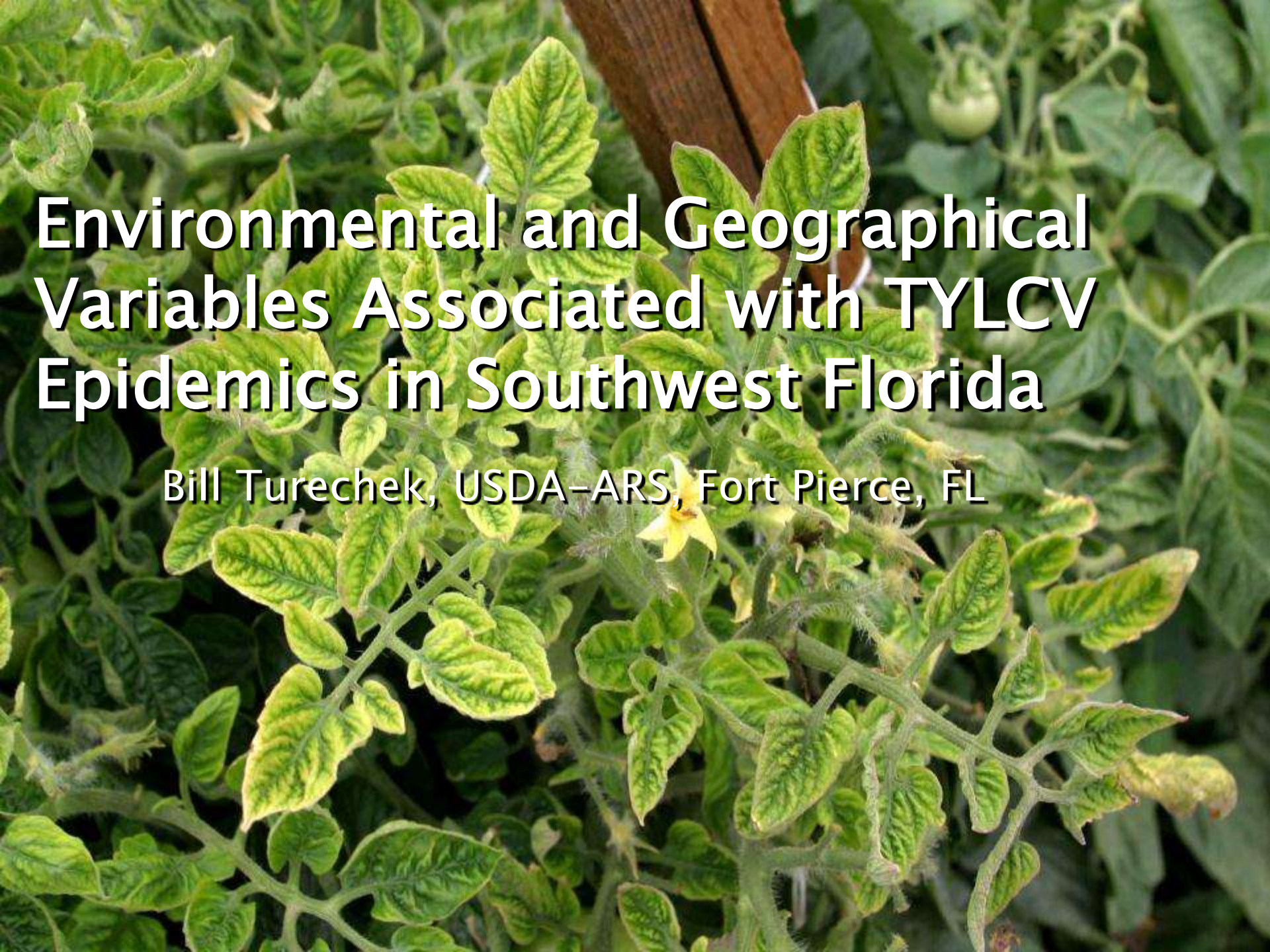


Environmental and Geographical Variables Associated with TYLCV Epidemics in Southwest Florida

