In: **Multipurpose Tree Species Research for Small Farms: Strategies and Methods.** p. 95-97. (Christine Haugen, Lee Medema, Celso B. Lantican, Eds.). Forestry/Fuelwood Research and Development Project (F/FRED), and International Development Research Centre of Canada. 1990.
(See full title page of publication at back).

Using Farmers and Their Ideas for Effective Extension Work: A Case Study from Thailand

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Agrotechnology transfer problems are not new to the farmer, extensionist, or researcher. By focusing more clearly on what the farmers are discovering on their own, coupled with outside research results, the extension agent can help the farmers find more appropriate, effective, and acceptable solutions to agricultural problems. This means that the classical extension agent, traditionally the source of information, must now take a more flexible and unassuming approach. The Khao Kho Alley Cropping/Agroforestry Project is an example of this extension technique. Khao Kho is characteristic of much of the tropics where demographics force marginal lands to be used for agriculture, often unsustainably. With the encouragement of an extension agent, the farmers involved in this project have been the innovators and disseminators of a solution to the problems of soil erosion.

Background

The relatively new agricultural sub-district of Khao Kho is located in Petchaboon Province in the mountains of northern Thailand. Only 20 years ago this region was covered by a dense, primary dipterocarp forest. However, between 1961 and 1982, 58% of the forests in the province were destroyed as a result of legal logging concessions, illegal logging, and shifting cultivation (Bostrom 1988). In the past 10 years the government has encouraged farmers from the lowlands to homestead on 20 rai (3.2ha) of land per family to promote political stability in the region. The farmers hold title to the land and can farm it indefinitely, but they may not sell it. The 33 villages in Khao Kho are home to 1,650 families.

Unlike the flat rice paddy land familiar to most of the farmers, Khao Kho is mountainous with slopes of 25-100% in the fields. The soils in the area vary considerably, classified under the Ustic groups of Alfisols, Inceptisols, Mollisols, and Ultisols, with some Vertisols. The climate is characterized by a rainy season from April to October (with peaks in June and September) for an annual precipitation of 1,800-2,000mm. In the dry, cool season from November to January, night temperatures drop to 8°C and rise to 25°C during the day. February to April is the dry, hot season. The elevation ranges from 600-1,000m, with most of the agriculture at altitudes between 600-900m.

Current Cropping System

The current cropping system in Khao Kho is unsustainable. Annual practices of burning crop and weed residues and plowing slopes dramatically increase the rate of soil erosion. Farmers generally hire a tractor and driver to plow their land for US$8/rai (1 rai = 1,600m^2). The cost to plow 20 rai would be $160, which is 37% of the 1986 average annual farm income of $430. Tractor drivers usually plow up and down the slope, even where slopes are less than 15% and contour plowing is possible.

Although the majority of the land in Khao Kho is unsuitable for cultivating annual crops due to the steep terrain, the major crop in the area is corn (*Zea mays*), planted for animal feed, with yields of 496 kg/rai (3,100 kg/ha) (Suebsak 1986). Minor crops include mung bean (*Phaseolus aureus*), ginger (*Zingiber officinale*), cucumber (*Cucumis sativus*), passion fruit (*Passiflora edulis*), castor (*Ricinus communis*), asparagus (*Asparagus officinalis*), and mulberry (*Morus alba*). Mulberry, a perennial used in sericulture, is a promising alternative to corn due to the favorable market conditions for silk. Recently planted fruit orchards include sweet tamarind (*Tamarindus indica*), lychee (*Nephelium mutabile*), mango (*Mangifera indica*), jackfruit (*Artocarpus heterophylla*), coffee (*Coffea arabica*), and custard apple (*Annona squamosa*).

Erosion rates of 1-2cm of topsoil/year and gullies 1m deep are not uncommon (author's observation). Farmers report that corn yields have decreased by 50% in the past 10 years, and that the soil is more difficult to dig with a hoe, indicating a loss of organic matter and topsoil.

The majority of farmers can not afford to buy chemical fertilizer, and animal and green manures are seldom used for soil improvement. Farmers are aware of the problem of declining soil fertility. Some say that when they can no longer grow corn, they will plant fruit trees, believing that trees can grow in depleted soil.

In addition to declining soil fertility, there is a parallel decline in sources of on-farm fuel for cooking. The search for fuelwood results in encroachment on forest reserves and watersheds. It has been observed that the cultivation of corn helps to alleviate the fuel shortage problem, but only for families who have fuel-efficient stoves that burn corncobs.

