Sociological aspects, decision-making, and communication strategies

The most important stakeholders are the farmers and plant protection practitioners. Understanding their decision-making process is thus vital to developing communication strategies that will help make better decisions and effect change. The Project develops sociological tools and survey methods for on-farm research. Activities involve conducting on-farm focus group discussions and determining baselines of farmers' knowledge, attitudes, and practices; developing intervention opportunities to reach farmers and motivate them toward change; developing communication strategies, materials, and campaigns; and conducting policy dialogues.

Capacity building

An essential component of the Project is enhancing the capacities of partners in the use of research tools, methods, data collection, and analyses. The Project conducts training courses on ecological engineering and research methods, toxicology, arthropod taxonomy, sociological tools and research methods, and biodiversity analysis. These are followed by advanced training on specific techniques as partners conduct research, as well as on-the-job training on specific topics and research skills.

Ricehoppers blog

The Project maintains a blog (http://ricehoppers.net) to facilitate communication among Project participants. It is a platform for disseminating news, information, publications, and other materials on rice planthoppers and is publicly accessible.

Partner countries

China

National Agro-tech Extension and Service Center

Zhejiang University

Zhejiang Academy of Agricultural Sciences

Thailand

Rice Department
Bureau of Rice Research and Development
Rice Seed Center
Chainat Rice Research Center

Vietnam

Plant Protection Department
Southern Plant Protection Center

Can Tho University

Department of Agriculture of Tien Giang

Institute for Agricultural Sciences

Affiliated partner country

Malaysia

Malaysian Agricultural Research and Development Institute

Collaborating institutions

Charles Sturt University
Australia

Visayas State University
Philippines

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Rice Planthopper Project

Reducing vulnerability of rice crops to preharvest losses caused by planthopper pest outbreaks

IRRI
INTERNATIONAL RICE RESEARCH INSTITUTE

ADB

Introduction

Rice planthoppers are outbreak pests. Between 2004 and 2009, several Asian countries suffered heavy losses due to planthopper outbreaks and the virus diseases the insects carry. China's persistent planthopper problems cause a yearly loss of about 1 million tons of rice. Because of slightly elevated summer temperatures in 2005, a loss of about 2.8 million tons was recorded. In 2006, rice exports in Vietnam were halted because of planthopper outbreaks that caused a loss of about 400,000 tons. Simultaneous outbreaks occurred recently in Vietnam, Bangladesh, Thailand, and Yunnan, China.

Most tropical rice ecosystems are endowed with rich biodiversity, which helps provide vital biological control services. Highly intensive production systems, however, harm the rich habitat biodiversity and, coupled with heavy chemical inputs, compromise ecosystem services and thus make rice production systems vulnerable to invading pests such as planthoppers and leaffolders. These pests were already threats to rice production during Asia's Green Revolution, when routine insecticide applications were packaged into rice intensification programs. The recent outbreaks are probably also caused by heavy chemical input regimes, a practice that weakens "system resistance" to the invading insects.

In April 2008, as a response to the rice crisis, the ADB and IRRI initiated the Rice Planthopper Project under the 13th Regional Technical Assistance (RETA) program. The goal was to develop sustainable means to reduce crop vulnerability to preharvest losses due to planthopper outbreaks. The Project was approved in October 2008..

Objectives

The Project has 5 objectives:

- To develop durably resistant varieties and new field resistance evaluation methods;
- To develop strategies for the management of virus diseases carried by planthoppers;
- To use ecological engineering to develop biodiversity-based pest control and to identify key indicators of this ecosystem service;
- To understand farmers' decision-making process, develop communication strategies, and initiate policy dialogues to upscale ecological practices; and
- To enhance capacities of national systems in research, communications, and extension.

Project themes

The Project's activities and outputs follow 5 themes:

Plant-insect relationships and development of host-plant resistance

Developing durable resistance to planthoppers in rice varieties would require better understanding of plant-insect relationships and new evaluation methods in identifying a diversity of functional genes to be deployed. Activities involve determining the ecological fitness and chemical basis of planthoppers, developing improved screening methods, and developing deployment strategies for genes with resistance.

Management of virus problems vectored by planthoppers

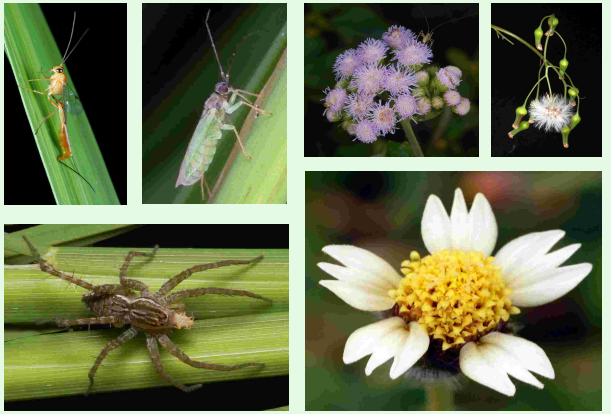
In developing management strategies, a good understanding of disease epidemiology, insect-virus relationships, and mechanisms of spread is necessary. Activities involve developing efficient diagnostic procedures to detect viruses in plants and insect vectors in the field; explaining vector-virus relationships; determining biological and genetic characteristics of the viruses; and determining the epidemiological characteristics of the virus diseases.

Ecology-based management strategies

To develop sustainable strategies for managing planthoppers, the Project adopts the ecological engineering approach to pest management. Key indicators for monitoring changes in pests and ecosystem services affecting pests are also identified.

Ecological engineering

Ecological engineering is the design of ecosystems in order to restore or build ecosystem services and resilience (crop health or "system immunity") into production systems. Various habitat manipulations and practices are integrated to favor natural biological control functions. Activities involve identifying key indicators for monitoring, evaluating, and quantifying ecosystem services; developing habitat manipulation strategies to maximize biological control; and developing practices to rationalize pesticide use.



Insecticide resistance

An indicator of changes in a pest is the development of insecticide resistance, which can be measured accurately using toxicological methods. The Project is developing a network of researchers who use the same methods to monitor and compare toxicological responses of planthoppers to frequently used insecticides. Activities involve developing a consistent and highly sensitive bioassay using topical application and determining toxicological responses of planthoppers to insecticides in a wide geographical area.