Bill Turechek, USDA-ARS, Fort Pierce, FL

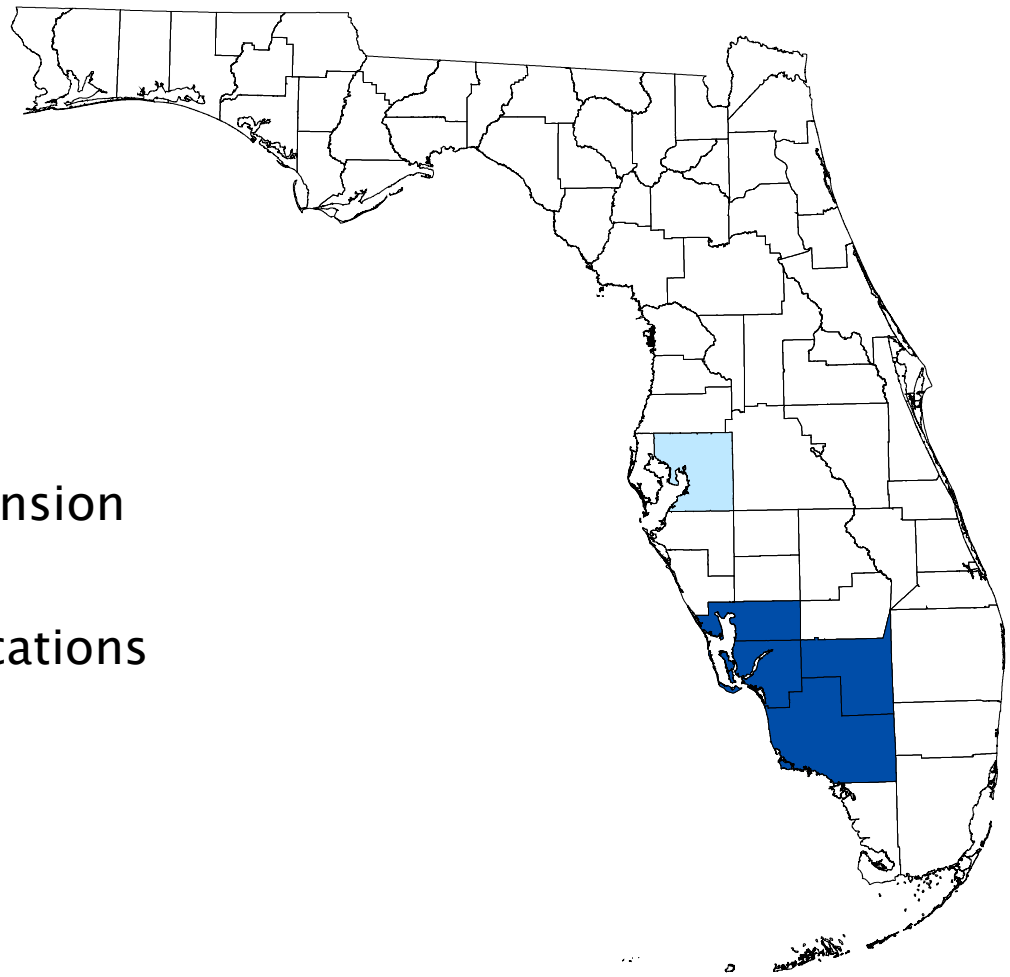
TYLCV/Whitefly Biology

- Project began in summer of 2007
  - After a meeting w/ grower groups, industry reps, and University personnel in the wake of the 2006 epidemic
- We suggested conducting a regional survey of growers fields to gather info. on TYLCV/WF
  - Goal is to improve management of TYLCV and whiteflies
- Greatly facilitated when "we" received funding for 3 years through NIFA's Specialty Crops Research Initiative (SCRI) program
  - The SCRI project focuses on managing whitefly-transmitted viruses of vegetables
    - Project team: Scott Adkins, Shaker Kousik, Susan Webb, Pam Roberts, Phil Stansly, Charlie Mellinger

Regional Survey

- An understanding of which factors contribute to “local” outbreaks of whiteflies & the viruses they transmit
  - Identify climatic variables and common features associated with problem locations (e.g., influence of location, production practices)
  - Develop a strategy to reduce epidemics
- ***Decision Support System***
  - GPS/GIS, internet, and smart phone-based technology
  - Develop a information collection, processing and delivery system
  - In cooperation with ZedX Inc.

Survey Location



Future Expansion

Current Locations

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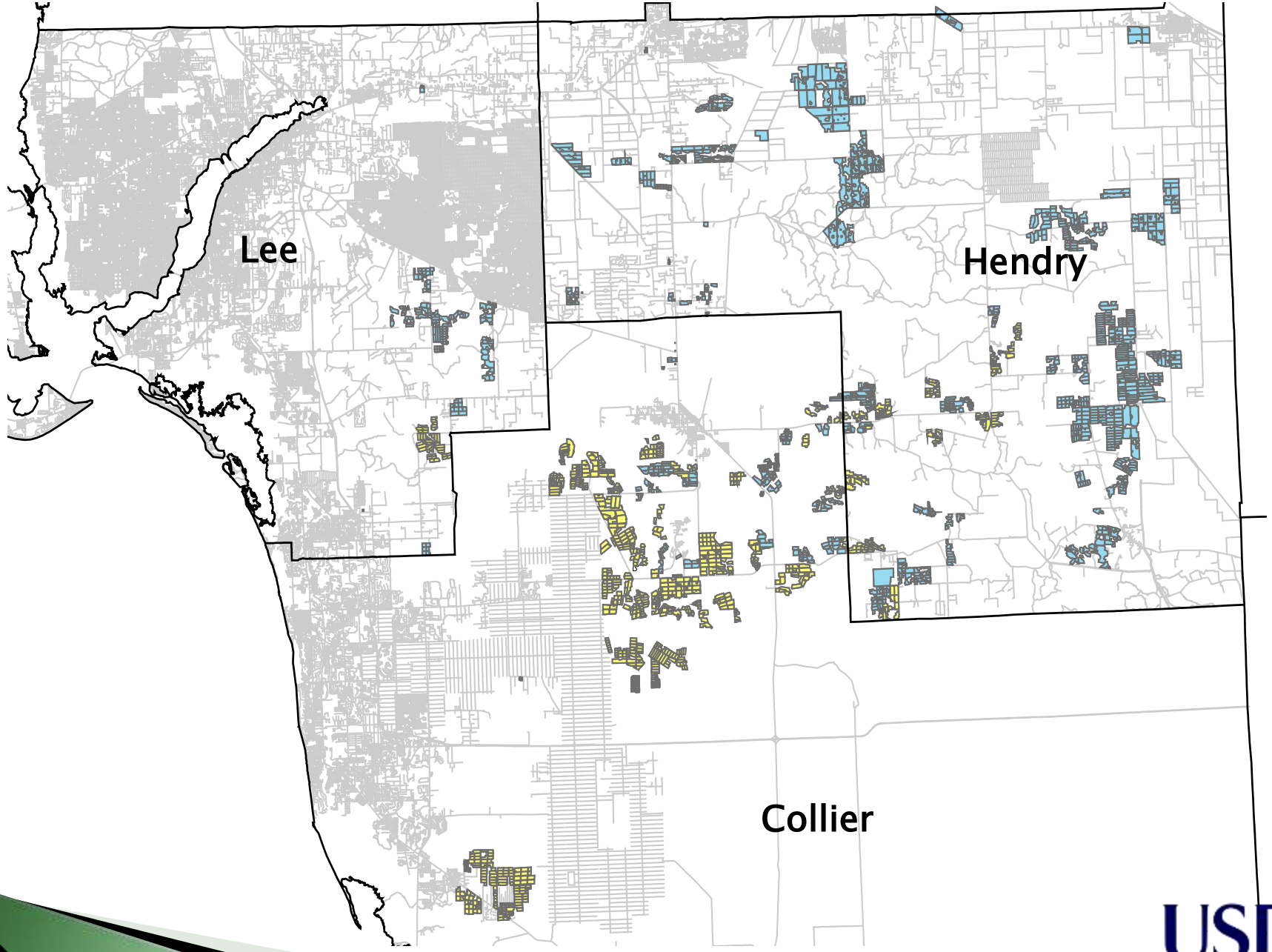

