IAPPS NEWSLETTER

Number VIII August, 2008

AN IPM BLOG SITE FOR AUSTRALIAN FARMERS

Helicoverpa has been a major pest of cotton, chickpeas and other crops in Australia for many years. Research on various aspects of helicoverpa ecology and management has provided the basis for designing integrated pest management approaches to helicoverpa control, which in many cases have been implemented by crop consultants and growers. Ongoing research has recently developed new monitoring techniques and threshold models for chickpeas and mungbeans that, along with evidence on the impact of using "hard" or "soft" chemicals, provide additional information on which pest managers can make sound IPM strategy decisions.

To provide access to this information and promote the exchange of the latest research results, entomologists at the Queensland Department of Primary Industries and Fisheries (QDPI&F) have created an IPM blog called 'The Beat Sheet' - http://www.thebeatsheet-ipmnews.blogspot.com/. The blog, which was launched in July 2007, provides updates on pest status in different regions of Queensland and information on a whole range of other topics. Information on monitoring protocols, natural enemies, thresholds and control strategies are provided both within the blog and via links to other sites. This mode of communication enables growers and consultants to easily keep up to date with latest news and findings and so provide another basis for making sound IPM decisions.

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SOYBEAN IPM IN SOUTHERN BRAZIL

During my Fulbright Fellowship I had a chance to visit an old friend, Antonio Panizzi, Entomologist at the Centro Nacional Pesquisa Soja (CNPSO) in Londrina, Parana. Claudia Godoy, IAPPS Governing Board member, is the Embrapa (Empresa Brasileira de Pesquisa Agropecuária) Plant Pathologist at Londrina responsible for developing a management strategy for soybean rust Since I was part of the early soybean IPM work in Brazil I am very interested in keeping up with the progress of the program and would like to share my observations regarding the Brazilian National Soybean IPM Program with my fellow IPM colleagues via the IAPPS Newsletter.
The soybean crop has experienced a dramatic increase in area and production during the 1970's in the temperate regions of Brazil (south). Later, due to an effective breeding program soybean production expanded to subtropical and tropical regions (southeast, central and north) as the new varieties were adapted to these regions.

Among the factors that limit soybean production in Brazil, insect pests are of great importance, especially the velvetbean caterpillar (VBC), Anticarsia gemmatalis, as a defoliator, and the stink bugs (mainly *Nezara viridula*, *Piezodorus guildinii*, and *Euschistus heros*), as pod and seed feeders. Asian soybean rust has recently become a severe problem in Brazil. With the expansion of the crop to other regions and the wide adoption of the no-till cultivation system, many new insect pests have adapted to the soybean crop and, currently, some of them are drastically affecting production.
A soybean IPM program, implemented in the mid 1970's in Brazil, was initially based on regular monitoring of major insect pests by the shake cloth method and application of selected insecticides when action thresholds were reached. From 1976 on, considerable efforts were undertaken by research institutions (mainly Embrapa) and private extension agencies to popularize the IPM program, through training of trainers and farmers, dissemination of publications, field demonstration plots, etc. These efforts culminated in a drastic reduction in insecticide usage in the crop, from a mean of more than five applications to approximately two applications per season. Adoption of the IPM program by 35 to 40% of the soybean farmers, resulted in considerable financial savings and ecological and social benefits.
In the early 1980's a program for use of a nucleopolyhedrosis virus of *A. gemmatalis* (*Ag*NPV) as a microbial insecticide was implemented at farmer level, resulting in use of this biological insecticide in approximately 1,000,000 ha annually. More recently, another biological control program was implemented at farmer level for the control of major species of stink bugs through production and release of the egg parasitoid *Trissolcus basalis*.

***Ag*NPV**. Efforts to develop this virus as a microbial insecticide for *A. gemmatalis* were initiated in 1979 with the objective of providing to soybean growers, an alternative to the use of toxic and broad spectrum chemicals. A pilot program for *Ag*NPV use in Brazil was implemented in farmers' fields during two consecutive soybean seasons (1980/81 and 1981/82). Following the pilot phase, in the season 1997/98 *Ag*NPV use reached ca. 1,400,000 ha. Virus produced in Brazil by Nitral and Geratec has also been used annually in Paraguay on approximately 100,000 ha. Applications of commercially produced *Ag*NPV cost the farmer about US$ 1.20, which is ca. 20 to 30% lower than the cost of the least expensive chemical insecticides.

Bacillus thuringiensis (Bt) - Commercial formulations of the bacterium *Bacillus thuringiensis* (Bt) are available in the Brazilian market and are used to some extent against larval populations of *A. gemmatalis*. Although treated area estimates are not available, use of Bt in soybean in Brazil is restricted because of its high cost/ha at the current recommended dosage (500 g of the commercial product/ha) to control *A gemmatalis*, compared to the cost of chemical insecticides.

