Working With Farmers: The Key to Adoption of Vetiver Grass Hedgerows to Control Erosion in Cassava Fields in Thailand

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Abstract: Cassava (*Manihot esculenta* Crantz) is the third most important food crop in southeast Asia and the most important upland crop in the northeast of Thailand. The crop is usually grown by small-holders in marginal areas of sloping or undulating land. Most farmers realize, however, that cassava production on slopes can cause severe erosion, while production without fertilizers will lead to a gradual decline in soil productivity.

Research has shown that cassava yields can be maintained for many years with adequate application of fertilizers and/or manures, and that there are various ways to reduce erosion. Adoption of recommended practices, however, has been minimal as farmers generally see little short-term benefits, while initial costs of establishing these practices may be substantial.

In order to enhance the adoption of soil conserving practices and improve the sustainability of cassava production under a wide range of socio-economic and bio-physical conditions, a farmer participatory research (FPR) approach was used to develop not only the best soil conservation practices, but also to test new cassava varieties, fertilization practices and cropping systems that tend to produce greater short-term benefits. The FPR methodology was initially developed in 2-3 sites each in China, Indonesia, Thailand and Vietnam.

In the second phase of this project, again funded by the Nippon Foundation in Japan, the farmer participatory approach to technology development and farmer-to-farmer extension has been further developed and the total number of sites has rapidly expanded to about 32 sites in Thailand, 35 in Vietnam and 23 in southern China.

In Thailand, farmers in almost all sites selected the planting of contour hedgerows of vetiver grass as the most effective and most suitable practice to control erosion. In 2002 nearly 900 farmers in 18 sites in eight provinces in Thailand had planted a total of 130 km of vetiver grass hedgerows in close to 950 ha of cassava fields. Through the use of a farmer participatory extension approach, including cross visits, farmers' field days, training courses and the establishing of community-based self-help groups, the number of farmers planting vetiver grass is growing day by day. In the long-term, this will result in less erosion and the conservation of soil and water resources to the benefit of farmers as well as the community as a whole.

Key words: cassava, erosion, extension, farmer participation, research, vetiver, Thailand

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1 INTRODUCTION

The northeast is the poorest region of Thailand. The soils are sandy and of very low fertility while rainfall is rather unpredictable even during the six month wet season. Cassava (*Manihot esculenta* Crantz) is the most important upland crop in the area because it is highly drought tolerant and well adapted to acid and low fertility sandy soils. Cassava is also a popular crop because it does not suffer from any serious diseases or pests problems in Thailand and, as such, does not require the spraying of pesticides. During the 1970s much of the natural forest vegetation in the northeast was cut and burned to open land for cassava cultivation. Initially farmers obtained reasonably high yields, but after several years of continuous cassava cultivation, yields started to decline due to soil degradation as a result of nutrient depletion, rapid organic matter decomposition and erosion. Despite the introduction and rapid dissemination of new high-yielding varieties, starting in the early 1990s, yields remained stagnant at about 14-15 t/ha due to declining soil fertility and a continuous displacement of cassava from the relatively more fertile eastern region to the less fertile northeast.

Intensive research over the past 25 years by the Department of Agriculture (DOA) and Kasetsart University (KU), in collaboration with the Centro Internacional de Agricultura Tropical (CIAT), not only resulted in several new high-yielding and high-starch cassava varieties, but also identified the best fertilization, improved cultural practices and effective ways to control erosion. The Department of Agric. Extension (DOAE) and the Thai Tapioca Development Institute (TTDI) were actively involved in the multiplication and distribution of planting material of new varieties, which were readily accepted by farmers. Presently, nearly 100% (one million ha) of the cassava growing area in Thailand is planted with these new varieties. Meanwhile, upon the suggestion of His Majesty the King of Thailand, King Bhumibol Adulyadej, the Land Development Department (LDD) and many other institutions conducted a wide range of studies on the use of vetiver grass for soil and water conservation. While cassava farmers in Thailand readily adopted the use of new varieties and some started to use fertilizers, there was little awareness of the seriousness of soil erosion and thus little adoption of any type of soil conservation practices.

