



Final report of the training workshop on Insecticide Resistance Bioassays to detect susceptibility of Fall Armyworm (FAW) to insecticides in Puerto Rico.

Training course organized by Michigan State University in conjunction with IRAC International, PRABIA and Corteva Agriscience, Agriculture Division of DowDuPont™

Place and Date

The training-workshop took place on May 15-17, 2019 at the Corteva Agriscience, Salinas Puerto Rico. The training MSU team arrived at Ponce two days before, on May 12, 2019 in order to meet for fine-tuning of the agenda and Bioassays establishment.

Training Team

The members of training team were Dr. Henry Teran-Santofimio, Research Scientist of Corteva Agriscience; Dr. David Mota-Sanchez, Assistant Professor of Department of Entomology, Michigan State University; Dr. Caydee Savinelli, Pollinator and IPM Stewardship Lead, Syngenta; Dr. Jim Johnson, Regional Head of Field Development, Syngenta Crop Protection; Mr. Omar Alejandro Posos, PhD Student, Department of Entomology, Michigan State University and Msc. Veronica Acevedo, Research Assistant, Diagnostic Laboratory, Corteva Agriscience.

Background Training

Fall armyworm (*Spodoptera frugiperda*– FAW) is a serious pest in corn, if uncontrolled; this pest can cause a severe damage at the breeding materials of the seed industry at Puerto Rico. One of the tools to manage FAW is the use of insecticides of different modes of action. However, FAW has a tremendous ability to develop resistance. Therefore, monitoring the susceptibility or resistance of FAW to insecticides is critical to establish a successful insecticide resistance management plan (IRM). Monitoring of resistance requires the knowledge of specific methods of insecticide bioassays, recording and analysis of data. Consequently, Michigan State University, IRAC International, and Corteva Agriscience in partnership with PRABIA offered a training course in methods of bioassays for FAW.

Training Program

Annex 1 contain a detailed program of activities for Wednesday 15th, Thursday 16th and Friday 17th. No adjustments to the agenda were needed; always the proposed schedule was fulfilled on time.

Participants

This training was designed to accommodate 22 employees from companies belonging to PRABIA who are working in IPM programs. The companies that participated were: BASF, Bayer, Corteva, ICIA (Illinois Crop Improvement Association), Rice Tec and Syngenta. The participants list could be found in the Annex 2.

The Training Workshop

The training-workshop was opened with a mandatory safety talk and posterior welcome from Dr. Jaime Sanchez, senior Research Site Manager of Corteva, Salinas, and Msc. Sol Rosado, PRABIA's board president. The training consisted of class room training and hands-on laboratory and field experience and reviewed concepts associated with insecticide mode of action and resistance to synthetic compounds. A review the theory and practice of laboratory bioassays methods for detection of insecticide resistance including leaf disc (IRAC Method No. 007) and insecticide incorporated diet (IRAC Method No. 020) was performed by the participants. In addition, evaluation of the larval mortality was performed by the participants of this training. Probit procedure from SAS and/or POLO program were used to analyze mortality data of the laboratory bioassays, and then all participants and instructors discussed the results of the data analysis.

On Friday 17th, certificates of participation were then awarded to each of the participants by Dr. David Mota-Sanchez, Dr. Jim Johnson, Dr. Jaime Sanchez, and Msc. Sol Rosado. The training-workshop was closed by Dr. Jaime Sanchez at 12:15PM.

Outcomes of the Training-Workshop

- 1- Photos and videos were made of all of the sessions and can be utilized by future participants as well as placed on the websites of PRABIA and IRAC.
- 2- At the end of the training, all participants were able to design, carry out, and analyzing bioassays to determine levels of insecticide resistance to main synthetic compounds used in the IRAC-PRABIA insecticide window strategy.
- 3- Jim Johnson and Xiomara Flores on behalf of Syngenta were committed to establish a basic lab facility to collaborate with Corteva in the bioassays needed to re-build the window strategy for 2019-2020. BASF, ICIA, Rice Tec and Bayer will explore avenues to develop similar lab facilities like Syngenta.