Khao Kho Alley Cropping/Agroforestry Project

Gou Seecong, 33 years old, is typical of Khao Kho farmers in certain respects, yet atypical in others. Originally from a village in the rice plains of Petchaboon Province, he volunteered to be one of the homestead farmers in Khao Kho in 1980.

When he first moved to the village of Tanit Com Tieng in Khao Kho the topsoil had such good tilth that his feet sank into it when he walked through the fields. However, in the past 8 years, he noticed the ears of corn getting smaller and the erosion gullies becoming more obvious. Like other farmers, he recognized the problem and attempted to solve it. On his 5 rai (0.8ha) vegetable plot, Seecong experimented by planting contour rows of lemon grass (*Cymbopogon citratus*) and making contour bunds of weed and crop residues (compost contours or trash lines). Both of these innovations were effective in reducing the rate of soil erosion. With his own ideas, initiative and labor, this farmer had started "on-farm experimentation."

Gou Seecong's field was an excellent site for a demonstration plot due to its proximity to the road, allowing passersby a good view. He had no way of knowing that in a few years, farmers from villages in Khao Kho and other regions of Thailand would visit his farm to hear him talk about his experience with soil conservation. Nor could he have predicted that he would speak to university students studying forestry, or international groups such as the participants in a UN conference on Desertification Control in Asia and the Pacific in 1989.

A year after Seecong planted the lemon grass hedgerows, a new Peace Corps Volunteer extension agent began work for the Royal Thai Department of Land Development in Khao Kho. The extension agent (EA) passed Seecong's field many times and was impressed by the lemon grass hedgerows. They reminded him of hedgerows of nitrogen fixing trees (NFTs) in alley cropping systems he had studied in college.

The EA approached Seecong, and found they had similar goals in their approach to farming. Seecong was more than happy to let the EA build a small hut on his farm and live there. Over the next few months Seecong and the EA worked together on farming and experimenting with NFTs to reduce erosion.

Exchanges of information and ideas constantly occurred as the EA and Seecong worked together. Seecong was intrigued when the EA pulled up a leguminous weed with root nodules and explained the process of nitrogen fixation and how the NFTs they were planting could improve soil fertility. A week later, the EA observed Seecong explaining nitrogen fixation to a curious neighbor who asked what was being planted in contours across Seecong's field. Another time, Seecong showed the EA how they could use a 10m section of clear plastic hose filled with water to determine the contour lines for the hedgerows.

Farmer to Farmer Extension

The EA wanted to expand alley cropping to include other farmers within three months but Seecong advised against it, saying that "the others will follow on their own if what we do on my farm is successful."

Soon, nearby farmers began to wonder why Seecong was planting contour hedgerows in his vegetable plot. It now had an attractive appearance, very important in Thai culture. Seecong would answer, "I'm planting trees to protect the soil and improve it." Many farmers said he was crazy.

Four months after the EA and Seecong began working together, there was a meeting at the local temple, organized by a development worker. When the development worker failed to appear, the village leader asked Seecong to talk about what he was doing on his farm. Without preparation or materials, Seecong spoke to the other villagers about the need for soil conservation and the method he and the EA were trying. The farmers at the meeting weren't afraid to ask questions or comment honestly

about what he said. What Seecong said made sense to the audience because he is a farmer and understands his neighbors in terms of culture, lifestyle, workload and available resources.

With the approach of the next planting season, the EA and Seecong wondered if some of the other farmers would be interested in trying this style of alley cropping. During the dry season, before the rains started, farmers began expressing their interest to both the EA and Seecong. The EA was very surprised with the unexpected interest in the soil conservation technique.

Each of the interested farmers was assisted by the EA for one day in marking contours using the plastic water-filled hose. The EA supplied NFT seeds to each of the farmers after they raked the crop and weed residue into compost contours. For many, this was the first time they had not burned the crop and weed residue in their fields. After the rainy season started, when each farmer had time, the EA returned and helped the farmers plant the NFT hedgerows. That year, Seecong expanded the alley cropping to cover all his land and 13 other farmers planted trial plots of varying size.

An essential tool to expand the area under alley cropping, and a further example of using farmers' ideas, was a human-powered plow that Seecong and the EA developed. The one-wheeled plow could make a furrow 80m long in 2 minutes, compared to the 30 minutes it took with a hoe. Water buffaloes are scarce in the mountains of Khao Kho, therefore human power is appropriate. Sufficient soil moisture makes it easy for a single person to pull the plow, which disturbs the soil less than a hoe and helps with soil conservation. The "human buffaloes" (both farmer and EA) were the source of much amusement in the village.

Tangible Results

Following the first rains and prior to the planting of hedgerows, 20 to 30cm of soil had built up along the compost contours in a field with a slope of 30%. Much of this soil would have otherwise collected in the reservoir at the bottom of the field, creating an additional problem of siltation.

