

## Chapter VII

### Summary of the Finding and Recommendations

This chapter is allocated to present summary of the results, recommendations and limitation of the study. At the beginning overall summary of the study and summary of the result under different criteria and overall sustainability are discussed. At the end of this chapter some recommendations based on finding and limitation of the study is presented.

#### 7.1 Summary of the Finding

Surveillance and forecasting is one of the major things for rice farming. Three types of farmers use three different farming practices for surveillance. But their target is same to reduce the harmful insects and to grow better crop. The cost of production is one of the major factors in here along with knowledge, information, and training is important tools for effective surveillance and forecasting. From our study we found that IPM farmers were most suited by their practice and total farming. It is also sustainable for environment and future farming. The average benefit-cost ratio of IPM farmers were 5.75, Non-IPM farmers 1.28, and for contact farmers 3.97. When we use level of sustainability to compare the systems it covers most of the criteria in system performance. So, when we want to introduce new technology for surveillance and monitoring in farmers field information on overall system performance with new technology is important. The multinomial logistic regression results can be used to clarify farmers' adoption, to justify the resource allocation for training and extension activities on IPM, also validate government policy formulation and close monitoring for this new programme. Pest management can be done in many ways but which is

best suited for farmers and which is sustainable in real sense is the main objective of this study. Study also reveals the comparison among the current widely used methods of surveillance, and trying to reduce the knowledge gap of all farmers' for sustainable surveillance method.

### **7.1.1 Spatially-explicit Finding**

Spatial analysis will help farmers to choose right cropping pattern at right season. Highly infested area easily been discarded for one or two season which will turn better return for farmers. The nature of pest's location change procedure helps farmer to choose right crop at the right locality. Insect movement procedure will help for future researcher to find out the cause of various type of movement. Policy makers also would pay attention for making future agricultural policy regarding the path of infestation of specific pest.

### **7.1.2 Socio-economic Sustainability Comparison**

Socio-economic sustainability of the IPM practices for surveillance is higher than that of Non-IPM and contact farmer practices. It is reflected by average benefit-cost ratio and ratio of pest-defender in the fields. Pest-defender ratio in case of IPM practices was 5.836, Non-IPM practices were 44.807, and contact farmer practices were 22.971. So, in economic sustainability concern IPM practices proved far better than that of other two practices. Farmers information of household from the questionnaire lack of knowledge and information about IPM technology and lack of training kept them away for practicing this method. Use of labour forces another economic sustainability proved in the IPM method. In case of IPM practices the

average labour forces need 5.36/ha, in case of Non-IPM it was 17.2/ha and for contact farmers it was 19.36/ha. The higher number of labour forces needed for extra application of pesticide, weeding and sometimes need extra doses of fertilizer to overcome pest's damage of crop.

From multinomial logistic regression the adoption of surveillance method depends on number of crop field visit in a week, number of pesticide application in a crop season, area of crop field, time of field visit, number of household members. So, those variables have influence in socio-economic sustainability for surveillance adoption.

### **7.1.3 Ecological Sustainability Comparison**

The pest-defender ratio is the main indicator of ecological sustainability. The other indicators are application of chemical pesticide, application of weedicide, and excess use of chemical fertilizers. In IPM practices farmer never use chemical pesticide as mechanical and cultural controls were sufficient for their insect pests control. In case of other two methods farmers use chemical pesticides 5 to 9 times all over the life cycle of rice crop. So, in terms of comparison of these three methods IPM must be ecologically sustainable method. For farmers knowledge based ecologically sustainable indicators IPM is most suited as they consider the total farming and environment sustainability. Future farming is most sustainable by IPM practices because the entire household indicator gave positive for farming benefit.

#### **7.1.4 Agronomic Sustainability Comparison**

The average pest infestation rate in case of IPM practices was 1.2% Non-IPM was 20.24%, and contact was 15%. So, in case of agronomic sustainability index the comparison showed that IPM practice is best suited for farmers decision making. Pest-defender ratio is higher which had been discussed earlier; less frequency of field visit and excess use of pesticides also influence negative impact on rice crop Surveillance and monitoring. Pesticides increases cost of cultivation and created negative effect on ecology. Therefore, utilization of high amount of pesticide gives loss for individual farmer as well as society. Almost all agrochemicals are imported using foreign exchange like chemical fertilizer and chemical pesticides. When reduce the utilization of agrochemical helps to save foreign exchange for the country.

#### **7.1.5 Overall Sustainability Comparison**

Sustainability index reflect overall sustainability of the systems. At the end, using existing indicator values of the systems and weights, which assigned by stakeholder the study constructed overall sustainability index at system level to compare three method of surveillance. The multinomial logistic model shows the factors that influenced the adoption of surveillance method in socio-economic and bio-physical condition.

#### **7.2 Recommendation**

The multiple regression and other comparison table showed that IPM is the best suited practice in terms of benefit-cost ratio, on the other hand multinomial logistic regression showed that farmers choice of adoption depends on many other

variables also. In Gazipur district and also in other places of Bangladesh need to introduce best suited practices for surveillance method considering those significant independent variables. There are too many reasons of increasing pest infestation in rice crop. The effective arrangement of socio-economic and bio-physical factors helps to control new resurgence of pests and effective forecasting and early warning.

### **7.2.1 Training and Extension**

From this study IPM practice prove significantly best from other two methods of surveillance. But it is a new technology and it is tough than other old technology for surveillance and insect pest control. So, proper training is must to introduce it and to replace it in lieu of traditional practices for appropriate surveillance. Another important thing is proper extension activities and proper monitoring of adoption is a crying need for this purposes. The method demonstration and result demonstration would be the effective tools of this adoption and introduce to large scale farmers. Government policy also needed here for national level IPM works. Too many workshop and seminar for awareness is needed in farmer's level. The real stakeholder is always should be the first consideration. In community IPM urban people know this technology for last few years, but in rural area it did not spread out in true sense.

### **7.3 Future Research**

From the overall sustainability IPM is the best suited practice for appropriate surveillance. But there are too many works to be done regarding adaptability index and the stakeholder of old practices using index. The system perspectives of old practice user group, their socio-economic condition, response to new technology,

training methodology, etc. are the field to further research. The cost of production is another thing to be considered for effective farming which needs some true activities.

The sketch of pest infestation all over Bangladesh is an important tool to select appropriate crop in that locality. The crop rotation, changing cropping pattern need to be further research in this arena.

#### **7.4 Limitation of the Study**

Multiple regression and multinomial logistic regression analysis had been done for comparison of best suited practice of surveillance. The benefit-cost ratio and pest-defender ratio was the other method of sustainability indicators. There are too many reasons which are bio-physical could not be considered for research limitations. Some natural resource scarcity also would be cause to adopt best suited method of surveillance. Those can be measure more socio-economic research. Regular monitoring record sometimes could not be remembered by Non-IPM farmers. This study refers the comparative analysis of various farming practices for surveillance in rice crop. Therefore the analysis wouldn't be applied if other method of surveillance and mixed methods are used by other farmers of the districts.