

## **ARDP & IKMP Prospective Resistance Management Project Team Meeting**

Tuesday, 29 September, 11:00am-2pm, MAC Rm. 11 (Catered working lunch)

### AGENDA

#### **Members (and co-PDs):**

Ellsworth, Peter C.	Carriere, Yves
Palumbo, John C.	Dixon, Wayne
Prabhaker, Nilima (UC-R)	Fournier, Al
Castle, Steve (USDA-ARS, ALARC)	Brown, Lydia
Pier, Naomi (grad. Student)	

#### **Purpose:**

We have completed the first year of the 2-year ARDP grant and are well underway with Year 1 of the Monsanto IKMP grant. The purpose of this meeting is for all team members to provide progress updates on the objectives their teams are responsible for, to review goals of the project, and to discuss strategies for meeting objectives as we move into Year 2.

To achieve this, the meeting is organized around a series of reports followed by group discussion. Please come prepared to present your progress and to address any questions of the group.

#### **Resources:**

All Project Notes, discussions and outputs are posted to the project website for easy reference. <http://cals.arizona.edu/apmc/proresistancemgt.html>

### **Draft Agenda:**

#### **I. Project Updates**

*ARDP Objective 1: Develop spatially explicit materials for teaching landscape principles of resistance management to stakeholders (Extension)*

- Develop Chemical Use Maps for Whitefly Chemistry in Arizona (**Dixon, Ellsworth & Fournier**, by July 1, Y1 & Y2)
- Publish maps on password protected website (**Dixon**, by July 1, Y1 & Y2)
- [Develop Chemical Use Maps for Whitefly Chemistry in California](#) (**Dixon, Ellsworth, & Fournier**, by July 1, 2016 & 2017)
  - Reach out to CA contacts
  - Integrate CDPR data into APMC database
  - Develop and finalize CA Maps
- Produce at least 2 IPM Shorts (**Pier, Brown, Ellsworth**)
  - Principles of resistance management

- Chemical Use Maps as a Tool for Decision Making
- Translate IPM Shorts into Spanish for distribution & trainings in Mexico (Y2, Ellsworth)
- PCA workshops and other outreach (**Ellsworth & Palumbo**)
  - Dec 2014 Cotton Pest Losses (**Ellsworth**)
  - Apr 2015 Lettuce Pest Losses (**Palumbo**)
  - Short features in Veg IPM Updates (Y1 & Y2, **Palumbo & Ellsworth**)
  - Work with industry leaders to develop a session at Southwest Ag Summit in March 2016 (Y2, **Ellsworth & Palumbo**)
  - Breakout session at DAC in May 2016 (Y2, **Ellsworth & Palumbo**)
  - Dec 2015 Cotton Pest Losses (**Ellsworth**)
  - Apr 2016 Lettuce Pest Losses (**Palumbo**)
- Present (preliminary) results of research findings through various channels (May 2016, **Ellsworth, Palumbo, Brown, Pier, Fournier**)
- Develop mock-up of Lygus Simulation Training Environment, adapted to demonstrate how such a tool can be used in the teaching of advanced concepts in spatial dynamics of resistances in simulated eco-regions made up of multiple crops subject to multiple pest control chemistries (May 2016, **Ellsworth with input from team**)