A study by KU conducted from 1989 to 1993, comparing the nutrient uptake and soil losses by erosion from cassava and six other crops, found that cultivation of cassava caused more severe erosion than that of other crops (Putthacharoen *et al.*, 1998). However, many cultural practices that could markedly reduce erosion were also identified, such as minimum tillage, contour ridging, planting at closer spacing, intercropping, mulching, fertilizer application, and the planting of contour hedgerows of various grasses, such as vetiver grass (*Vetiveria zizanioides*), *Paspalum atratum*, *Brachiaria brizantha and Setaria sphacelata*. Still, few of these practices were adopted by farmers as they usually considered soil conservation as either not necessary or too complicated or costly.

For that reason, a new project, funded by the Nippon Foundation in Japan, was initiated in 1994 to try to enhance the adoption of soil conservation practices through the use of a farmer participatory approach, in which farmers conduct soil erosion control trials on their own fields.

2 METHODOLOGY

The first phase of the Nippon Foundation supported cassava project (1994-1998) was coordinated by the CIAT Regional Cassava Office for Asia, located in Bangkok, and was implemented in collaboration with several research and extension organizations in China, Indonesia, Thailand and Vietnam. In Thailand the project was implemented in partnership with DOA, DOAE, KU and TTDI; KU and DOA concentrated on research on effective erosion control practices, DOA and DOAE on the development of farmer participatory research (FPR) methodologies, and TTDI on the training of farmers.

2.1 Farmer Participatory Research (FPR) Methodologies

The farmer participatory approach is basically an extension of the previously used on-farm and farming-systems approach, in which farmers become more and more involved in the research process. Farmers' problems and limitations also feed back to researchers, thus improving the relevance of their work. The idea behind FPR is that farmers, researchers and extensionists all have complementary skills and that real on-farm problems can best be solved by researchers and extensionists working closely together with farmers, especially by helping farmers test a few selected options on their own farms using simple experimental techniques. Since farmers know the environmental (soil and climate), social and economic conditions in the area better than anyone else, they should select the type of trials to be conducted and the treatments to be tested. They conduct the trials themselves with some initial help from project technicians, and based on the results of these trials they select the most suitable practices for adoption. By conducting simple soil erosion control trials on their own fields, farmers can see the amount of soil loss by erosion, and become convinced of the need for soil conservation. They also can see that a few simple practices can markedly reduce the loss of soil, water and fertilizers from their fields, that gully formation can be prevented or existing gullies repaired, and that crop yields will increase as a result of this. Having experienced this, these farmers are more likely to adopt soil conservation practices.

The FPR methodologies used in this project, as well as the experimental techniques for on-farm erosion control trials, have been described in detail before (Howeler, 1999, 2002; Howeler *et al.,* 2002; Vongkasem *et al.,* 2001; Watananonta *et al.,* 2001). This includes the following activities:

1. Researchers conduct Rapid Rural Appraisals (RRAs) in potential pilot sites; from this a few pilot sites are selected.
2. Farmers from these sites visit demonstration plots that show many options to reduce erosion; from these farmers select a few promising treatments.
3. With the help of project technicians, farmers conduct simple erosion control trials on their own fields; they may also conduct trials on new varieties, fertilization practices, green manuring, weed control, intercropping etc.
4. After harvest of all the trials in the village, results are discussed and farmers decide on treatments to be retested or adopted on their production fields.

During the first phase of the project this methodology was tested initially in two pilot sites in each of the four countries mentioned above. In Thailand this was in Soeng Saang district of Nakhon Ratchasima province and in Wang Nam Yen district of Sra Kaew province; this was later expanded to another two sites in Kalasin and Chachoengsao provinces. By the end of the first phase (1998), farmers in all four sites in Thailand had selected the planting of contour hedgerows of vetiver grass as the best way to control erosion in cassava fields, and some farmers had started to plant vetiver grass in small areas of their fields (Howeler *et al*., 1998; Howeler, 1999; Vongkasem *et al*., 2001).