Recommendations

In the future, it will be useful to review the results of the monitoring and efficacy studies of the PRABIA member companies in order to evaluate how the IRM program is working and if it needs to be adjusted.

There were many key learning opportunities throughout the program which made this type of workshop a success and useful investment in the execution of IRM programs.

Submitted by:

Henry Teran-Santofimio

May 24, 2019



Annex 1. Training Agenda

Time	Specifics to know and understand	On charge
Wednesday, May 15		
8:00-8:10 am	Safety talk	Lynette Echevarria
8:10-8:20 am	Welcome to the training course	Jaime Sanchez/Sol Rosado
8:20-8:30 am	Self-introduction	All
8:30-8:45 am	Objectives of the training & window approach	Henry Teran
8:45-9:30 am	Insecticide Mode of Action (IRAC)	Caydee Savinelli
9:30-10:00 am	Coffee break and picture of the group	
10:00-11:10 am	Toxicity, dose-response relationships, insecticide bioassays	David Mota-Sanchez
11:10-12:00 am	Laboratory work: basic lab setup & management of lepidopteran colonies	Omar Posos/Veronica Acevedo
12:00-1:00 pm	Lunch	
1:00-2:30 pm	Bioassays for Lepidoptera: Diet incorporated and leaf disc bioassays	David Mota-Sanchez
2:30-3:00 pm	Coffee break	
3:00- 4:30 pm	Overview of statistical methods: Probit analysis to calculate LD50s, LC50s, slope, and fiducial limits.	David Mota-Sanchez/Henry Teran
Thursday, May 16		
8:00-9:45 am	Bioassays establishment (laboratory): Chlorantraniliprole, Indoxacarb, Emamectin benzoate, Esfenvalerate, and Methoxifenozone	David Mota-Sanchez/Omar Posos/Veronica Acevedo
9:45-10:00 am	Coffee break	
10:00-12:00 am	Bioassays establishment (laboratory): Chlorantraniliprole, Indoxacarb, Emamectin benzoate, Esfenvalerate, and Methoxifenozone	David Mota-Sanchez/Omar Posos/Veronica Acevedo
12:00-1:00 pm	Lunch	

1:00-2:00 pm	Insect control in Puerto Rico seed production: how to choose the proper mode of action	Jim Johnson
2:00 -3:45 pm	Field practice	Henry Teran
3:45-4:00 pm	Coffee break	
4:00-5:00 pm	Data Recording	Omar Posos/Veronica Acevedo
4:00-5:00 pm		
Friday, May 17		
8:00-9:00 am	Data analysis, interpretation & conclusions	David Mota-Sanchez
9:00-9:30 am	Coffee break	
9:30-10:30 am	Insecticide performance Lab vs Field	Henry Teran
11:00-12:00 am	Round table and wrap-up of the training	Henry Teran
12:00-12:45 pm	Training close and participation's certificate issue	Jaime Sanchez/Caydee Savinelli/Sol Rosado
12:45-3:00 pm	Lunch at "Finca el Castillito" – Gabia sector	Henry Teran

Annex 2. Training participant list

#	Name	Company
1	Xiomara Flores	Syngenta
2	Zabulón Mercado	Syngenta
3	Juan Chavez	Syngenta
4	Veronica Acevedo	Corteva
5	Anais Rodriguez	Corteva
6	Alexis Cruz	Corteva
7	Pascual Ramos	Corteva
8	Maria Berrios	Corteva
9	Kelvin Borges	Corteva
10	Marinlise Ruiz	Rice Tec
11	Alex Aquino	Rice Tec
12	Axel Toro	Rice Tec
13	Emmanuel Lasalle	ICIA
14	Marilys Rivera	ICIA
15	Raymond Mercado	BASF
16	Tamar Detres	BASF
17	Javier Gonzalez	BASF
18	Sol Rosado	BASF
19	Pablo Pineiro	Bayer
20	Carlos Ortiz	Bayer
21	Pedro J. Gori	Bayer
22	Kevin Langdon	Syngenta