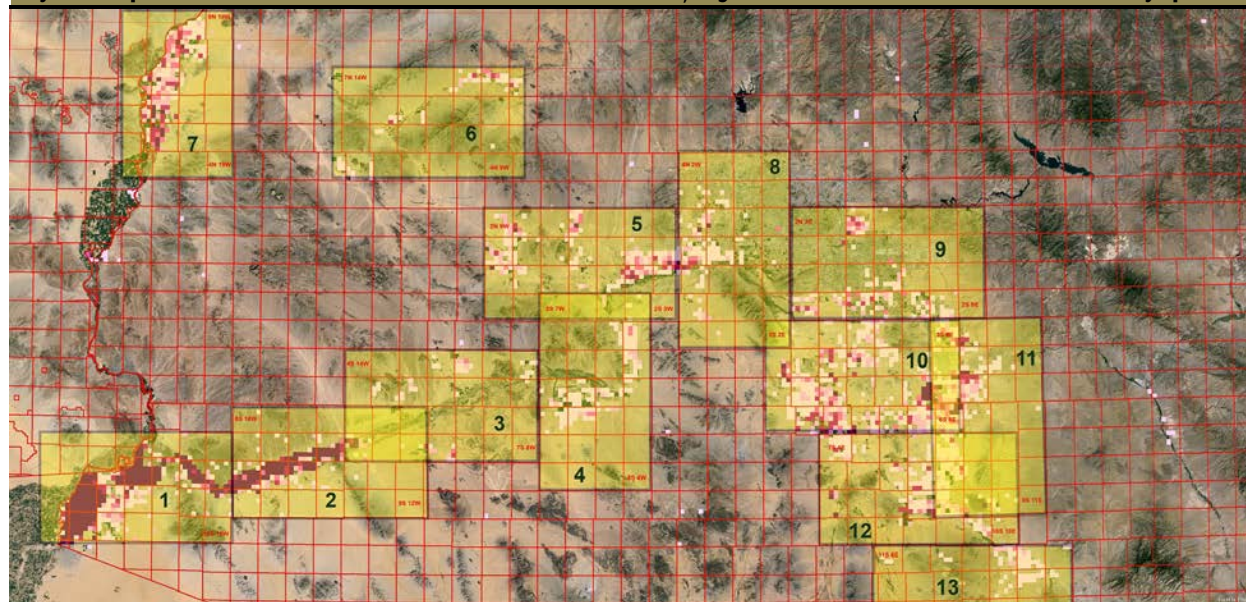
*ARDP Objective 2: Test hypotheses for understanding / predicting regional patterns of resistance as they relate to whitefly chemical use patterns (Research)*

- **Carrière** will lead discussions on the best approach for testing resistance hypotheses drawing from one or both of two possible approaches detailed in proposal (Y1, Oct 2014)
- Use the chemical use maps to strategically focus and deploy resistance monitoring (sampling) in “designated” zones for testing key hypotheses about resistance development. These test zones will be selected carefully to preserve the integrity of the experimental design and secure statistical power sufficient to reveal trends in resistance dynamics spatially (**Castle & Pier**, May–October Y1 & 2).
- Collect whitefly populations during the period of rapid population growth in cotton when they are about to be under the most active management and readily collected in large numbers for bioassays (**Castle & Pier**, May–October Y1 & 2)
  - In discussions in previous meetings, 40 populations per chemistry was determined as a minimum sample size to ensure adequate statistical power. Ideally, 54 populations per chemistry across 5 geographic regions, including high, medium, and low pesticide intensity sites, where available (see table 1).
  - Blythe and Imperial (Bard/Winterhaven) populations to be collected and sampled in 2016 for IKMP.
- Test WF populations collected against each of the 6 chemistries (7 products) for resistance (**Prabhaker & Pier**, May–October Y1 & 2)
- Prepare data from resistance testing for analysis (**Castle, Prabhaker & Pier**, Sept 2015)
- Perform statistical and spatial analyses on Year 1 data (**Carrière & Pier**, Oct – Dec 2015)
- Perform statistical and spatial analyses on Year 2 data (**Carrière & Pier**, Oct – Dec 2016)

Timing	Location	PI =Low	PI = Medium	PI = High
15 July	Yuma	3	3	3
15 July (Monsanto, 2016)	Imperial	3	3	3
1 August	Parker	3	3	3
1 August (Monsanto, 2016)	Blythe	3	3	3
15 August	Central AZ	6	6	6

Table 1: Target number of populations collected per chemistry by location. PI = Pesticide Intensity.

