

# Scientific Support and Tools for Surveillance

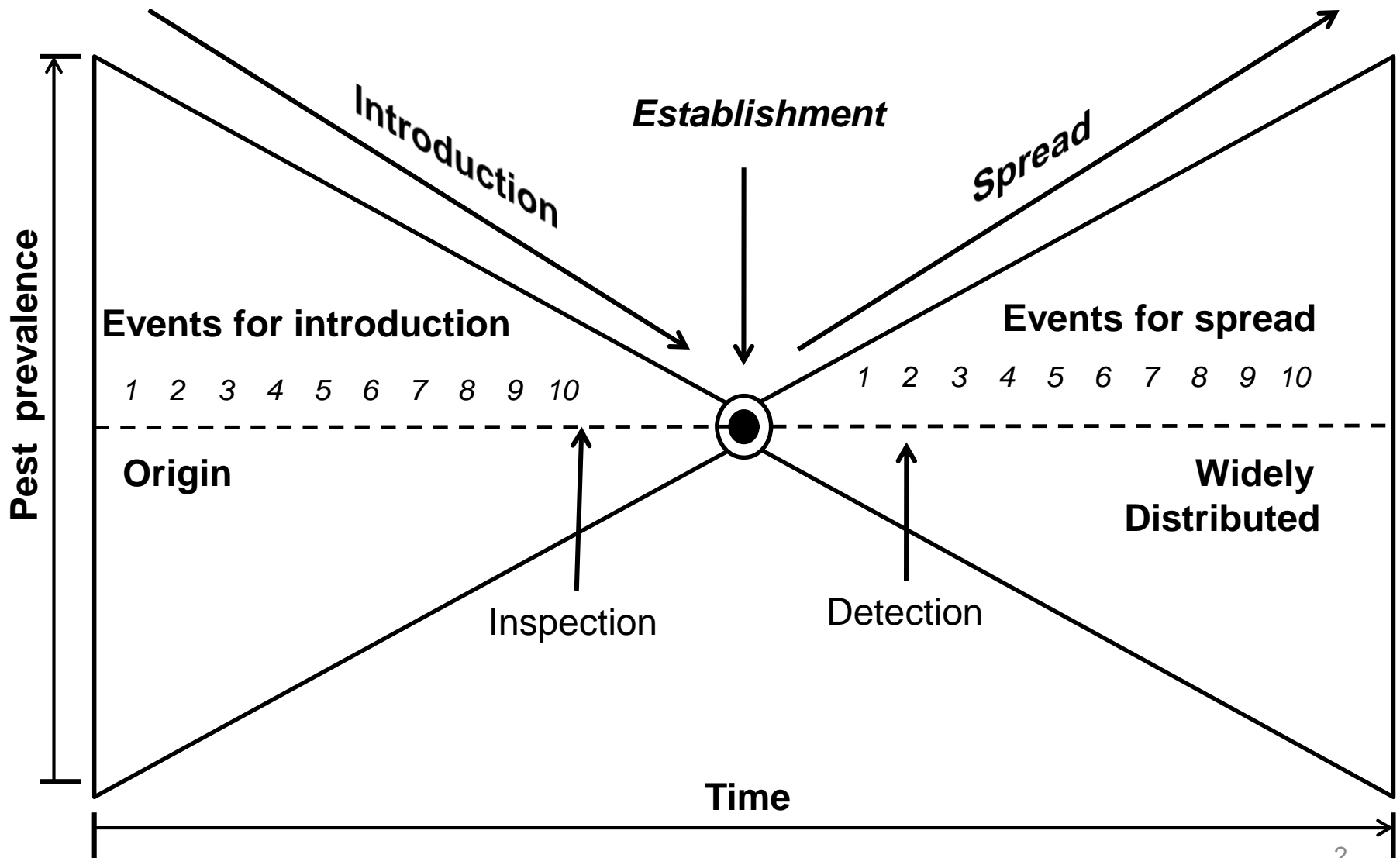
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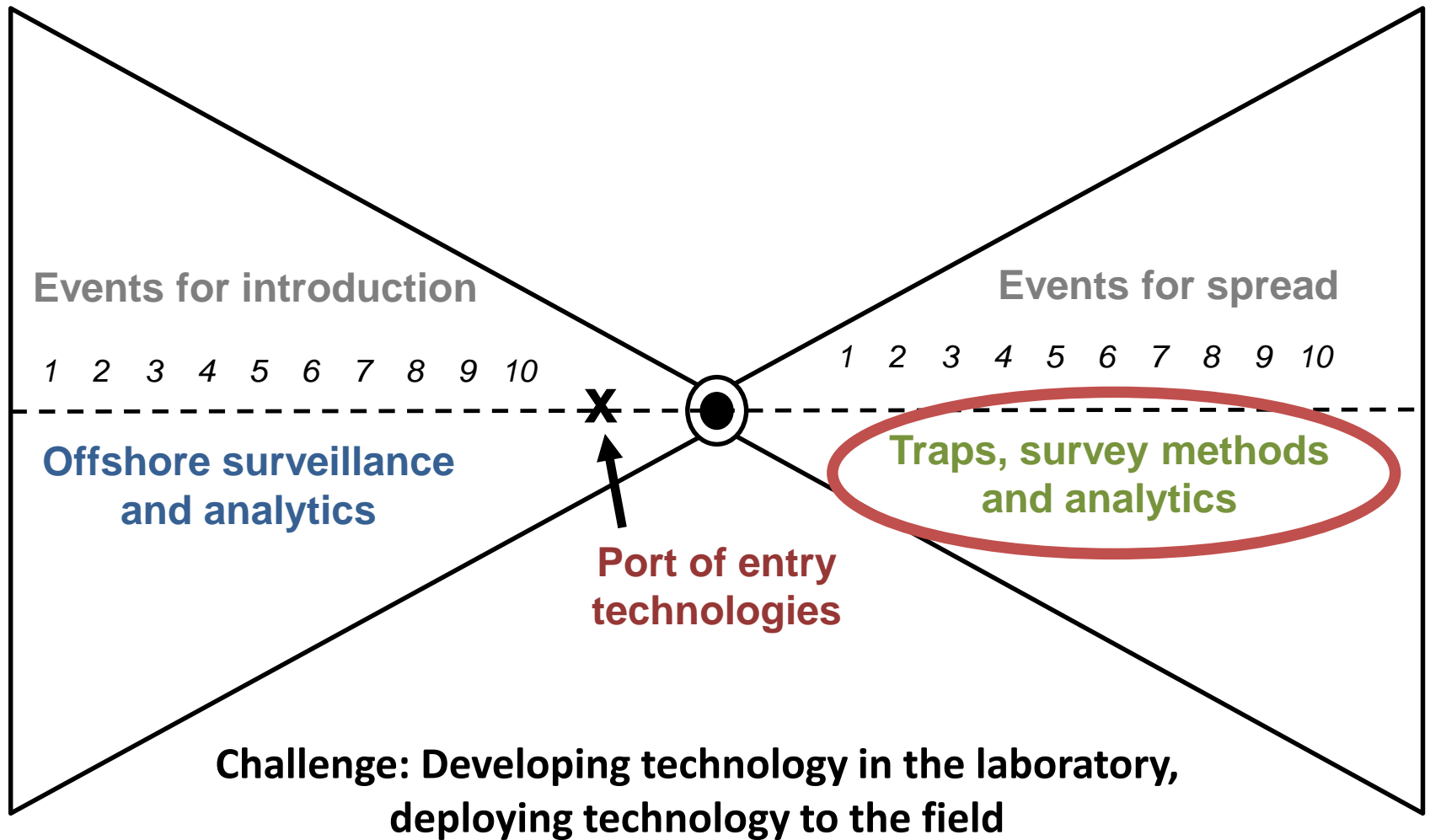
October 2017



# Introduction and Spread of Pests



# Opportunities for Surveillance



# Scientific Support and Tools

- Survey support
  - Domestic
  - Offshore
  - Programs
- Pest analysis and prioritization
- Survey methods and manuals
- Mapping and Spatial analysis
- Survey tools
  - Lures and traps
  - Molecular analytics



# Tools and Services

## Approved Survey and Diagnostic Methods

- Based on scientific recommendations, practicality at the field level, identifier needs, and cost.

