CHAPTER 2

LITERATURE REVIEW

2.1 Peri-urban agriculture

The meaning of peri-urban agriculture according to FAO 1999, refers to farm units close to town which operate intensive, semi- or fully commercial farms to grow vegetables and other horticulture, raise chickens and other livestock, and produce milk and eggs.

Peri-urban agriculture includes both commercial agriculture (thus contributing to overall urban food availability, in particular of fresh and perishable plant and animal foods rich in micronutrients), and food production for home consumption. It can therefore generate income, reduce household expenditure on food and contribute to the diet, thus contributing to food security of the urban population, as consumers and as producers. On the other hand, inappropriate use of agricultural inputs such as pesticides, use of contaminated water for irrigation and spreading of breeding sites for disease vectors can have negative impacts on health and in particular food safety (Haen, 2003).

Livelihoods in the peri-urban interface (PUI) are severely affected by land use changes and transformation. The nearby urban markets lead to more focus on production of high value, perishable vegetables and fruits, as well as high-priced off-season vegetable production (Habermann, 2003).

Horticulture, mainly vegetable production, has expanded in and around cities in many developing countries as an informal activity practiced by poor and landless city dwellers. The broad diversity of horticultural crop species allows year round production, employment and income. Growers have realized that intensive horticulture can be practiced on small plots, making efficient use of limited water and

land resources. Horticultural species, as opposed to other food crops, have a considerable yield potential and can provide up to 50 kg of fresh produce per sq.m. per year depending upon the technology applied. Leafy vegetables provide a quick return to meet the families' daily cash requirements for purchasing food. Leafy vegetables are particularly perishable and post-harvest losses can be reduced significantly when production is located close to consumers. The same study also indicated that in the peri-urban and irrigated areas, the main source of income is from vegetable cultivation (FAO, No date).

FAO (No date) reported that peri-urban growers often use very intensive production systems to receive maximum outputs from small plots of land leading to overuse of harmful chemicals. On the other hand, the fact that production costs are rapidly increasing makes it difficult for small-scale farmers to remain competitive.

2.2 Farmer field school approach

The concepts of farmer field school (FFS) was developed in 1989 when the FAO Inter-Country IPM Program designed this innovative participatory and learning model for farmer training on integrated pest management (IPM) in rice farming systems in Indonesia (Pontius *et al.*, 2001). From 1991 to 1994, with the support from the FAO Inter-Country IPM Program, Rice IPM FFS expanded to Bangladesh, Cambodia, China, India, Lao PDR, Philippines, Sri Lanka and Vietnam. During this period, the FFS program moved from its single-crops within rice-based systems and also vegetables in both low and highland systems. After a Global IPM meeting was held in Bangkok, Thailand in 1993, small FFS programs were expanded to other region such as Africa, Latin America and also in East Asia. Around 1995, the FFS programs began to broaden the scope (beyond IPM) to cover other commodities or socio-ecological conditions. In 1997, the FAO program started promoting the Community IPM approach in Asia to sustain and expand the learning achieved in FFS. Meanwhile, the FFS approach continued to be adapted to other sectors and contexts, leading to the adoption of IPM in schools and non-formal education programs that were initiated in Thailand (CIP-UPWARD, 2003).

CIP-UPWARD (2003) also referred to the statement of Michel Pimbert that "Farmers Field Schools are a form of social learning, negotiation and effective collective action that focuses on society's relationship with nature".

Pretty (2003), in the FAO publication "Ten Years of IPM Training in Asia", enumerated five key principles of the FFS that

1. What is relevant and meaningful is decided by the learner, and must be discovered by the learner. Learning flourishes in a situation in which teaching is seen as a facilitating process that assists people to explore and discover the personal meaning of events for them.
2. Learning is a consequence of experience. People become responsible when they have assumed responsibility and experienced success.
3. Co-operative approaches are enabling. As people invest in collaborative group approaches, they develop a better sense of their own worth.
4. Learning is an evolutionary process, and is characterized by free and open communication, confrontation, acceptance, respect and the right to make mistakes
5. Each person's experience of reality is unique. As they become more aware of how they learn and solve problems, they can refine and modify their own styles of learning and action.