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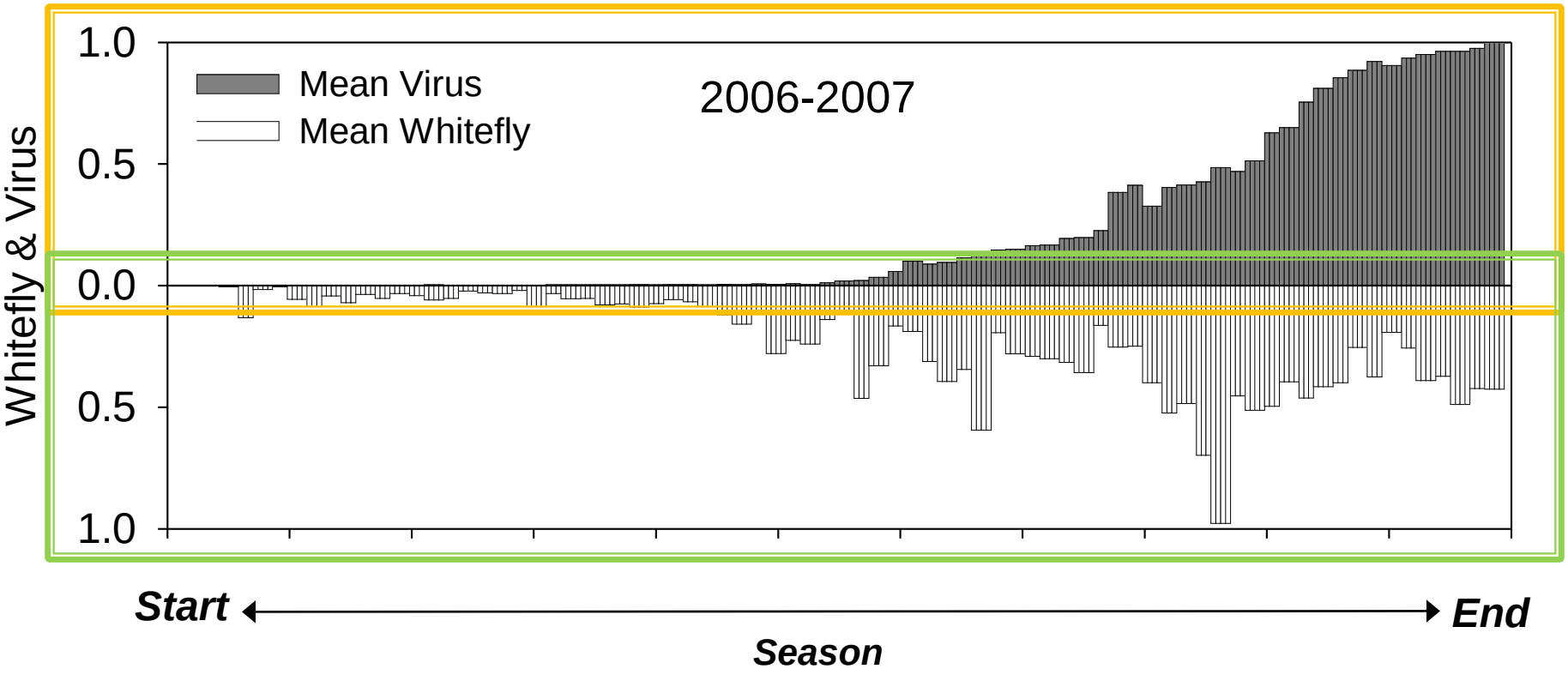