## **Benefits of standardizing survey methods**

- Ensure best methods are used
- Homogenize the data collected
- Methods available on CAPS Resource and Collaboration website ([http://caps.ceris.purdue.edu/approved\\_methods](http://caps.ceris.purdue.edu/approved_methods))

**Tomato Leaf Miner - *Tuta absoluta*** Version: 03/18/

Effective: March 18, 2014

Resources: [Global Pest & Disease Database](#) [CPHST Pest Datasheet](#)

Taxonomic Position: Lepidoptera : Gelechiidae

Pest Type: Insects

Pest Code (NAPIS): ITAMCLA

This pest is a member of the following lists:

List	2014	2015	2016
Economic and Environmental	<a href="#">list</a>	<a href="#">list</a>	<a href="#">list</a>
Solanaceous	<a href="#">reference</a>	<a href="#">reference</a>	<a href="#">reference</a>

This datasheet represents an Approved Method for: 2014, 2015, 2016

**Human and Animal Pathogens Transmitted:**  
Not known to transmit any human or animal pathogens.

**Plant Pathogens and Organisms Vectored:**  
Not known to vector any pathogens or other associated organisms but damage may lead to invasion by secondary pests.

**Survey**

Approved Method(s):

Method	Product Name / Instructions	NAPIS Survey Method
Trap	Large Plastic Delta Trap Kits, Orange	00009 - Trap;Delta Pheromone (Large Plastic)
Trap	Large Plastic Delta Trap Kits, Red	00009 - Trap;Delta Pheromone (Large Plastic)
Trap	Large Plastic Delta Trap Kits, White	00009 - Trap;Delta Pheromone (Large Plastic)

**Trap Spacing:** When trapping for more than one species of moth, separate traps for different moth species by at least 20 meters (65 feet).

**Method Notes:**  
9/11/12: A new type of sticky trap insert (liner), which uses a hard type of adhesive, has been approved for use in *Tuta absoluta* CAPS surveys. This product has been tested by CPHST and has been found to be as effective as the traditional trap liners at capturing *Tuta absoluta*. In addition, the identifiers are able to pre-screen a higher number of specimens from the hard glue liners, and the specimens tend to be of higher quality. The product name in the IPHIS survey Supply Catalog is Large Plastic Delta Trap - Liners - Hard Glue.

Trap color is up to the state and does not affect trap efficacy.

Approved Lure(s):

Option	Product Name	Dispenser	Effectiveness	Compound(s)
1	<i>Tuta absoluta</i> Lure	rubber septum	28 days	<a href="#">E3Z8Z11-14Ac</a> <a href="#">E3Z8-14Ac</a>

**Lure Placement:** Do not include lures for other target species in the trap when trapping for this target.

# Tools and Services

## Pest Survey Manuals

- CAPS surveys use commodity-based or bundled survey approach.
- Increases efficiency by surveying for group of exotic pests at same time.

### **Types of manuals:**

- Commodity-based
- Taxon-based
- Pathway-based

## Solanaceaceous Hosts Commodity-based Survey Reference



2017 Version



# Spatial Analysis: SAFARIS

Spatial Analytic Framework for Advanced Risk Information Systems

- System to forecast exotic species behavior for assisting pest survey, risk assessments, pest emergency responses, and economic assessments.