Fungi - Despite their potential to control soybean insects, fungi have not been used as microbial insecticides on the crop. Natural epizootics by *Nomuraea rileyi* are common in defoliating Lepidoptera, leading to drastic reductions (nearly 100%) of their populations. The use of *N. rileyi* as microbial agent has been limited mainly because of the instability of the conidial production and high cost of culture media. But their natural incidence can be conserved to favor the spontaneous control of caterpillar populations.

Use of the Egg Parasitoid *Trissolcus basalis* **for Stink Bug Control -** About 20 species of parasitoids have been reported from stink bug eggs in Brazil. Natural parasitism may reach up to 90%, 65%, and 78% in the major stink bugs (*N. viridula*, *P. guildinii* and *E. heros* respectively). Trissolcus basalis attacks eggs of seven stink bug species, but with preference to *N. viridula*. Despite its high natural incidence, peak populations of this parasitoid usually occur when stink bugs have already reached damaging levels. Therefore, a program for laboratory production and inoculative releases of *T. basalis* was developed at Embrapa so as to allow timely multiplication of the parasitoid to maintain stink bug populations below damaging levels.
One of the key aspects for adequate control of stink bugs by released parasitoids is the use of biological (Baculovirus, Bt) or selective insecticides (eg. IGRs) against larval populations of *A. gemmatalis*, prior to the release of *T. basalis*. This conserves natural populations of egg parasitoids as well as of other natural enemies. This is a novel soybean IPM approach in Brazil, as it involves direct farmer participation in the decision of IPM actions to be taken.

Soybean IPM in Micro River Basins - The objective of this work has been to test and implement soybean IPM in continuous areas of micro river basins, so as to integrate growers of each community towards reducing application of very toxic chemical insecticides in these sensitive areas and improve quality of life of rural and urban populations around these basins. The main strategies utilized were:

1. Pest monitoring, especially VBC and stink bugs and natural enemies, by weekly samplings on all farms through the shake cloth and collection of insects;
2. Making control decisions, based on action thresholds;
3. Use of the *Ag*NPV or other highly selective products (Bt and IGRs) to control VBC;
4. Releases of *T. basalis* parasitoids at strategic points of the river basin to control stink bugs and
5. Insecticide applied on the border rows of soybean fields or in reduced dosages mixed with cooking salt to control stink bugs whenever necessary.

After four years of the IPM program the mean number of insecticide applications fell from 2.80 to 1.23 (56.1%).

Asian Soybean Rust - Since its first report in Brazil in 2001, Asian soybean rust (ASR) *Phakopsora pachyrhizi* has spread quickly over the main soybean growing areas. Economic losses due to ASR have been estimated over U$ 7 billion, which includes yield losses and costs for disease control. In 2004, an initiative called *anti-rust consortium* was established under the coordination of the Ministry of Agriculture, Livestock and Supply. Beginning in October 2007, a new website was launched (www.consorcioantiferrugem.net) that offers updated information to assist in disease identification, provides control measures and reports new occurrences of ASR through a web mapping system. One of the most important control measures adopted was the establishment of a "free host period" (FHP) between crop seasons starting in the 2005 (three states) and extended to six more states in the following season. Survival of the fungus during the winter has been considered the main reason for the higher inoculum pressure and early onset of ASR epidemics. Other strategies adopted to manage the disease are: i) early sowing with early maturing cultivars, ii) monitoring disease presence in the region and field and, iii) proper timing of fungicide applications. About 54 different commercial fungicides are currently labeled for the ASR control in Brazil.

Conclusions - Soybean IPM in Brazil may be considered a success story in terms of farmer adoption and impact (economic, environmental and social). Biological control programs for major insect pests, the strategy of IPM in continuous micro river basin areas and more recently the development of soybean rust management strategies have certainly contributed to considerable improvement of the program in terms of a reduction in pesticide use. Considerable efforts are being directed to improve the profile of the pesticides used to control soybean pests. Besides biological strategies against these major insect pests research activity is being targeted towards the development of resistant varieties and the identification of effective cultural practices.

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The IAPPS Newsletter is published by the International Association for the Plant Protection Sciences and distributed in *Crop Protection* to members and other subscribers. *Crop Protection*, published by Elsevier, is the Official Journal of IAPPS.

IAPPS Mission: to provide a global forum for the purpose of identifying, evaluating, integrating, and promoting plant protection concepts, technologies, and policies that are economically, environmentally, and socially acceptable.

It seeks to provide a global umbrella for the plant protection sciences to facilitate and promote the application of the Integrated Pest Management (IPM) approach to a the world's crop and forest ecosystems.

Membership Information: IAPPS has four classes of membership (individual, affiliate, associate, and corporate) which are described **here**.

The *IAPPS Newsletter* welcomes news, letters, and other items of interest from individuals and organizations. Address correspondence and information to:

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