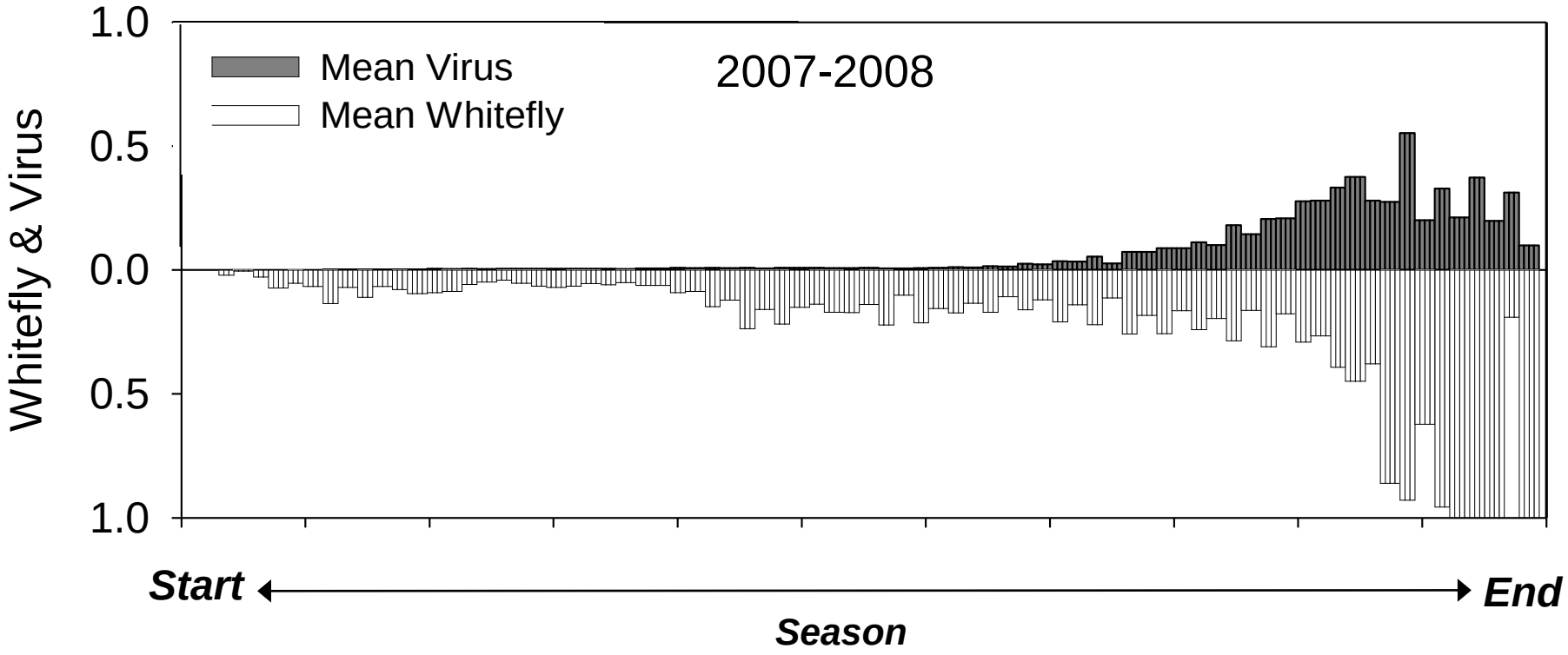
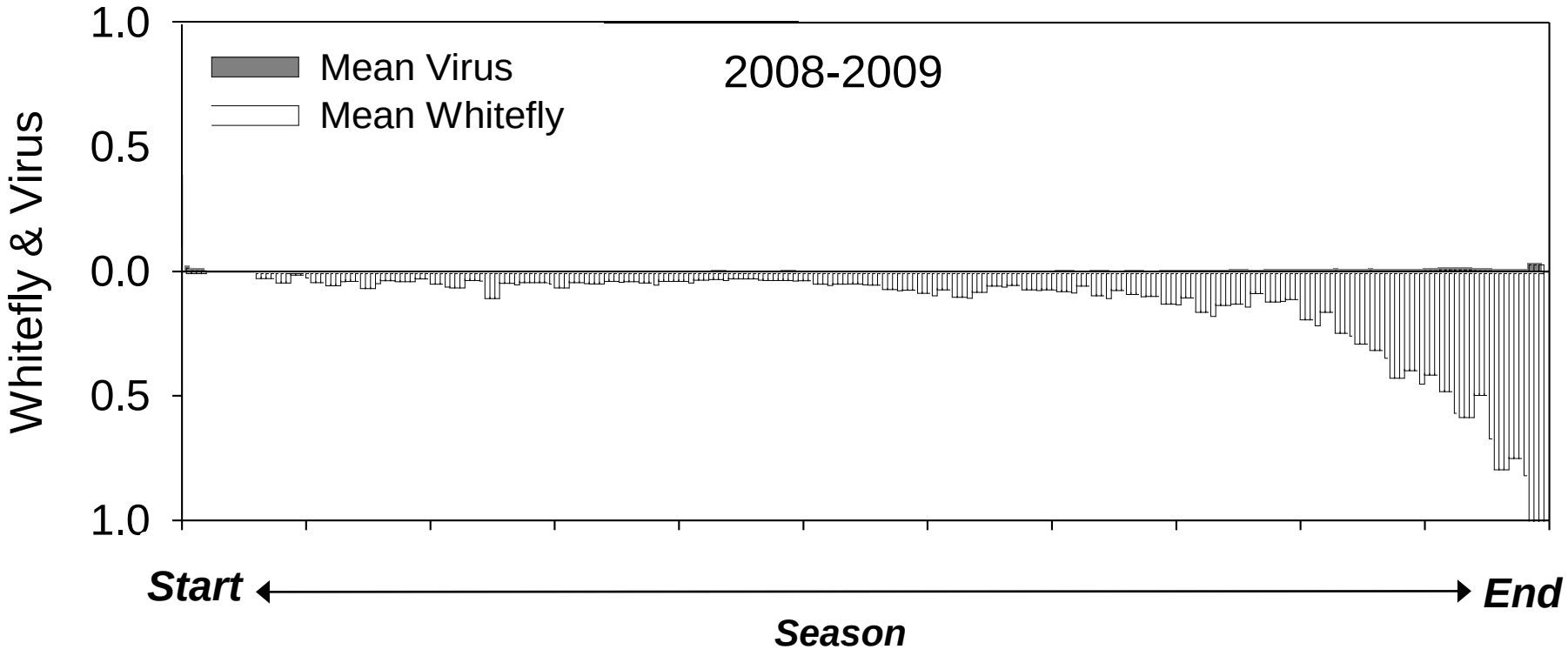
2006/2007 Season