Three components:

- Databases containing biotic and abiotic data
- Knowledge base repositing pest information and expert opinions
- Forecast models and analytic tools





# Spatial Analysis: SAFARIS

## Spatial Analytic Framework for Advanced Risk Information Systems

[HOMESITE](#) [ABOUT](#) [PHENOLOGY MODEL](#) [ANALYTIC TOOLS](#) [INSECT POPULATION MODEL](#) [SHOWCASE](#)

**Begin Date**

**End Date**

**Email Address**

**Pest Name**

Development	Parameters	Units	Default
Minimum Temperature	<input type="text" value="13.3"/>	C	10
First optimum temperature	<input type="text" value="24.0"/>	C	20
Second optimum temperature	<input type="text" value="34.0"/>	C	30
Maximum Temperature	<input type="text" value="41.0"/>	C	35

Population Growth	Parameters	Units	Default
Days to one generation	<input type="text" value="30.44"/>	D	30
Max. generation	<input type="text" value="4"/>	None	3
Initial Population	<input type="text" value="0.01"/>	None	0.01
Maximum Population	<input type="text" value="1"/>	None	1
Population Extinction	<input type="text" value="0"/>	None	0

Low temperature mortality	Parameters	Units	Default
Low Temperature Threshold	<input type="text" value="13.3"/>	C	-100
Low Temperature Theta 0	<input type="text" value="1101.7"/>	None	1101.7
Low Temperature Theta 1	<input type="text" value="-49892.0"/>	None	-49892
Low Temperature Theta 2	<input type="text" value="-162.9"/>	None	-162.9

High temperature mortality	Parameters	Units	Default
High Temperature Threshold	<input type="text" value="39.0"/>	C	100
High Temperature Theta 0	<input type="text" value="25.9"/>	None	25.9595
High Temperature Theta 1	<input type="text" value="-0.49"/>	None	-0.4959
High Temperature Theta 2	<input type="text" value="0.0"/>	None	0

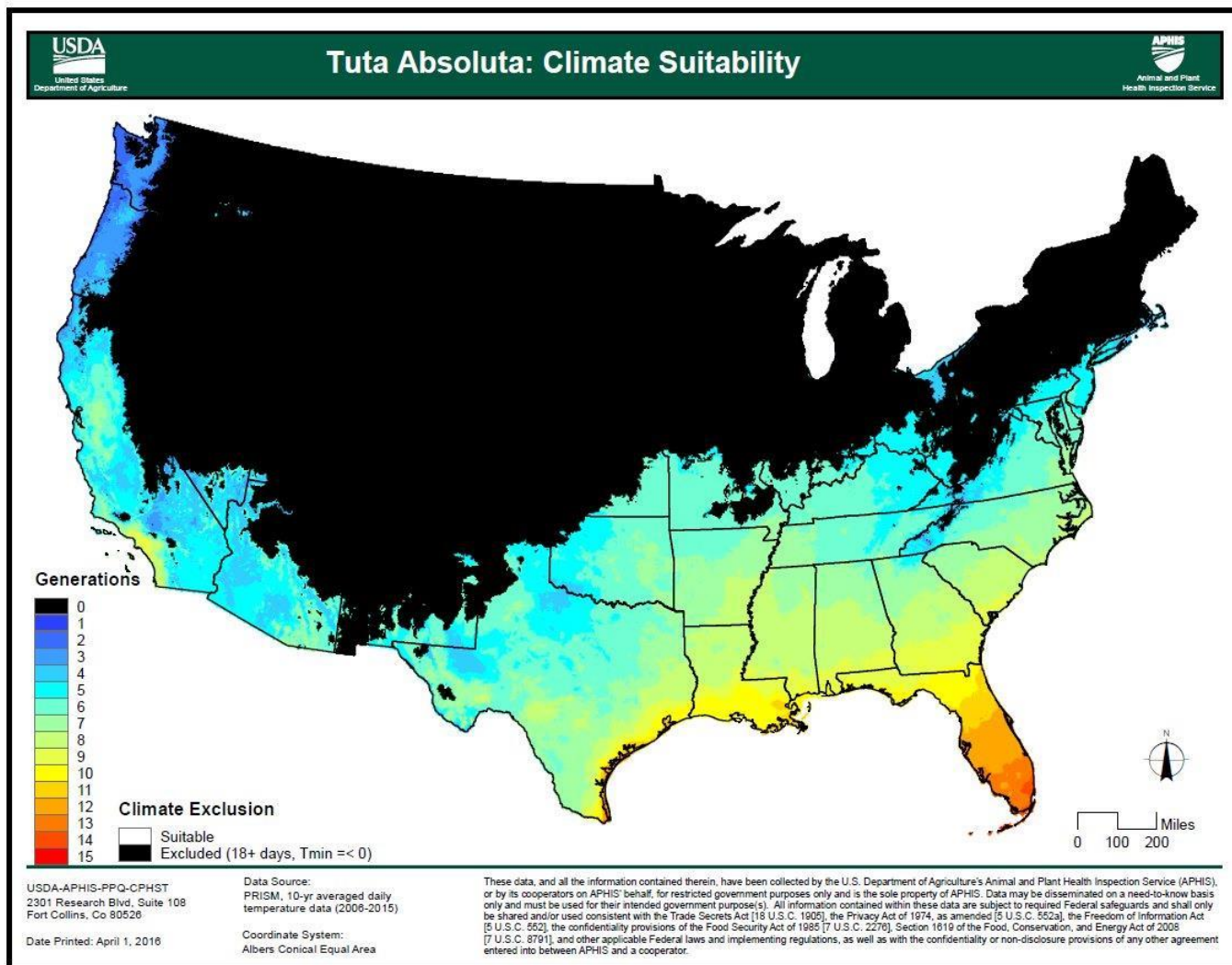
Wet Soil moisture mortality	Parameters	Units	Default
Soil moisture threshold %	<input type="text" value="80.0"/>	%	80
Days to 100% death	<input type="text" value="2.1"/>	days	
Pupal Stage fraction	<input type="text" value="0.36"/>		

