

CHAPTER 7

CONCLUSION AND RECOMMENDATION

Rice remains and will always be the vital component of agricultural sector for combating food deficiency and alleviating poverty in the rural areas in Cambodia. Various promotional strategies lay out, including improvement of irrigation facilities, use of improved cultivars and inorganic fertilizer, by the government has been effective in achieving this crucial objective, i.e., an incremental increase in rice production over the past few years. Nevertheless, through these strategies it is felt that there is a tendency that sustainability of rice production is being jeopardized, mainly by pest infestations. As the results of the case study conducted in Roleang Ken commune revealed, the intensification of rice cultivation in the area has indeed substantially augmented output of rice production. But, at the same time, pest infestations have intensified dramatically. Consequently, pesticides use, mostly in the most extremely toxic form, has been increasingly resorted to. This trend is expected to continue to further aggravate the stability and sustainability of rice ecosystem in the commune.

Integrated pest management (IPM) was introduced into the area as an intervening measure to solve the growing pest constraints with fairly impressive success and feedback. Although misperception about pesticide use remained relatively high, farmers have expressed their acceptance and groovy impression about the principles and usefulness of IPM approach primarily because it may help them reduce the pesticide use and various pesticide-induced hazards. Farmers graduated from the IPM FFS had better knowledge and awareness on various important ecological aspects in the rice fields. More importantly, IPM was found to have significantly increased incomes for farm households. This is a major merit of the IPM approach. The consistency in terms of economic returns benefiting from practicing IPM practices was also corroborated by the field experiment.

Many important findings relative to the green leafhoppers and their natural enemies produced by the field experiment include the following:

Manipulation of any component involving in rice production more or less affects the arthropod community. As discovered in this study, a manipulated package of rice production and pest management practices, including the spray of parathion at a dosage of 0.5 l ha^{-1} , based on the conventional practices of the Cambodian farmers did result in lower numbers of leafhoppers and individuals of natural enemies as compared with those in the IPM-based practices. However, the differences were not significant. Potential determinant to these findings was perhaps the already low population of leafhoppers in the location. In addition, climatic factors, particularly high rainfall experienced in the past season, and limited size of experimental field may also have affected the outcome of the trial.

Many field trials have been conducted on research stations to evaluate the efficacy of various insecticides against leafhoppers and their effectiveness in reducing tungro disease. Some insecticides have been recommended as alternative solutions for successful control of leafhoppers. However, they may not be possible under certain conditions. As indicated by this trial, a conventional spray of insecticide was just a waste of input and labor and a hostile act against the beneficial agents. The pest situation was not that serious where chemical measure was required, but was in the range of capacity of the natural enemies. It is therefore not uncommon to foresee that natural control system will be broken down under continued practices of conventional pest management approach. To put in a clear term, the conventionally based pest management approach is rigid and not well suited to actual pest situations. Should ideal ecological sustainability and economic returns are the center of decision making process in pest management practice, pest control workers should be wise enough to assess the pest situation they are facing with before taking certain measures. For this reason, they have to adopt/adapt the IPM concept.

Sampling techniques are also important deserving special attention when conducting an assessment of abundance of arthropods in the rice field. That is, pest

surveillance has to consider carefully the right sampling method to be used with consideration of the biological and ecological characteristics of the target pests. Concerning this aspect, the study found that sweep net method perhaps the most convenient sampling technique for the study on population dynamic of the active green leafhoppers and their natural enemies. Because it overcame two major defects of the direct visual count including catching more leafhoppers and consuming less labor, thereby resulting in an increase in accuracy of leafhopper estimates as well as reduction in cost of production. Equally important is that sweep net is suitable for less experienced pest surveyors.

From these valuable findings it is worth making relevant recommendations as follows:

- If sustainable rice intensification in Roleang Ken commune is to become a reality, there should be an adjustment in rice production techniques. Farmers should be well equipped with various ecologically sound pest-coping tactics as well as improved rice cultivation techniques.
- To achieve the above, it is imperative that integrated pest management (IPM) research and extension running in the area be expanded to encompass as many compatible components as possible. An integrated research model entitled “Soil and cultivars interactions with pests and yields (SCIPY)” proposed by Janh *et al.* (2001) should be pursued in a greater magnitude.
- If a successful IPM program is to be seen, policy and institutional backup by responsible agencies must be cohesively secured. This is to suggest that the 1998 Agricultural Materials Standard Sub-decree must be fully enforced to meet with one of its prime objectives: prevention of the dumping of the banned pesticides, such as the deadly hazardous methyl parathion, in the country’s rural areas. Otherwise, promotion of IPM is merely a fruitless effort.
- Conventionally based leafhopper control practice is rigid and not suited with the actual pest situation. Applying insecticides to control leafhopper

vectors of tungro disease cannot be justified in a situation where inoculum sources are not present or widespread, except for leaving harmful effects on the natural enemies in the rice field. Therefore, farmers' perceptions towards prophylactic control of leafhoppers should be corrected. They should be offered system-thinking tools useful in assessing the pest situation with consideration of the role of the numerous beneficial insects in their fields that normally provide free of charge, safe, and effective control measure without added cost to their production. These are jobs to be done by the IPM program and plant protection extension workers in the area.