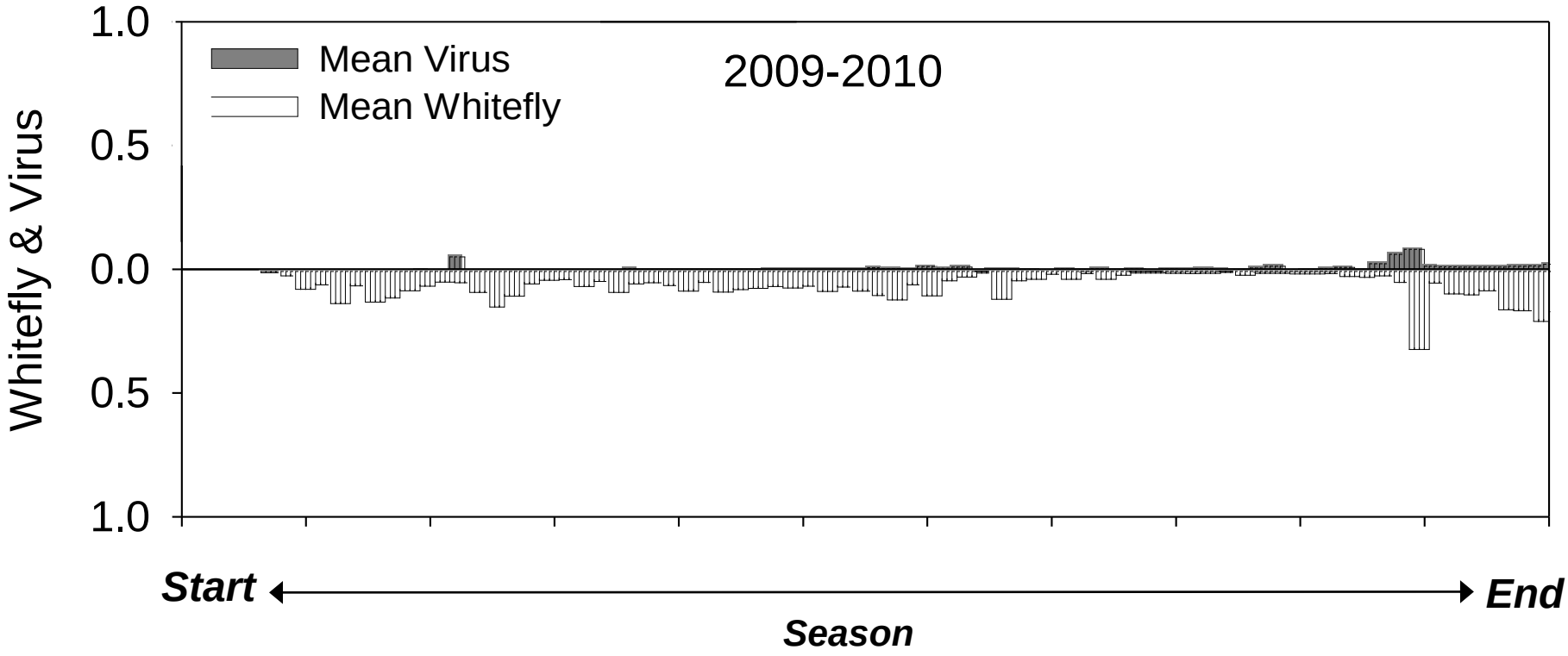
2007/2008 Season



2008/2009 Season



2009/2010 Season



Two Questions

- Can we rely on weather conditions to predict whitefly and/or virus outbreaks?
  - …Yes and No
- Can we rely on geographical attributes or simply location to predict whitefly and/or TYCLV outbreaks?

Two Questions

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Important Weather Variables

- Windowpane or Moving-Window Analysis
  - Variables
    - Temperature (max, min, avg.)
    - Wind speed, gusts, direction (max, min, avg.)
    - Dewpoint & Relative humidity (max, min, avg.)
    - Precipitation (max, min, avg.)
    - Visibility
  - Window sizes
    - 5, 10, 15, 30, 60, 90 and 120 days
- Determine the correlation between TYLCV severity or whitefly density and associated weather variables

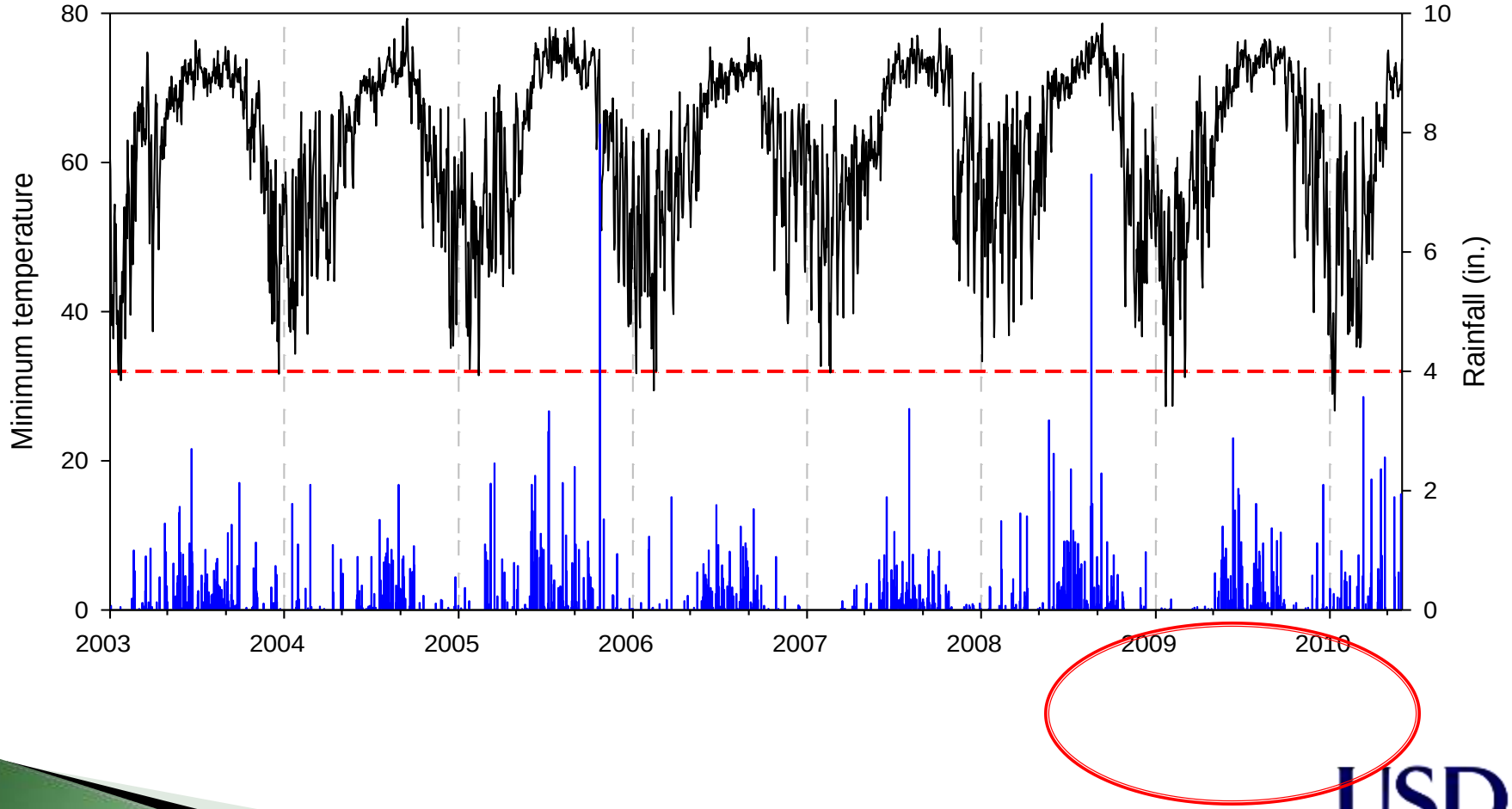
Important (?) Weather Variables

Variable	Whitefly	TYLCV
Wind Speed	+	+
Wind Direction	± (30 day)	± (30 day)
Precipitation	–	–
Minimum Temperature	±	–
Average Temperature	±	–
Maximum Temperature	±	–