Age mortality	Parameters	Units	Default
Rate	<input type="text" value="0"/>	h-1	0



# CLIMATE SUITABILITY – TUTA ABSOLUTA

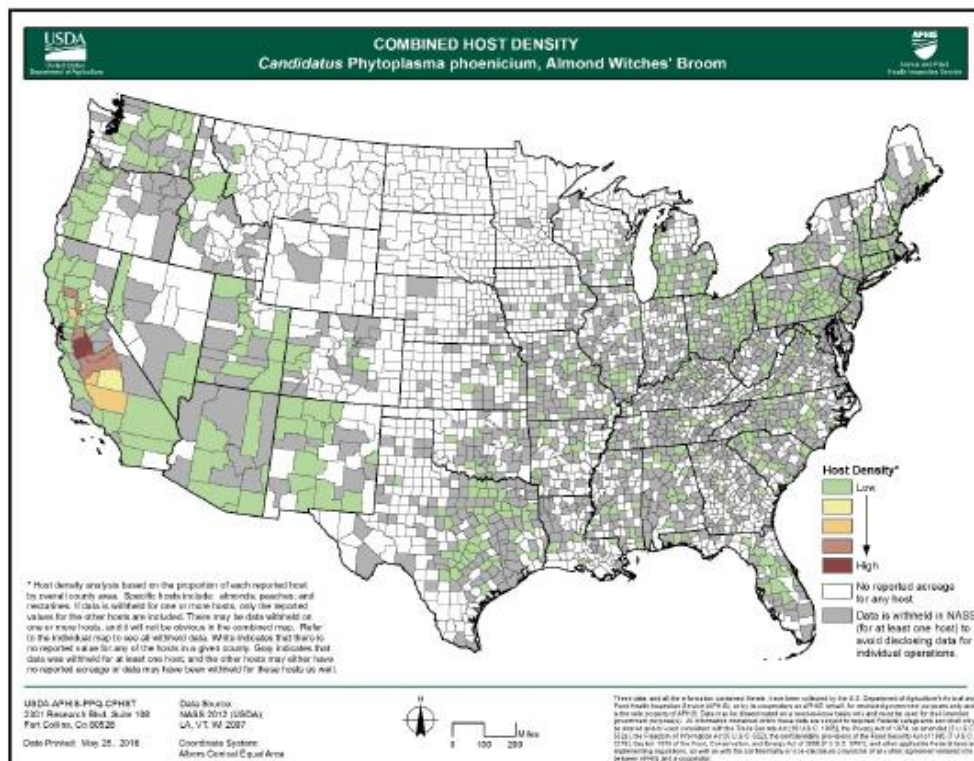
## Degree Day Map - Generations



# Spatial analysis: Tools and Services

## Spatial analysis

- Focus on host distribution maps, climate suitability maps, and pest-specific analyses.
- Products support surveillance planning and resource allocation through a better understanding of pest risk dynamics.



**Figure 7.** Combined distribution map for '*Candidatus Phytoplasma phoenicium*' within the continental United States. Values represent combined host density low to high (almond, peach, and nectarine). Map courtesy of USDA-APHIS-PPQ-CPHST.



# Traps and lures

- Trap design and deployment
- Color, chemistry, placement...



