

## Introduction

Insects and mites compete with humans and other animals for food, fiber and forage, and entomologists calculate that crop damage caused by insects has doubled in the last 50 years, in part due to intensified farming efforts to feed a growing world population. The agrochemical industry has tried to curtail this destruction with new and novel chemical and biotechnology solutions. As a result, more than 200 different insecticides make up the active ingredients in some 40,000 commercial chemical products today, all targeted at reducing insect damage. However, despite the 'armoury' of products available more than 500 arthropod pests worldwide have developed resistance to insecticides.

Resistance to pesticides in insect and mite pests is thus one of the most economically damaging situations growers and pest control professionals face, and no commodity, farmer or region of the world is exempt. The agrochemical industry is aware of the consequences of the development of resistance and is proactively taking the lead in tackling the problem, and IRAC is a key partner in this effort. IRAC's Crop Protection Team is actively developing strategies to prevent or minimize the chances of the development of resistance to valuable new insecticide classes.



## Role for IRAC Crop Protection Team

Resistance has been documented in many major pests around the world. Of high priority focus of IRAC currently are:

**Whiteflies** (*Bemisia tabaci*) showing resistance in many countries of the world,

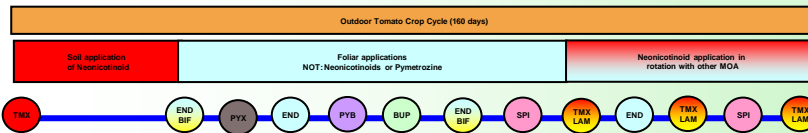
**Pollen beetles** (*Meligethes aeneus*) developing resistance to synthetic pyrethroids in Europe

**Rice brown planthopper** (*Nilaparvata lugens*) developing resistance to neonicotinoids in Asia.

*In all cases the development of resistance to the most effective products has resulted in serious economic impact to crop yields.*

## Whitefly

The sweet-potato whitefly, *Bemisia tabaci*, has developed rather high resistance to many chemical classes of insecticides including organophosphates, carbamates, pyrethroids, neonicotinoids and insect growth regulators such as pyriproxyfen and buprofezin. IRAC has been proactive in developing guidelines to manage resistance at the practical farmer level.



## Pollen Beetle

In many European countries the pyrethroids are the only insecticides registered for use on oilseed rape – particularly for control of pollen beetle – and there is resistance!!

IRAC has established a Pollen Beetle Working Group to develop a practical IRM strategy and support the use of standardised resistance monitoring methods



IRAC resistance monitoring Method 11

## Rice Brown Plant Hopper

Over the last decade excellent BPH control under field conditions was mainly achieved by using foliar application of neonicotinoid insecticides. However in the last few years reduced field performance of the neonicotinoids has occurred in the Asia region including Japan, China, Korea and India.

In order to address the issue of neonicotinoid resistance in BPH in India, members of IRAC India have established a Neonicotinoid Working Group. It is planned to monitor the resistance status of BPH in collaboration with the National Rice Institute (DRR) in order to define resistance management tactics for BPH control in Rice in India and provide training to key stakeholders in rice production on integrated management.

