

TIMELY INFORMATION

Agriculture & Natural Resources

April 21, 2009

Highlights from AU Vegetable Entomology Research: Focus on the Development of Reduced-risk Insecticides

Henry Fadamiro, Elly Maxwell, Rammohan Balusu, and Ayanava Majumdar

This article provides you summary of research activities that have been the focus of the Vegetable Entomology team at Auburn University. It is important to make pertinent research information freely available to you, hence this article. Special focus has been given to Entrust, Pyganic and other biological insecticides that have been the subject of many recent queries by vegetable producers and gardeners (local interest groups) in Alabama. For additional queries about this article, please contact Ayanava Majumdar at 251-331-8416 or email azm0024@auburn.edu.

Managing Lepidopteran Pests of Cole Crops

This following information is based on a 2006 publication by Elly Maxwell and Henry Fadamiro (*Florida Entomologist*, 89: 117-126). **Dipel DF** (*Bacillus thuringiensis* subspecies *kurstaki*), **XenTari DF** (*Bacillus thuringiensis* subspecies *aizawai*), Dipel + XenTari (a premix of two subspecies), **Entrust 80WP** (a spinosyn product registered for use in organic systems), and **Novaluron** (insect growth regulator) were field tested against the three key lepidopteran pests of cole crops: diamondback moth (DBM), imported cabbageworm (ICW), and cabbage looper (CL). Research period was 2004 to 2005. Pertinent information from the project is presented.

- Scouting technique for caterpillars: Action threshold was 0.5 cabbage looper equivalents (CLE) which is a smart way to account for all three caterpillar species. 1 CLE = 20 DBM larvae = 1.5 ICW larvae = 1 CL larva. 10 plants were randomly selected from each plot for damage rating. Based on the action threshold, 1.3 to 5 sprays were required throughout the season. Insect pressure, especially CL population, was highest in the Spring of 2005 when ~3.6 sprays of Entrust and up to 5 sprays of XenTari were required to manage the target insects.
- All insecticides provided reduction of DBM larvae. However, plots treated with Dipel @ 1 lb/A had higher incidence of ICW.
- Entrust, a Group 5A insecticide, significantly outperformed all other treatments in the test. XenTari was #2 in efficacy. In fact, Entrust @ 2 oz/A emerged as an insecticide that provided consistent results (low mean damage ratings) against all larvae. Remember that Entrust is a broad-spectrum insecticide with multiple modes of entry, in contrast to other tested insecticides that have to be ingested for activation inside the body of larvae. Entrust (spinosyn) disrupts the normal functioning of the nervous system in the muscles causing convulsions and death of target insect.

- No non-target effects (on spiders and lady beetles) from any of the alternative insecticides were found in the test.

Progress Toward Yellowmargined Leaf Beetle Management in Alabama

The yellowmargined leaf beetle (YMLB) is a serious defoliator of cruciferous crops in many southern states, especially in organic vegetable production systems. There are no insecticides available for organic producers to counter the increasing menace of YMLB. Laboratory studies were conducted at Auburn University (Dr. Fadamiro's lab) to evaluate the pathogenicity of fungal formulations like **Mycotrol O** (*Beauveria bassiana*) and **Tick Ex** (*Metarhizium anisopliae* strain F52), for supporting the future development of a bio-based management system for YMLB. Also, the research team conducted field trials in 2007 and 2008 to evaluate against YMLB several organically acceptable insecticides including **PyGanic** (Pyrethrum, 2 pt/A), **Entrust** (2 oz/A), **Aza-Direct** (Azadirachtin, 2 pt/A), **Pyganic + Aza-Direct** (1 pt/A each tank mix), **Mycotrol O** (1 quart/A), and **Novodor** (*Bt* subspecies *tenebrionis*, 4 quarts/A). The results are summarized below.

- At the high field rate (1×10^{13} conidia/A), exposure of YMLB to Mycotrol O killed 100% of the larvae in 4 just days, whereas only 86% mortality was achieved with Tick Ex at the same time.
- Field trials in commercial organic farms showed that Entrust and Pyganic were the only effective insecticides. Weekly applications of Entrust or Pyganic resulted in significant suppression of the density and damage caused by YMLB.

Conclusions: It is wise to familiarize oneself with basis of insect behavior and insecticidal chemistries in order to practice progressive agriculture in the 21st Century. From the above discussion, there is reliable information on the effectiveness of spinosyn products like Entrust that are highly recommended for foliar insect control in organic vegetable production systems. Please note that reported studies were preliminary investigations and we are learning more from each year's observations. Management of highly mobile insects like YMLB and lepidopteran larvae is very challenging when control choices are few; so, insecticide usage should be integrated with other IPM tactics such as cultural control and conservation/augmentation of natural enemies. Work is ongoing to determine whether Entrust and Pyganic can be rotated with other organically acceptable insecticides for effective control of YMLB and other pests such as harlequin bugs. Also, conventional farmers should watch for new spinosyn products such as Radiant 1SC (spinetoram – a new isomer) that is being recommended for countering lepidopteran insects.