Roling (2002) stated that FFS is an alternative to existing extension services or used in place of the transfer-of-technology (TOT) approach. The differences between FFS and TOT compared with the seven key dimensions important to today's agricultural extension and rural development work as shown in Table 2.1.

FFS model recognizes the characteristics of sustainable agricultural development being people-centered, knowledge intensive and location specific (Van de Fliert *et al.*, 2002a). It attempts to tackle the needs for change towards agricultural sustainability by applying the principles of non-formal education, which is experienced-based learning linking to living problems. It seeks to empower people to

solve problem and create initiatives by fostering participation, self-confidence, open-dialogue, joint decision-making and commitment.

Three main activities of the FFS indicated by CIP-UPWARD (2003) were (a) weekly meetings in the field where farmers improve on their observation, data analysis and decision-making skills, (b) farmer experimentation where farmers learn how to work together and solve problems systematically, and (c) farmers'fora where they discuss existing problems, share experiences and co-develop plans for the future while at the same time enhancing their organization and communication skills.

The IPM FFS has become a model approach for farmer education in Asia and many parts of Africa and Latin America. The approach has been used with a wide range of crops including cotton, tea, coffee, cacao, pepper, vegetables, small grains, and legumes. It is designed to capacitate farmers by enhancing their agro-ecological knowledge, and develops skill needed for problem solving, such as field monitoring, agro-ecosystem analysis, farmer experimentation and farm economic analysis (Van de Fliert *et al.*, 2002b).

Table 2.1 TOT and FFS compared according to key dimension

	Transfer of Technology	Farmer Field School
Definition of farmer	End user	Expert
Desirable practices	Use of component technologies to control target variables	Management of the farm as an agro-ecosystem so as to enhance its self-organization
Learning required	Individual adoption of innovations	Group learning based on field observation and inference, and on experimentation. As long as the decision-making process is right, the decision is right
Assumed autonomous scaling up mechanism	Diffusion of innovations among users	Spontaneous local dynamics started up by empowered FFS alumni

Table 2.1 TOT and FFS compared according to key dimension (continued)

	Transfer of Technology	Farmer Field School
Facilitation required	Extension: transfer of knowledge by demonstration, lectures, etc.	Adult education: non-directive methods that energize and foster discovery learning
Institutional support	Linear organization of science-to-practice continuum so as to allow uninterrupted flow of technology from science to farmer	Decentralized organization that allows making available process expertise and resources to foster local dynamics and farmer-driven FFS
Conducive policies	Support for R&D and extension services, Subsidies on input use. Treadmill policies.	Abolish subsidies on input use. Support and finance for local dynamics and networking. Encourage farmer organizations and local R&D. Support of ecological (e.g. organic) food labeling and local market

Source: Roiling, 2002.

The four principles of IPM FFS as Pontius (2001) reported were (a) grow a healthy crop (b) conserve natural enemies, (c) conduct regular field observations, and (d) farmers become IPM experts.

The first principle means healthy plants are stronger and thus better equipped to withstand attacks by pests and diseases. IPM farmers are aware and make use of all factors that contribute to the health of crop (e.g. good crop variety, healthy seeds and healthy seedlings, land preparation, correct spacing, fertilizer management, water management, crop rotation).

The second principle implies that natural enemies of pests are the defenders of the crop. IPM farmers know the defenders and understand their role through regular observations of the agro-system. They avoid using poisonous chemicals that kill the beneficial insects. Maintaining a healthy balance between pests and natural enemies become their first priority.

The third principle asserts that IPM requires farmers the ability to regularly observe, analyze, and take informed discussions based on the conditions of their agro-ecosystems. It is important to monitor the field situation at least once a week (observe soil, water, plants, pests, natural enemies, etc.).

The fourth principle points out that because of local specificity, farmers are better positioned to be taking the decisions relevant to their fields than agriculture specialists in a distant city.