Nine months after the NFT hedgerows were planted and the 1989 rainy season began, the positive effect of alley cropping was obvious on Seecong's farm. Where the slope was 25% and the cropping area was 5m between the hedgerows, an average of 5-10cm of soil had built up directly up-slope of the hedgerow, the beginning of a natural terrace.

The effect of the NFTs on crop yields is unknown, but data will be collected at the end of the 1989 cropping season. Seecong used pigeon pea (*Cajanus cajan*), the giant variety of *Leucaena leucocephala*, *Sesbania sesban*, and sunhemp (*Crotalaria juncea*) in his hedgerows. In terms of insect avoidance (especially the psyllid), and the establishment of a biomass productive hedgerow, the mixture of all four species was very successful. A thick hedgerow, approximately 1 plant/cm, was hand sown using a mixture of seeds.

In 1989, additional species planted included *Gliricidia sepium*, *Cassia siamea*, *Calliandra calothyrsis*, *Leucaena diversifolia* (showing some resistance to the psyllid), and *Tamarindus indica*. It is still too early to evaluate the performance of these latter species.

Conclusion

The planting of multipurpose and nitrogen fixing trees to control soil erosion has been readily accepted and adopted by the farmers of Seecong's village due to many factors. This paper emphasizes that the reason for success is due to using the farmer's ideas and supplementing them with additional extension information. In Khao Kho the farmers recognized the problem of soil erosion and took action to solve it. However simplistic that explanation may seem, when an idea is farmer-generated it will be more acceptable to other farmers. The author believes that farmers' acceptance of unfamiliar technologies has been hindered by the lack of input from the farmers themselves. This stems from the fact that the flow of information is one way, originating from outside the farmers' environment and with people who are unfamiliar with the farmers' way of life. For successful and sustainable agricultural development, a two way flow and exchange is critical. The adoption of such a system could help in solving the agricultural technology transfer problem.

In the case of Khao Kho, the demonstration plot was not on a government station, an artificial and unrealistic setting, but rather in a farmer's field, using the resources of the farmer. For neighboring farmers, such a demonstration is appropriate because it is developed within their environment, under the same conditions and constraints they face.

The fact that the EA lived among the farmers

and worked with them in both project related (soil conservation) and unrelated activities (harvesting crops and weeding), made him a part of the community and thus more credible. This helped the EA better understand many different aspects of the farmers' lives, leading to more effective extension work. If the EA does not live in the community or have a feeling for the work of the farmers, he will probably be less committed to seeking solutions.

Too often, extension programs are overly ambitious and push results at the expense of learning. When an EA receives orders from outside the farming environment from planners in the regional office, to complete X rai of terracing, or plant Y number of trees with Z number of farmers, problems are inevitable. Such problems might include farmers accepting a technology just to please the EA, but abandoning it shortly thereafter; lack of farmer participation in selecting and developing a technology, rendering it inappropriate; and the extension agents may acquire a reputation among farmers for being unmotivated and insensitive to the farmers' concerns and needs, hampering future extension work.

These problems block the message and prevent any progress towards lasting positive change. The experience in Khao Kho has shown that by starting small, with one farmer and one extension agent, problems in the alley cropping method could be worked out before they were magnified over an extensive area. Agricultural development workers can benefit greatly by remembering that sustainable development, like a successfully established tree, must begin as a small seed.

The primary role of the EA should be as an "encouraging" agent. In this case the EA saw something good (lemon grass contours) and used that as a door into the farmer's field. Extension agents need to be constantly on the lookout for such doors to create a positive relationship with the farmers. The EA should enter the farmer's field accepting the fact that farmers often have many of the answers to their own problems, but may simply need encouragement. When farmer to farmer extension is utilized, the information is more believable and the experience is internalized.

Using farmers and their ideas will lead to more effective and worthwhile development, as the Khao Kho Project has successfully demonstrated. For the extension agent this means being patient, flexible and unassuming, and listening and learning from the farmers.

The formula for this is simple -- pick up your hoe, get out in the field and work with the farmers!

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MULTIPURPOSE TREE SPECIES RESEARCH FOR SMALL FARMS: STRATEGIES AND METHODS

Proceedings of an International Conference
held November 20-23, 1989
in Jakarta, Indonesia

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Co-sponsors: Winrock International Institute for Agricultural Development
International Development Research Centre of Canada
Ministry of Forestry of Indonesia

Co-publishers: Forestry/Fuelwood Research and Development Project (F/FRED)
International Development Research Centre of Canada