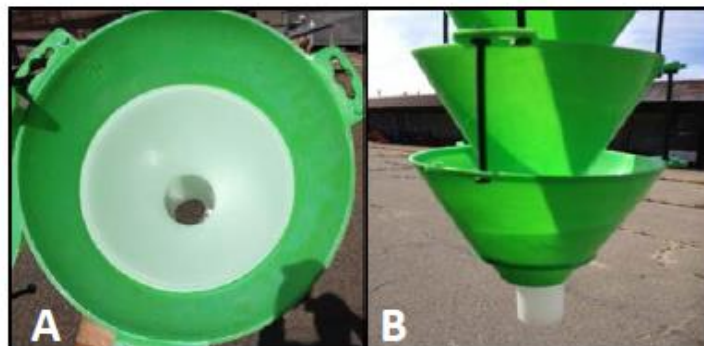
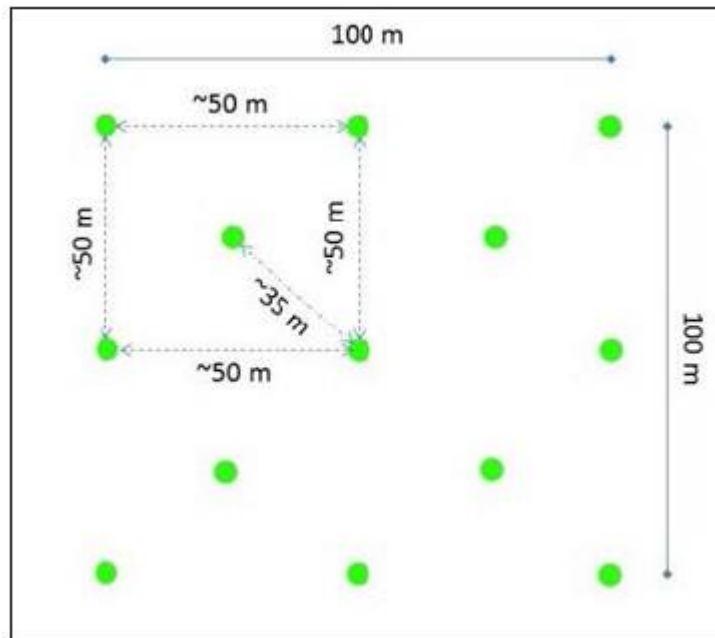
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