Common Name	<sup>1</sup> IRAC Number	Chemical Group	Whitefly Crop Hosts Targeted	Resistance Status	Assayed Life Stage(s)
synergized pyrethroids	1B + 3A	Pyrethroids + Organophosphates	All	Resistance detected	Adults
acetamiprid	4A	Neonicotinoid	Cotton, Melons, Vegetables	Field complaints	Adults
clothianidin	4A	Neonicotinoid	Cotton, Vegetables	–	
dinotefuran	4A	Neonicotinoid	Cotton, Melons, Vegetables	–	
imidacloprid	4A	Neonicotinoid	Cotton, Melons, Vegetables	Resistance detected	Adults
thiamethoxam	4A	Neonicotinoid	Cotton, Melons, Vegetables	–	
pyriproxyfen	7C	Juvenoid	Brassicas, Cotton, Melons	Resistance detected	Eggs
buprofezin	16	Chitin inhibitor	Cotton, Melons, Vegetables	None	Nymphs
spiromesifen	23	Lipid synthesis inhibitor	Cotton, Melons, Vegetables	None	Nymphs
spirotetramat	23	Lipid synthesis inhibitor	Vegetables	None	
cyantraniliprole	28	Diamides	Melons, Vegetables	None	Nymphs



*ARDP Objective 3: Measure changes in awareness, knowledge, skills, behavior and condition with respect to resistance status, chemical use practices and landscape concepts in resistance management (Extension) (Fournier)*

*Individual Changes in Awareness, Knowledge and Intention to Adopt*

- a) Pre-/post- surveys at organized Extension events, workshops and meetings where this content is delivered (**Fournier, Y1 & Y2**)
- b) Online surveys distributed as links in the cotton advisory blog and the bi-weekly, Vegetable IPM Updates and County Agent communications (**Fournier, Y1 & Y2**)
- c) Web-based surveys on password protected chemical use maps site, deployed as a Pre-survey at first log in and a post survey at the end of the season (**Fournier, Y1 & Y2**)

*Individual Changes in Skills & Behaviors Leading to Changes in Condition*

- d) Examination of individual user reported and aggregated chemical usage and other crop pest loss statistics of the Crop Pest Losses and Impact Assessment Signature program of the Western IPM Center and directed by Ellsworth (for cotton) and Palumbo (for melons and lettuces) and of the APMC Pesticide Use Database (**Fournier with input from Palumbo & Ellsworth, Jan 2016 for Y1; Jan 2017 for Y2**).
- e) from collected comments from existing stakeholder advisory committees and from data and information collected from Obj. 1 and 2 (**Fournier with input from Palumbo & Ellsworth, Y2**).

*Assessment of Changes in Group Knowledge & Group Adoption of Practices over Space & Time by comparing and contrasting:*

- f) individual sections for product “switching” that took place in Y0 v. Y1 or Y2 (partitioning chemistry through time) and for changes in locations of usage beyond the operational areas of resistance (> 6km diameter from hot spots) (partitioning chemistry through space) (**Fournier & Ellsworth, Jan 2016 for Y1; Jan 2017 for Y2**);
- g) resistance status of whiteflies based on monitoring results from Obj. 2 in Y1 v. Y2 and in comparison to previously developed baselines and on-going general resistance monitoring (as summarized in Ellsworth et al. 2013b) (**Fournier with input from Castle, Prabhaker, Pier, Carrière & Ellsworth, Jan 2016 for Y1; Jan 2017 for Y2**); and
- h) results from the hypotheses testing conducted in Obj. 2. This last effort would focus on the statistical relationships revealed and how these directly measure changes across the entire eco-region (**Carrière & Pier, Jan 2016 for Y1; Jan 2017 for Y2**).

**II. Technical Discussion** related to achieving objectives (All)

**III. Update on Budgets, subcontracts, etc.** (Ellsworth & Fournier)

**IV. Other Topics as needed** (All)