During the second phase (1999-2003), project activities concentrated in Thailand, Vietnam and China, while the emphasis gradually changed from farmer participatory research to extension, with the principal objective of enhancing adoption of improved varieties and production practices and benefiting more farmers. In addition to the four institutions participating during the first phase in Thailand, the Land Development Department (LDD) also joined the project. Each year the project expanded to more sites and in 2002 the project was or had been working in 24 villages in 17 districts of eight provinces where cassava is an important crop (see **Figure 1** and **Table 3**). In 2003 the project further expanded to seven new sites in three additional provinces.

Farmer participatory extension activities were mainly the responsibility of DOAE with active participation of personnel at the national, provincial, district and subdistrict levels. Researchers and extension personnel were trained in FPR and FPE methodologies in special training courses held in 1994, 1997, 1999 and 2002.

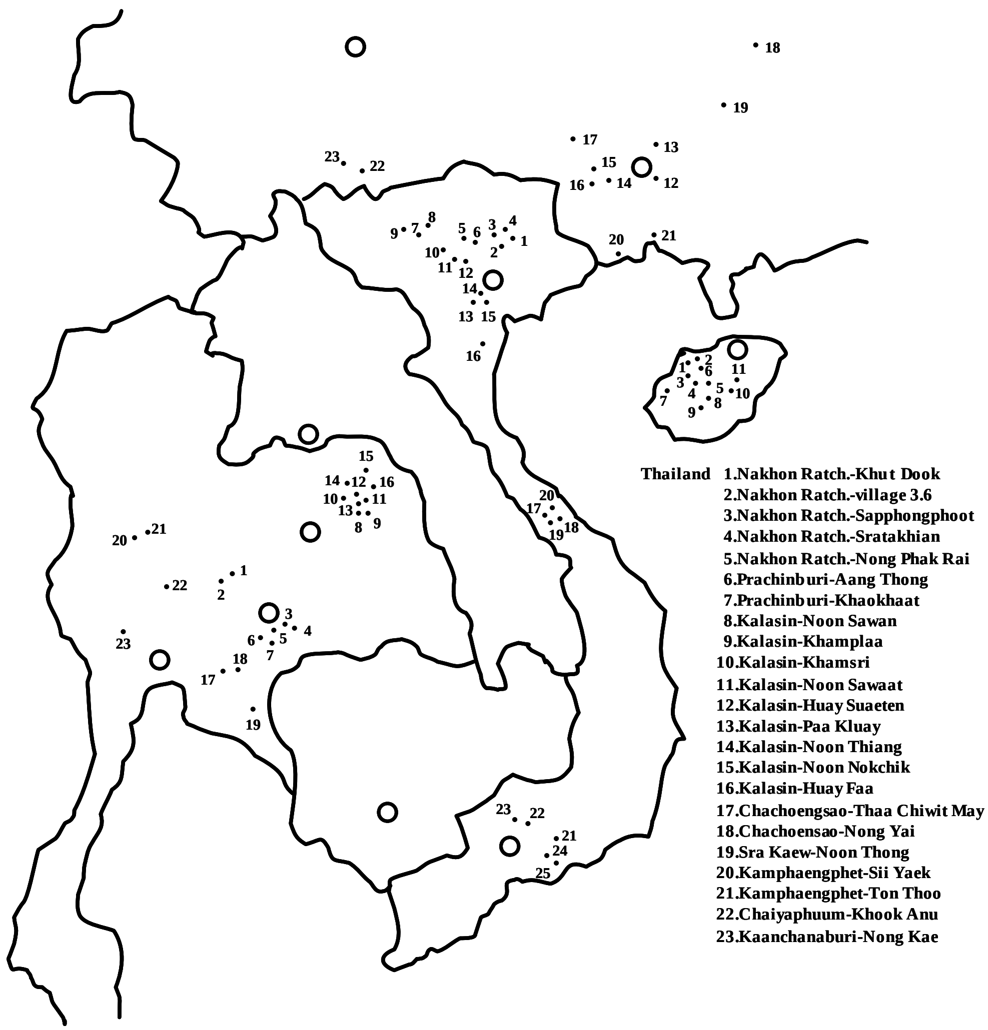

Figure 1. Location of FPR pilot sites in Thailand, Vietnam and China in 2002.