- Pest management practices considerably alter counts
  - Averaging over the region helps to mediate this effect
- Varietal differences alter epidemic development
- Data is still sparse to fully overcome limitations

Mother Nature's Role

Minimum temperature and total daily rainfall recorded in Immokalee



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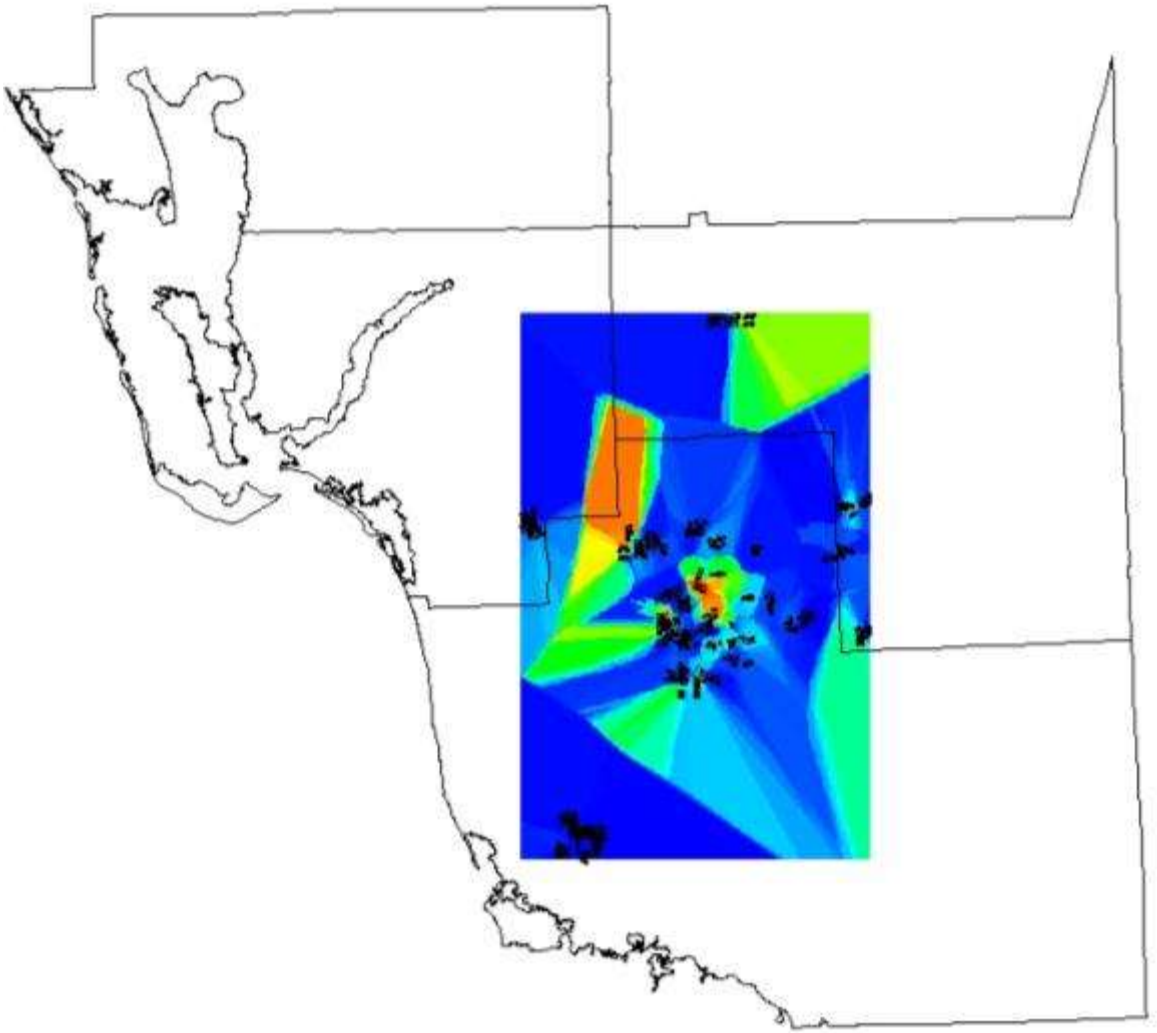
Some Natural Questions

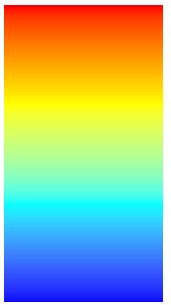
- Can we rely on weather conditions to predict whitefly and/or virus outbreaks?
  - …Yes and No
- Can we rely on geographical attributes or simply location to predict whitefly and/or TYCLV outbreaks?

Field Attributes

Variable	Mean Whitefly			Maximum Virus		
	06/07	07/08	08/09	06/07	07/08	08/09
East-West Direction	***0.35***	***0.31***	***0.39***	***0.39***	***0.21***	***0.21***
North-South Direction	0.02	***0.49***	***0.40***	***0.16***	***0.29***	***0.35***
Perimeter	***-0.28***	-0.05	-0.05	***-0.18***	***-0.19***	-0.07
Area	***-0.32***	-0.06	-0.06	***-0.23***	***-0.23***	-0.09
Date Planted	***0.74***	***0.23***	***0.21***	***0.74***	***0.36***	-0.12

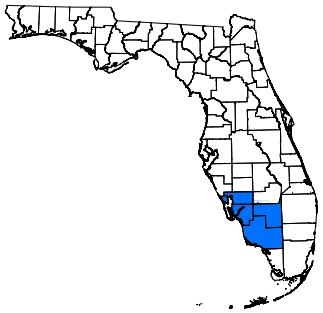
Maximum Virus (2007–2008)