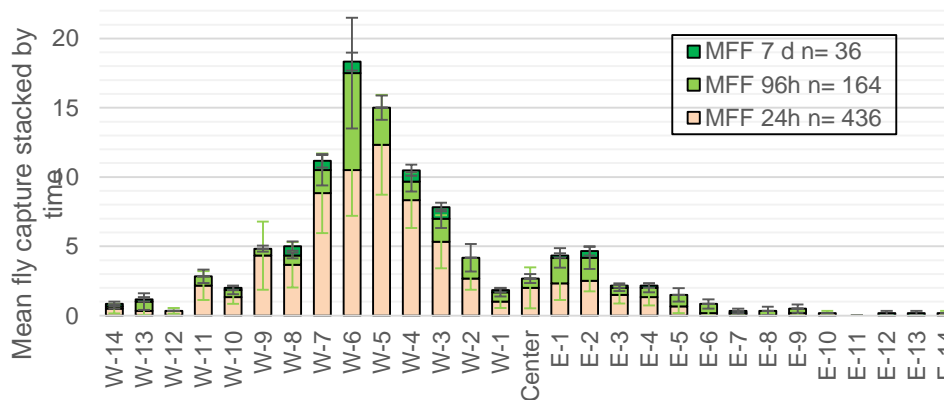
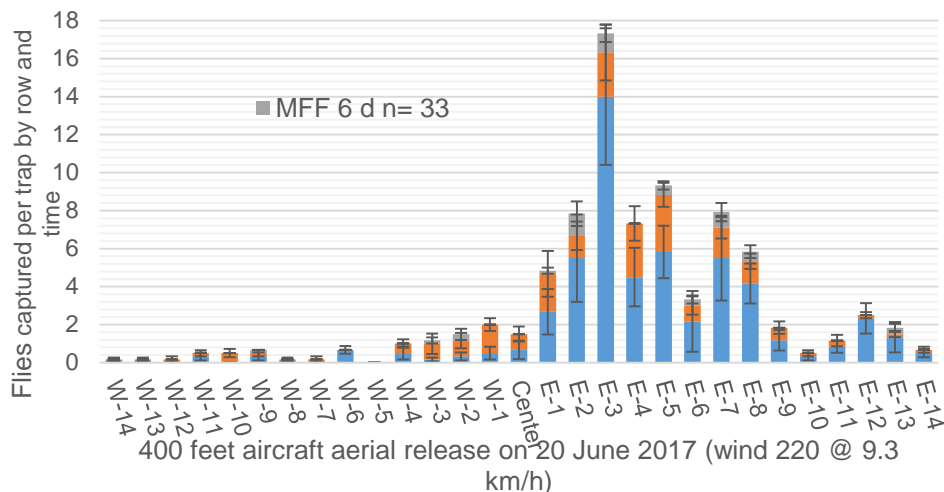
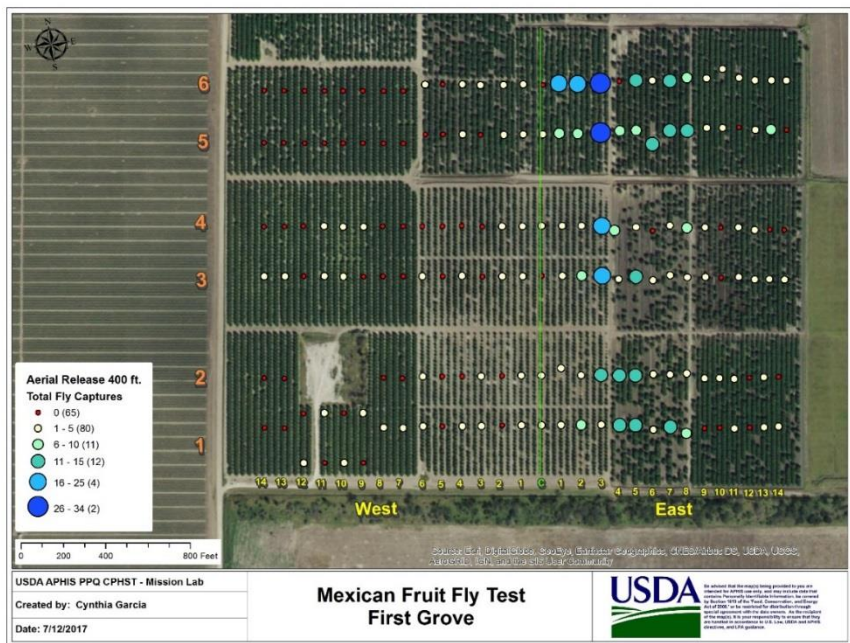
# Traps and lures