2.2 Farmer Participatory Extension (FPE) Methodologies

The idea behind FPE is that farmers are often more convinced about the benefits of a particular technology if they see it adopted or being promoted by other farmers, rather than just being recommended by researchers or extensionists. Farmers who had already participated in FPR and had adopted certain technologies were often willing to share their experiences with other farmers in the community or from other sites. This "farmer-to-farmer extension" was encouraged and facilitated by the following FPE activities:

1. *Cross-site visits:* farmers from a new site would visit a village where the project had worked before ("old" site), and where new technologies had already been adopted.
2. *Farmer field days at harvest:* farmers from the community and surrounding villages were invited to evaluate each treatment in the FPR trials, including the amount of roots harvested and the amount of eroded soil trapped in plastic covered channels below each plot. Together they would discuss the results and select the best treatments for further testing or adoption.
3. *District or provincial level field days:* these were held in only a few sites with participation of hundreds of farmers, school children, government officials, press and TV. This was an opportunity for local farmers to disseminate to a wide audience the results of their trials as well as their experiences in the field.
4. *FPR training courses:* these were organized for key farmers and the local extension agent from each site with the objective of forming local "FPR-teams" that could help farmers in their own or neighboring communities conduct FPR trials or adopt the practices that they had selected.
5. *Setting up of community-based self-help groups:* in Thailand these are called "Cassava Development Villages". These groups select their own president and four other officials, write their own by-laws and manage a rotating credit fund, which was initially supplied by the Thai government in the form of chemical fertilizers. After harvest, members who had used the fertilizers must return the value of the fertilizers plus some interest to the rotating fund, from which they can then borrow again.

3 RESULTS AND DISCUSSION

Table 1 shows results of the FPR demonstration plots at the TTDI Research and Development Center in Huay Bong in 2001/02. These plots were visited by several groups of farmers from new pilot sites. Farmers visually evaluated all treatments and selected a few that they considered most useful and wanted to try out in FPR erosion control trials on their own fields. The data indicate that most of the hedgerow treatments (T_{12}-T_{18}) as well as contour ridging (T_3) and closer plant spacing (T_8) were very effective in reducing soil losses by erosion. Some of the intercrops (T_9 and T_{11}) and one of the three vetiver grass (T_{16}) accessions competed strongly with nearby cassava, causing a reduction in yield. Most farmers selected vetiver grass hedgerows as the most suitable practice, followed by closer plant spacing, the combined application of fertilizers and chicken manure, contour ridging, and intercropping with pumpkin.

Many results of the FPR trials conducted by farmers in Thailand have already been published (Howeler, 2001; Vongkasem *et al.,* 2001; Watananonta *et al.,* 2001; Howeler *et al.,* 2002). **Table 2** is an example of FPR trials conducted by farmers in Chayaphum province. It shows that both vetiver grass and lemon grass hedgerows were very effective in reducing soil losses by erosion; in some (but not all) cases they also increased yields and net income. Farmers overwhelmingly selected vetiver grass over lemon grass because of the former's tolerance to drought and poor soils, and for its ease of planting and maintenance. Similar results were obtained in many other sites. Farmers observed that contour plowing and ridging, closer plant spacing and adequate fertilization also contributed to reduced erosion and generally increased yields. Intercropping with peanut, mungbean, sweet corn and pumpkin often increased farmer's income and reduced erosion, but these practices are not widely adopted in Thailand because of the high cost of labor, marketing problems of pumpkin, and regular intercrop failures due to insect pests and drought. Once farmers saw the benefits of the various soil conservation practices, they adopted closer plant spacing, more balanced fertilization and the planting of contour hedgerows of vetiver grass; the latter in turn led to contour plowing and ridging in some areas.

