Preliminary results for IPM Implementation in **Specialty Crops: Ornamentals and Vegetables**

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Abstract

The whitefly (WF; Bemisia tabaci) is a major pest of important specialty crops in Puerto Rico and the US Virgin Islands. As a priority, we are compiling Integrated Pest Management (IPM) materials and Best Management Practices (BMP), identifying WF biotypes, and developing a protocol to manage WF infestations with the goal of increasing yields and decreasing the use of harmful and ineffective pesticides.

The objective of the program are to 1) identify WF biotypes, 2) create protocols on BMP, and 3) establish IPM practices and an appropriate selection of reduced-risk insecticides. Best practices will emphasize adequate plant rotations, appropriate application methods, and encourage IPM implementation. Growers, farmers, Agricultural Agents and other stakeholders will be trained on application and implementation of IPM-BMP and protocols for poinsettia production; selection of several growers/farmers to test protocols; and how to evaluate the impact of the BMP-IPM trainings and materials produced.

Results and Discussion

Bemisia tabaci cryptic species detected in Puerto Rico in 2021 were MEAM1 and MED (Table 1). Fourteen samples were collected from poinsettia and tomato from 6 towns around the island. Towns included Comerío (2), Barranquitas (3), Cidra (2), Añasco (1), Aibonito (3), and Adjuntas (1). Poinsettias were the most sampled crop (13) followed by 1 sample from tomato. Vegetables were not available mainly because samples were collected at the end of the Poinsettia production cycle and it is not until December that some of the producers begin to introduce vegetable crops to diversify the production. Column five represent the ratio of WF biotype identified in each sample. MEAM1 was detected in 93% of all samples surveyed, but also was detected mixed with MED (7%) cryptic species (Table 1). The NW was not detected in the samples. MED was detected only in one sample (75%) from one town in Poinsettia. The Comerío grower, where whitefly was not detected, leaves the ranches without plants from December to March, since it is only dedicated to the poinsettia production, and several IPM practices were implemented during the production. This could be a factor influencing the lack of WF collected during the visit. The second year, two farms were selected to evaluate the protocol to manage WF infestations. The employees of each farm are being trained in record-keeping, pest and beneficial organism identification and inspection, preventative practices, and cultural, physical, and chemical practices. The WF population continues to be monitored through the production period on the two selected nurseries, and additional samples are being taken for identification.

Introduction

The Importance: In 2018, ornamental plants contributed \$34.8 million to the Puerto Rico Gross Farm Income (USDA-NASS, 2018). There are about 303 farms dedicated to nursery, greenhouse crops, floriculture and sod grown in Puerto Rico, which includes foliage and flowering plants, cut flowers, turf, trees, palms, orchids, and poinsettias. In 2020, ornamental plant growers were facing problems controlling whitefly populations, especially in poinsettias. Since their profits are limited to a short period of time, poinsettia growers have diversified their production to include other ornamentals and vegetable seedlings to maintain a cash flow and supply the demand for vegetable gardens. Since both crops are susceptible to WF, populations have increased in recent years due to the availability of host plants year long. As a result, the quality of plants has decreased which results in reduced profits. In addition, management of WF relies mainly on the use of insecticides which has led to frequent control failures and associated loss of revenue for growers.

The Problem: Bemisia tabaci (Gennadius) (Hemiptera: Aleyrodidae) is a large cryptic species complex of whitefly whose Table 1. Bemisia tabaci cryptic species (MEAM1: Med: NW) detection in Puerto Rico in 2021. Biotyping was conducted by Dr. Cindy McKenzie at the U.S. Horticultural Research Laboratory Fort Pierce, FL.

			Host	<i>Bemisia tabaci</i> cryptic species
2021 Sample date	Location	Common name	Scientific name	MEAM1: MED: NW
3 Sep	Comerío	Poinsettias	Euphorbia pulcherrima	16:0:0
3 Sep	Comerío	Poinsettias	Euphorbia pulcherrima	No WF collected
20 Sep	Barranquitas	Poinsettias	Euphorbia pulcherrima	20:0:0
20 Sep	Barranquitas	Poinsettias	Euphorbia pulcherrima	19:0:0
20 Sep	Cidra	Poinsettias	Euphorbia pulcherrima	10:0:0
20 Sep	Cidra	Poinsettias	Euphorbia pulcherrima	19:0:0
24 Sep	Añasco	Poinsettias	Euphorbia pulcherrima	1:3:0
18 Oct	Aibonito	Poinsettias	Euphorbia pulcherrima	18:0:0
18 Oct	Aibonito	Tomato	Solanum lycopersicum	5:0:0
18 Oct	Aibonito	Poinsettias	Euphorbia pulcherrima	20:0:0
8 Nov	Adjuntas	Poinsettias	Euphorbia pulcherrima	20:0:0
23 Nov	Barranquitas	Poinsettias	Euphorbia pulcherrima	20:0:0

members are particularly invasive pests to hundreds of economically important commodities worldwide including vegetables, and ornamental crops (Serra et al., 2019). The two most invasive members of the cryptic species complex posing the greatest threat to growers are Middle East – Asia Minor 1 (MEAM1, formerly known as B biotype) and Mediterranean (MED, also known as Q biotype) (Aparecida et al., 2018). In the United States, the original *B. tabaci* or New World Biotype (NW) was the main concern to producers until the introduction of MEAM1 and MED. Of these two, MED has become an important pest around the world because of its propensity to develop high levels of resistance to several insecticides representing different insecticide classes (Nauen et al., 2002).

The Justification: In Puerto Rico, failure to control WF can be due to a misidentification of the species and biotype present, and lack of a comprehensive IPM plan to minimize the specific WF population. Two major concerns were identified: 1) no report of which WF biotypes are present, and 2) relying mainly on the use of pesticides for WF management. This has led to frequent control failures and subsequent loss of revenue for growers. In recognition of global climate change and the need for sustainability and environmental stewardship, it is imperative that PR and the USVI reduce the use of pesticides, protect our natural resources and beneficial organisms, and strengthen food security and profitability.





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Conclusions

MEAM1 and MED has been detected in protected environments for the first time in Puerto Rico. This survey serves as a baseline for biotype distribution, and to help track the potential spread in the islands. Knowing the biotypes presence, selection of effective insecticides based on biotype resistance reports, can improve plant quality and profits of growers. Growers are adopting BMP and IPM, especially insecticide rotation, based on the knowledge acquired from trainings and WF biotype identification.

Next Steps...

- Evaluation of biological control agent (BCA) and pesticides compatible with BCA.
- Evaluation of all IPM practices adopted by the two growers selected.
- Train and assist other growers, farmers, Agricultural Agents and other stakeholders on application and implementation of IPM-BMP and protocols for poinsettia production. Future works: It is necessary to study the distribution of WF biotype in open fields and other crops through the island, especially where control failures have been reported.

References:

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