- Detection
- Population estimates
- Hosts



# Traps and lures

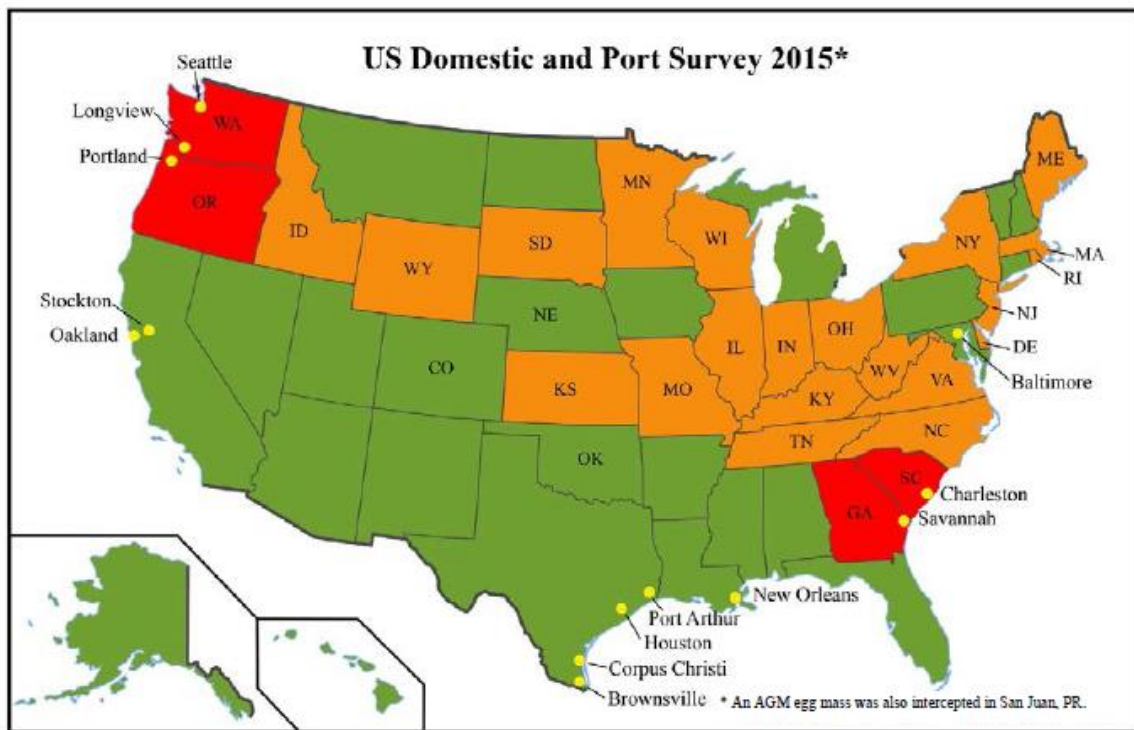
## Testing fruit fly release by UAV in south Texas



# Molecular analytics

- Asian and European GM Trapping
- Molecular identification to differentiate types
- Annual baseline mapping for EGM
- Detection of any new AGM

Port	Number of egg masses
Baltimore, MD*	5
Brownsville, TX*	4
Charleston, SC*	8
Corpus Christi, TX*	4
Houston, TX*	4
Longview, WA*	1
New Orleans, LA*	18
Oakland, CA*	1
Port Arthur, TX*	2
Portland, OR*	5
San Juan, PR*	1
Savannah, GA	4
Seattle, WA*	3
Stockton, CA	1



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