Table 1 Results of the FPR Demonstration Plots at TTDI, Huay Bong, Nakhon Ratchasima, Thailand, in 2001/02.

Treatments[1)]	Dry soil loss (t/ha)	Cassava yield (t/ha)	Starch content (%)	Intercrop yield (t/ha)	Gross Income[2)] <-----('000 B/ha)	Prod. costs	Net income ---->
1. farmers' practice: up/down ridges, no fertilizers	10.50	44.12	25.4	-	53.74	17.59	36.1
2. up/down ridges; 50 kg/rai 15-15-15 fertilizers	37.68	43.51	30.9	-	57.78	20.93	36.8
3. contour ridges; 50 kg/rai 15-15-15 fertilizers	5.86	40.28	28.0	-	51.16	20.06	13.1
4. no ridges; 50 kg/rai 15-15-15 fertilizers	12.06	48.68	25.5	-	59.39	21.51	37.8
5. no ridges; 25 kg/rai 15-15-15 fertilizers	12.70	46.96	28.7	-	60.30	19.42	40.8
6. no ridges; 25 kg/rai fert.+125 kg/rai chicken manure	10.83	45.36	24.5	-	54.43	19.85	34.5
7. no ridges; 25 kg/rai fertilizer+1,000 kg/rai compost	13.09	45.63	29.0	-	58.86	20.16	38.7
8. no ridges; closer spacing (0.8 x 0.8 m)	4.52	49.27	31.6	-	66.12	21.98	44.1
9. no ridges; peanut intercrop	11.70	27.00	26.1	2.00	53.26	18.66	34.6
10. no ridges; pumpkin intercrop	5.53	40.41	23.5	3.80	85.68	23.28	62.4
11. no ridges; sweet corn intercrop	16.70	17.80[3)]	25.7	7.10	57.29	18.18	39.1
12. no ridges; *Leucaena leucocephela* hedgerows	5.28	33.80	25.4	-	41.17	18.50	22.6
13. no ridges; sugarcane (for chewing) hedgerows	7.51	44.01	23.0	-	51.49	21.25	30.2
14. no ridges; lemon grass hedgerows	6.51	42.09	27.2	0.65	52.78	20.73	32.0
15. no ridges; *Paspalum atratum* hedgerows	14.24	39.09	23.3	-	45.97	19.92	26.0
16. no ridges; vetiver (from TTDI) hedgerows	4.69	25.46[4)]	22.0	-	29.28	16.24	13.0
17. no ridges; vetiver Songkla-3 hedgerows	6.24	46.10	26.0	-	56.70	21.82	34.8
18. no ridges; vetiver from Vietnam hedgerows	8.25	41.68	24.6	-	50.10	20.62	29.4

[1)] Variety KU-50; T_8-T_{18} were all fertilized with 50/kg rai of 15-15-15 fertilizers, and all treatments except T_8 were planted at 0.8 x 1.25 m. spacing; 1 ha = 6.25 rai

[2)] Prices: cassava baht 1.31/ kg fresh roots at 30% starch
peanut 10.0/ kg dry pods
pumpkin 10.0/ kg
sweet corn 5.0/ kg
lemon grass 5.0/ kg

[3)] Low yield due to strong intercrop competition and poor drainage

[4)] Low yield due to competition from very vigorous vetiver grass hedgerow

Table 2 Average Results of Two FPR Erosion Control Trials Conducted by Farmers in Khook Anu Village, Thep Sathit District of Chayaphum Province, Thailand, in 2001/02