High

Low



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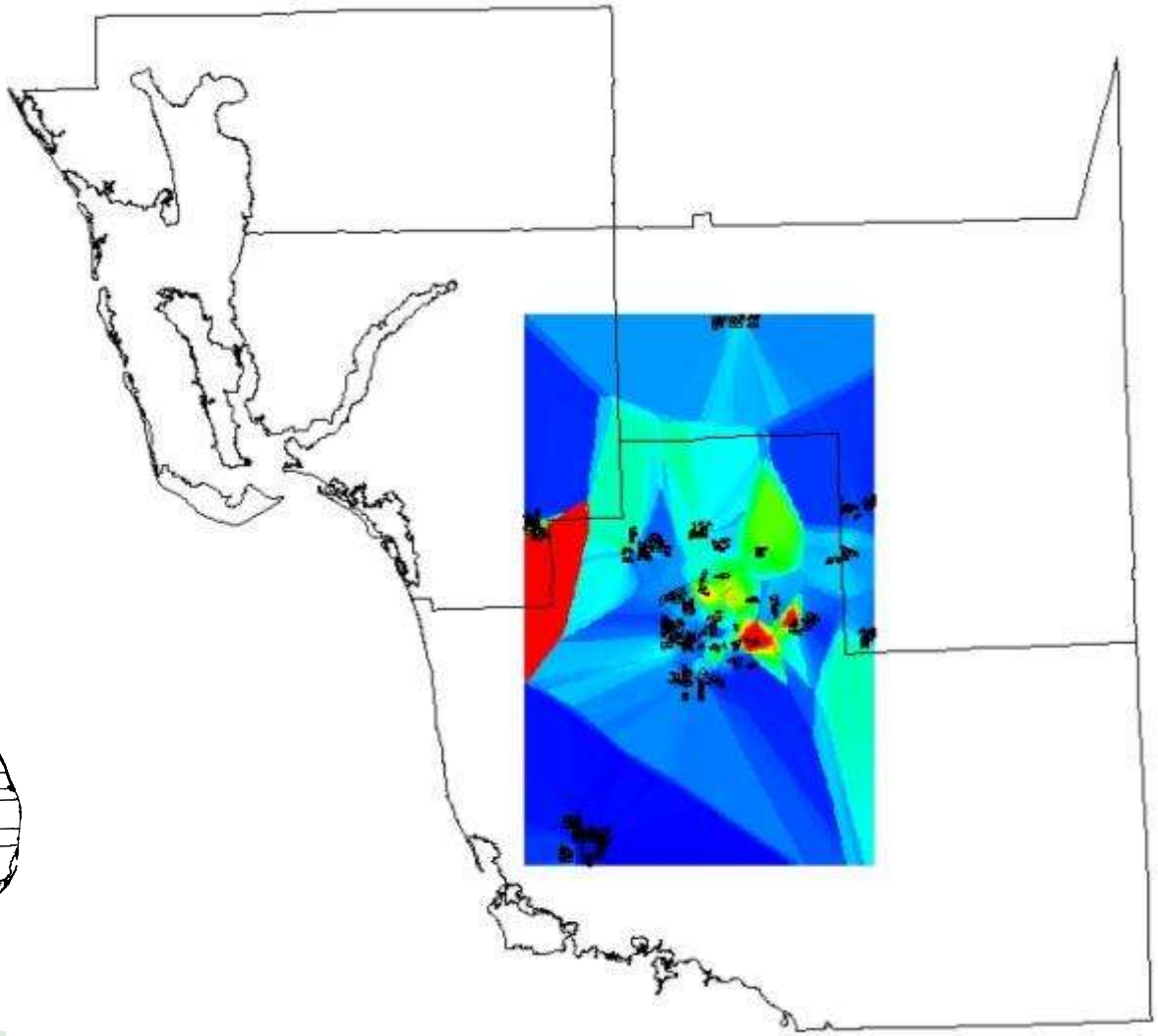
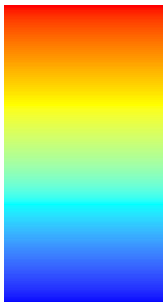
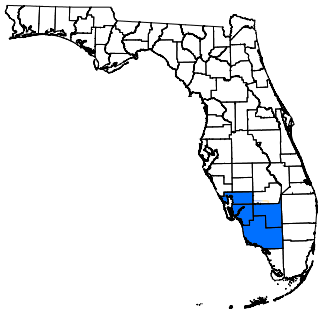
Mean Whitefly (2007–2008)







