

Biological control based IPM in GMS rice fields

Dirk Babendreier^{1,2*}, Maolin Hou¹, Feng Zhang^{1,3}, Annamalai Sivapragasam⁴

¹ MOA-CABI Joint Laboratory for Bio-safety, Institute of Plant Protection, CAAS, Beijing; ²CABI Europe-Switzerland, Delémont; ³CABI East Asia, Beijing; ⁴CABI Southeast Asia, Kuala Lumpur

Background



Agriculture accounts for more than half of the GDP and provides over 80% of total employment in the region and rice is the most important crop in the Greater Mekong Subregion (GMS). Insect pests, particularly stem borers, leafrollers or planthoppers, are most consistent constraining factor in rice production.

In this EuropeAid funded project, IPP-CAAS, CABI and partner organizations aimed to increase rice production in South West China, Laos and Myanmar through multi-regional research, capacity building and the implementation of biologically-based IPM.

Developing an IPM strategy

Jointly developed among all partners and adapted to target countries. Key elements are:

- Monitoring of pests as basis for decision making
- Release of *Trichogramma* (*T. chilonis/ japonicum*) against lepidopteran pests, at 3-4 releases per cropping season
- Reduction in pesticide applications, particularly insecticides, selection of less toxic products
- Growing nectar-providing plants on bunds, such as sesame or soy bean
- Balanced fertilization
- Alternative wetting and drying



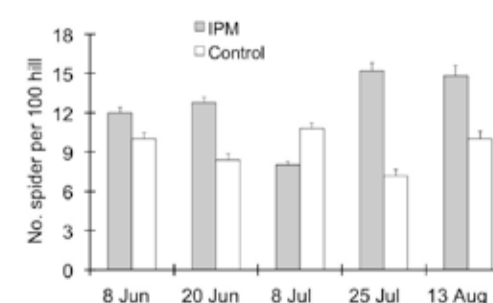
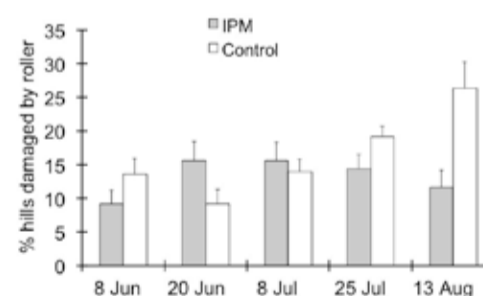
Sesame was grown on the bunds



Tricho-card released on rice plant

Demonstrating its effectiveness

- Demonstration plots (plus controls) set up in a total of 6 locations on 10 ha each in Guangxi and Yunnan, South West China during 2013-2014.
- Pest incidence was generally similar between IPM and control plots with a trend towards lower numbers in IPM late in the season (see below).
- Higher numbers of natural enemies were found in IPM plots compared to control (see below).
- 30-60% parasitism by *Trichogramma* on rice stem borer and rice leaf roller observed.
- IPM plots received 1.5-2 times less pesticide applications than the control.
- 156 kg/ha extra rice harvested from IPM plots.
- Pesticide input costs reduced in IPM plots by 1500 Yuan/ha (excl. costs for *Trichogramma*).



Establishing *Trichogramma* rearing facilities (TRFs)

To enhance sustainability of the action, the released *Trichogramma* are produced locally on eggs of the rice moth. Four TRFs are being established per target country, each with a capacity to produce enough *Trichogramma* for treating about 700 ha of rice field, thus 8,400 ha in total.

The design is based on locally produced material and equipment.

Mass production of *Trichogramma* is ongoing in Guangxi and Yuannan in South West China in 2014 and initiated in Laos and Myanmar.

Biological control based IPM in rice has shown high potential for improving farmers livelihood and the environment in the Greater Mekong Subregion



Rice moth larval rearing



Equipment for rice moth egg collection



TRF established in Yangon, Myanmar

Outcome/conclusions

- In Guangxi and Yunnan, the IPM strategy resulted in positive effects on yield and had an overall positive effect on farmers income and the environment as fewer pesticides were applied.
- Seven TRFs already established in the target area, with five more in progress.
- Training of farmers, extension staff and *Trichogramma* production staff ensured to get relevant knowledge to stakeholders in the rice area targeted for *Trichogramma* releases.
- Difficulties are larger and impact likely smaller in Laos and Myanmar where most farmers are already applying very few pesticides, particularly in the monsoon season.

Partners:

Plant Protection Station, Xingan, Guangxi
 Plant Protection Quarantine Station, Dehong, Yunnan
 Plant Protection Centre, PDR Laos

Plant Protection Division, Myanmar
 Tian Yi biological control co. LTD, Hengshui, Hebei
 International Rice Research Institute



acknowledgements: this project has been funded by EuropeAid