Treatment	Dry soil loss (t/ha)	Yield (t/ha) Cassava	Yield (t/ha) Intercrop	Root starch content (%)	Gross income (baht/ha)	Product. costs[2] (baht/ha)	Net income (baht/ha)	Farmers' preference (%)
1. farmer's practice	14.0	12.61	-	20.3	12,736	12,018	718	0
2. contour plowing	10.2	8.41	-	20.0	8,410	11,471	-3,061	100
3. up/down plowing	31.1	12.34	-	18.3	11,970	11,974	-4	0
4. mungbean intercrop	10.3	8.70	0.306	24.0	15,516	15,392	124	82
5. lemon grass hedgerows	4.5	15.94	-	21.0	16,259	13,550	2,709	0[3]
6. vetiver grass hedgerows	8.0	13.02	-	22.3	13,619	13,083	536	100

[1] Prices: cassava baht 1.20/kg fresh roots at 30% starch
mungbean 20/kg dry grain

[2] Cost of cassava production without harvest 10,000/ha
Cost of C+mungbean production 14,000/ha
Extra cost of contour plowing 125/ha
Cost hedgerow planting + maintenance 1,000/ha
Harvest + transport 160/tonne

[3] Although lemon grass hedgerows produced the highest net income, farmers do not like this practice because lemon grass does not tolerate drought and it is difficult to sell in large quantities.

The planting of vetiver grass hedgerows was done either by individual farmers on their own fields, or as a community activity. For instance, in 1999 farmers in Sapphongphoot village in Nakhon Ratchasima province spontaneously organized a Soil Conservation Group which decided to plant about 100 km of vetiver grass hedgerows on 320 ha of cassava fields in the community. In 2000 they had planted 17 km and in 2002 this had increased to 20 km covering about 132 ha (**Table 3**). Being one of the first groups to adopt the planting of vetiver grass hedgerows for erosion control on a large scale, farmers from many other sites visited Sapphongphoot village during "cross-visits" to talk directly to farmers who had adopted this technology. Similarly, well organized *Cassava Development Villages* in Huay Suea Ten (Kalasin) and Khut Dook (Nakhon Ratchasima) received many groups of cassava farmers during cross-visits. Large-scale field days were also organized at these sites to disseminate farmers' experiences about the planting of vetiver grass to other farmers, government officials and the media. This further enhanced the adoption of the technology.

The setting up of the *Cassava Development Villages* was another effective way to empower farmers to organize themselves and to make their own decisions. In 2001 the Thai government, through DOAE, set up these community–based self-help groups in 11 of the project pilot sites, providing about US$1,000 to each group in the form of fertilizers to initiate a rotating fund. In 2002 this was further expanded to another 7 sites. These groups generally hold monthly meetings to discuss local problems, they conduct their own FPR trials on new varieties, fertilization, green manures, organic manures, soil erosion control, weed control etc.; some set up their own vetiver grass nurseries to supply planting material to members, and as a group they planted many kilometers of vetiver grass hedgerows. **Figure 2** shows the rate of adoption of soil conservation practices in the project sites in Thailand and Vietnam, while **Table 3** shows the extent of vetiver grass planting in each of the FPR pilot sites in Thailand in 2002. By the end of 2002, nearly 900 cassava farmers in Thailand had planted about 130 km of vetiver grass hedgerows in 940 ha of cassava fields. It can be assumed that many more farmers outside the pilot sites had similarly adopted this technology after hearing about it on the radio or TV, or from extensionists or other farmers through word-of-mouth. The fact that His Majesty the King promotes the use of vetiver grass, and that free planting material is available at LDD stations nation-wide are surely decisive factors favoring the rapid spread of this technology.

Table 3 Location of FPR Pilot Sites in Thailand in 2002, and the Adoption of Vetiver Grass for Erosion Control in Those Sites