The typical rice IPM field becomes to a norm for implementation of FFS. The IPM field school is field-based and lasts for a full cropping season. A FFS meets once a week with a total number of meetings that might range from at least 10 up to 16 meetings. The primary learning materials at a FFS is the field. The field school meeting place is closed to the learning plots often in a farmers' home and sometimes beneath a convenient tree. FFS educational methods are experiential, participatory, and learner centred. Each FFS meeting includes at least three activities: the agro-ecosystem analysis, a "special topic", and a group dynamics activity. In every FFS participants conduct a study comparing IPM with non-IPM treated plots. An FFS often includes several additional field studies depending on local field problems. Between 25 and 30 farmers participate in a FFS. Participants learn together in small groups of five to maximise participation. All FFS's include a field day in which farmers make presentations about IPM and the results of their studies. A pre- and post-test is conducted as part of every field school for diagnostic purposes and for determining follow-up activities. The facilitators of FFS's undergo intensive season long residential training to prepare them for organising and conducting field schools. Preparation meetings precede an FFS to determine needs, recruit participants, and develop a learning contact. Final meetings of the FFS often include planning for follow-up activities.

2.3 Limitations and strength of FFS approach

CIP-UPWARD (2003) referred to some limitations of the FFS initiatives in Indonesia, proposed by Rik Thijssen in "Farmer Field Schools: From IPM to platforms for learning and empowerment", that FFS programs are resource-intensive and hence suffer easily from the fact that they are project-dependent. The learning

process is often interrupted when facilitators have to move on the next village; sustained learning and collective action could possibly be encouraged by a broadened scope of interrelated farm management topics and skills in the FFS content, and involvement of community-based organizations and farmer leaders in FFS implementation and follow-up on the other hand. Inadequate inclusion of local knowledge and practices because of time limitation, relative narrow focus and general approach of FFS (only superficial) are also the limitations for FFS activity.

The strength of the FFS approach as reported in IPM DANIDA newsletter mentioned that it is a participatory process where farmers become the real experts in crop management. While other training programs often focus on giving recommendations to farmers (top-down from teacher to farmer). An FFS farmer will be able to make his own observations. He will learn to make his own decisions that are valid for his own crop and he will learn to experiment in his own field to develop the best methods for his own specific situation (IPM DANIDA, 2003).

2.4 Farmer Field School in Thailand

The primary IPM program under the DOAE, the Ministry of Agriculture and Cooperatives (MOAC) is Transferring Agricultural Technology through the Institute of Biological Agriculture and Farmer Field Schools (IBAFFS), established in 1999 under the Royal Initiative by his Majesty the King of Thailand. The three-year Strengthening Farmers' IPM in Pesticide-Intensive Areas project was initiated in 2000 by the Department of Agriculture (DOA) with technical and financial support from the Danish Cooperation for Environment and Development (DANCED), recently DANIDA. In addition, the FAO-EU cotton IPM program for Asia explored collaboration with the DOAE for cotton IPM activities in late 2001 and 2002. Apart from IPM and FFS activities in rice and vegetables, the DOAE has been involved in FFSs for fruit tree crop such as durian, pomelo, and orange since 1994.

Since the establishment of IBAFFS in early 1999 to 2001 the amount of the FFS activities conducted by DOAE covered various aspects, such as training of the trainers in rice (228 participants), vegetables (109); FFS facilitated by government trainers in rice (5,775 farmers), vegetables (4,525 farmers), and fruits (785 farmers),

community rice seed (44,550 farmers); FFS facilitated by farmer trainers in rice (1,000 farmers) (DOAE, 2001)

The other major developments during this period were from the Ministry of Education with support from Community IPM Program (CIPM) and Thai Education Foundation (TEF). IPM activities were pioneered with primary school children. The Education Ministry's Department of Non-formal Education (DNFE), also collaborating with the CIPM and TEF, began conducting training courses for their staff and field schools for both farmers and NFE students (DNFE, 2001).