etc). Experience shows that FDTs are an effective means of involving farmers in species evaluation and technology innovation. FDTs are very suitable to conditions where off-farm or seasonal employment in urban areas restrict the availability of household labor. FDTs help farmers develop the tree-farming systems and skills that are better suited to such socioeconomic conditions than annual cropping alone.

The technical and leadership capacity built through the FDT process empowers communities and creates conditions where sustainable smallholder tree farming cultures can evolve. Beyond enhancing local livelihood, the creation of tree-farming cultures directly advance the international public environmental goals of land rehabilitation/reforestation, carbon sequestration, watershed protection and biodiversity conservation.

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