FPR pilot sites				Adoption of erosion control practices		
Province	District	Subdistrict	Village	No. of farmers	Cassava area with vetiver (ha)	Vetiver hedgerows (km)
Nakhon Ratchasima	Daan Khun Thot	Baan Kaw	Khut Dook	53	49.4	15.0
	Thephaarak	Bueng Prue	3 and 6	26	34.2	11.0
	Soeng Saang	Noon Sombuun	Sapphongphoot	62	132.5	20.0
		Sratakhian	Sratakhian	0	4.8	2.0
	Khonburi	Tabaekbaan	Nong Phak Rai*	27	24.0	5.0
Prachinburi	Naadii	Kaeng Dinso	Aang Thong} Khao Khaat	34	27.2	4.5
Kalasin	Mueang	Phuu Po Khamin	Noon Sawan Khamplaafaa	61	49.0	8.6
	Nongkungsri	Nong Bua	Khamsri	67	110.4	11.2
	Sahatsakhan	Noonburi	Noon Sawaat	63	59.2	8.6
		Noon Namkliang	Huay Suea Ten } Paa Kluay	47	40.6	12.8
	Naamon	Naamon	Noon Thiang*	50	24.0	1.6
	Don Chaan	Dong Phayung	Noon Kokchik*	50	24.0	1.6
	Huay Phueng	Nikhom	Huay Faa*	50	24.0	1.6
Chachoengsao	Sanaam Chaikhet	Thung Phrayaa	Thaa Chiwit Mai	32	10.4	2.0
	Thaa Takiab	Khlong Takraw	Nong Yai	42	27.2	5.3
Kamphaengphet	Khanuwaralak burii	Bo Tham	Siiyaek } TonThoo	42	27.2	3.0
Chaiyapuum	Thep Sathit	Naayaang Klak	Khook Anu	42	27.2	4.0
Kanchanaburi	Law Khwan	Thung Krabam	Nong Kae	42	27.2	3.0
Srakaew	Wang Sombuun	Wang Sombuun	Baan KhlongRuam	75	220.8	9.0
Total: 8	**17**	**20**	**24**	**>865**	**943.3**	**129.8**

* initiated in 2002

Cassava farmers in Vietnam similarly conducted many FPR erosion control trials in 25 villages in 11 provinces of the north, central and southern part of the country (see **Figure 1**). In 2002, 30 such trials were conducted and results generally were even more convincing than in Thailand about the benefits of planting vetiver grass hedgerows. However, good results were also obtained with contour hedgerows of *Tephrosia candida* (mainly in north Vietnam), *Panicum* *maximum*, *Paspalum atratum* and pineapple. Because of the unavailability of large amounts of planting material of vetiver grass in Vietnam, as well as farmers' practice of on-farm cattle, buffalo, pig and fish feeding, most cassava farmers in Vietnam adopted the planting of *Tephrosia candida* or *Paspalum atratum,* in adition to vetiver grass.

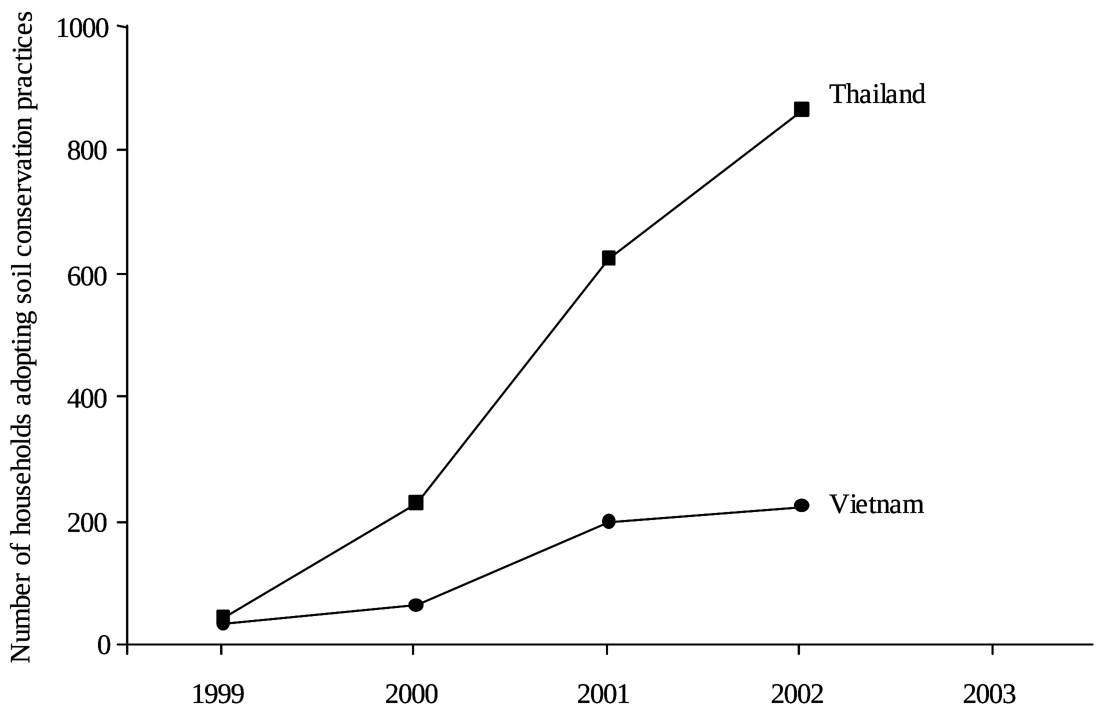

Figure 2. Number of farmers adopting soil conservation measures in their cassava fields in FPR pilot sites in Thailand and Vietnam from 1999 to 2002

In both Thailand and Vietnam farmers were initially not very concerned about soil erosion and were not fully aware of its impact on soil productivity. They joined the project mainly to get planting material of new cassava varieties. They readily agreed to test these varieties as well as different fertilizers and intercropping systems, as these technologies can give them substantial short-term benefits. In contrast, soil conservation practices seldom produce immediate benefits to farmers, while they generally require additional labor or inputs (seeds, planting material, fertilizers etc). It is, therefore, not surprising that farmers seldom adopt soil conservation practices spontaneously, but only if there are some incentives such as government subsidies. Once those subsidies stop, farmers are likely to abandon soil conservation practices. By letting farmers test on their own fields several different technologies, such as varieties, fertilization, intercropping, and the planting of various contour hedgerows, all of which can contribute to reducing erosion, they become aware of the extent of soil loss by erosion, and can select simple practices that will reduce these losses. Thus, new higher yielding varieties, as well as other practices with immediate financial benefits are excellent *entry points* for the testing of soil conservation practices. Without these it is unlikely that farmers are interested in soil conservation.

4 CONCLUSIONS

From the results and experiences obtained in this project the following conclusions can be drawn:

1. The use of a farmer participatory approach for technology development and dissemination was very effective in enhancing the adoption of soil conservation practices.
2. The testing of various technologies that may produce immediate financial benefits, such as new varieties, organic and inorganic fertilizers, improved weed control etc., are good *entry points* to arouse farmers' interest in testing soil conservation practices. A combined package of suitable practices, adapted to local conditions, including soil conservation practices such as the planting of contour hedgerows, is more likely to be adopted than soil conservation practices by themselves.
3. Which soil conservation practices are most suitable for a particular area depends on the soil and climatic conditions, on the socio-economic situation and on farmers' traditional practices. Outside influences and peer pressure from other farmers also affect farmers' choices.
4. In Thailand, the planting of vetiver grass hedgerows for erosion control is a very suitable technology considering the conditions under which cassava is generally grown; in Vietnam those conditions are different and farmers may prefer other species over vetiver grass.
5. The various national and international research and extension organizations all have their strengths and weaknesses. By working together as partners they can complement each other and become more effective in achieving the country's development goals, for the benefit of farmers.

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A. Brief Introduction to the First Author

The first author, Reinhardt Howeler, is a soil scientist and cassava agronomist with the Centro Internacional de Agricultura Tropical (CIAT) in Cali, Colombia. He is a Dutch citizen and obtained his PhD from Cornell University in the USA in 1970. For the past 33 years he has worked with CIAT, first 16 years in Colombia, and since 1986 in the CIAT Regional Cassava Office for Asia in Bangkok. He has conducted on-station and farmer participatory research together with colleagues in China, East Timor, Indonesia, Laos, Malaysia, Philippines, Thailand and Vietnam.