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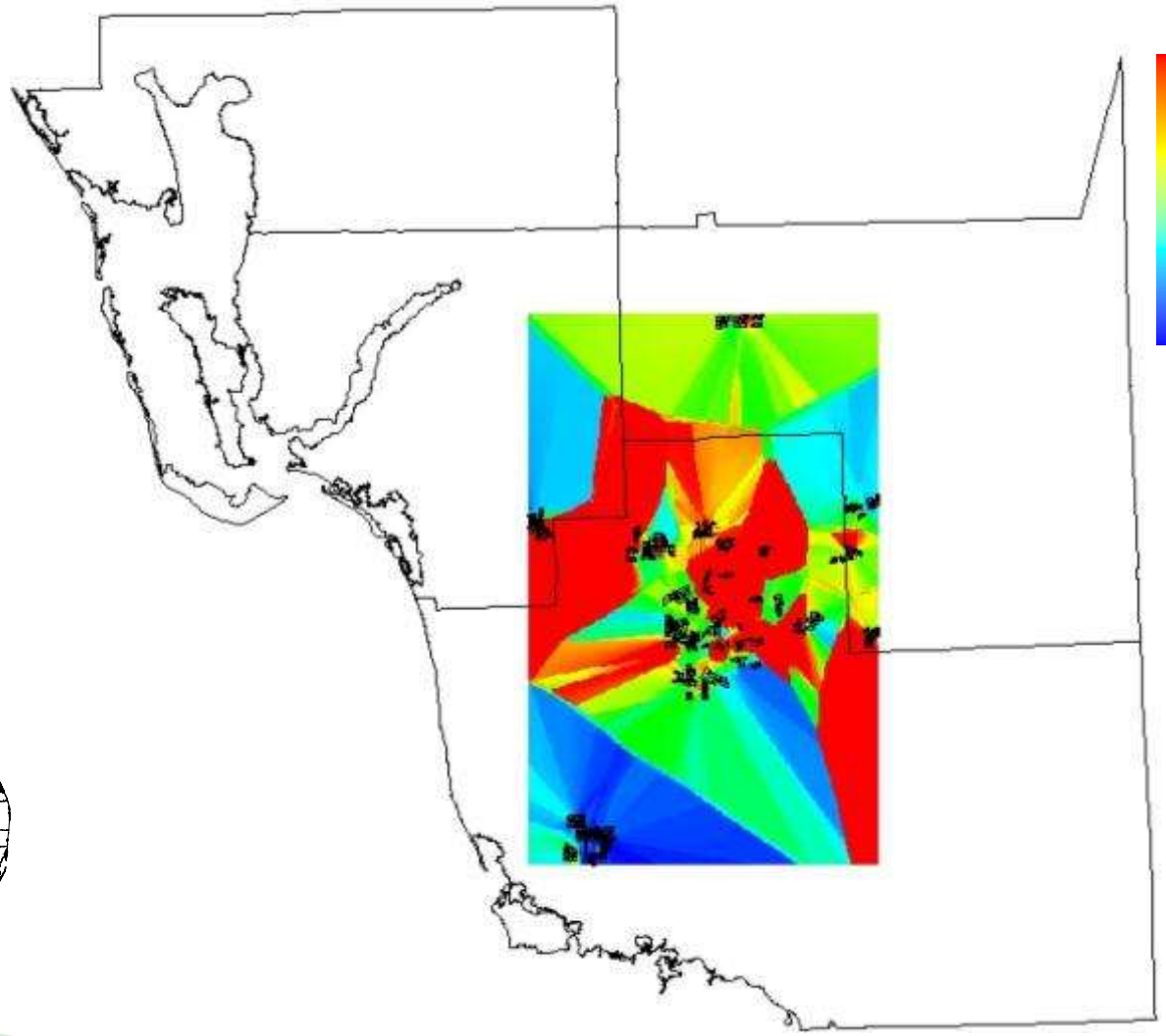
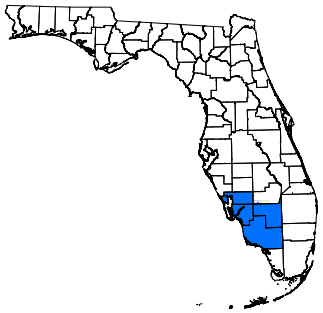
Maximum Whitefly (2007-2008)





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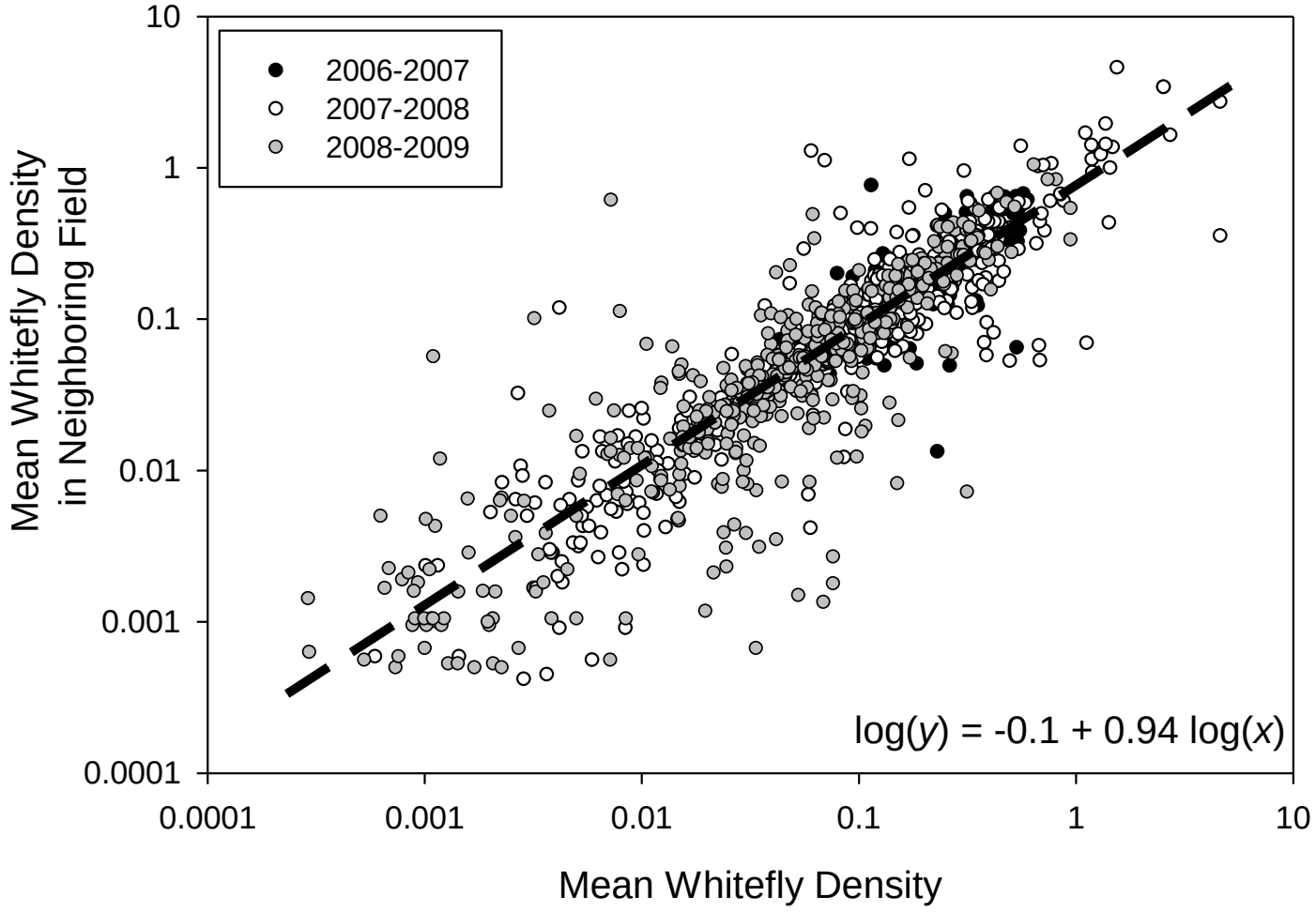
1st Order Nearest Neighbors (whiteflies)



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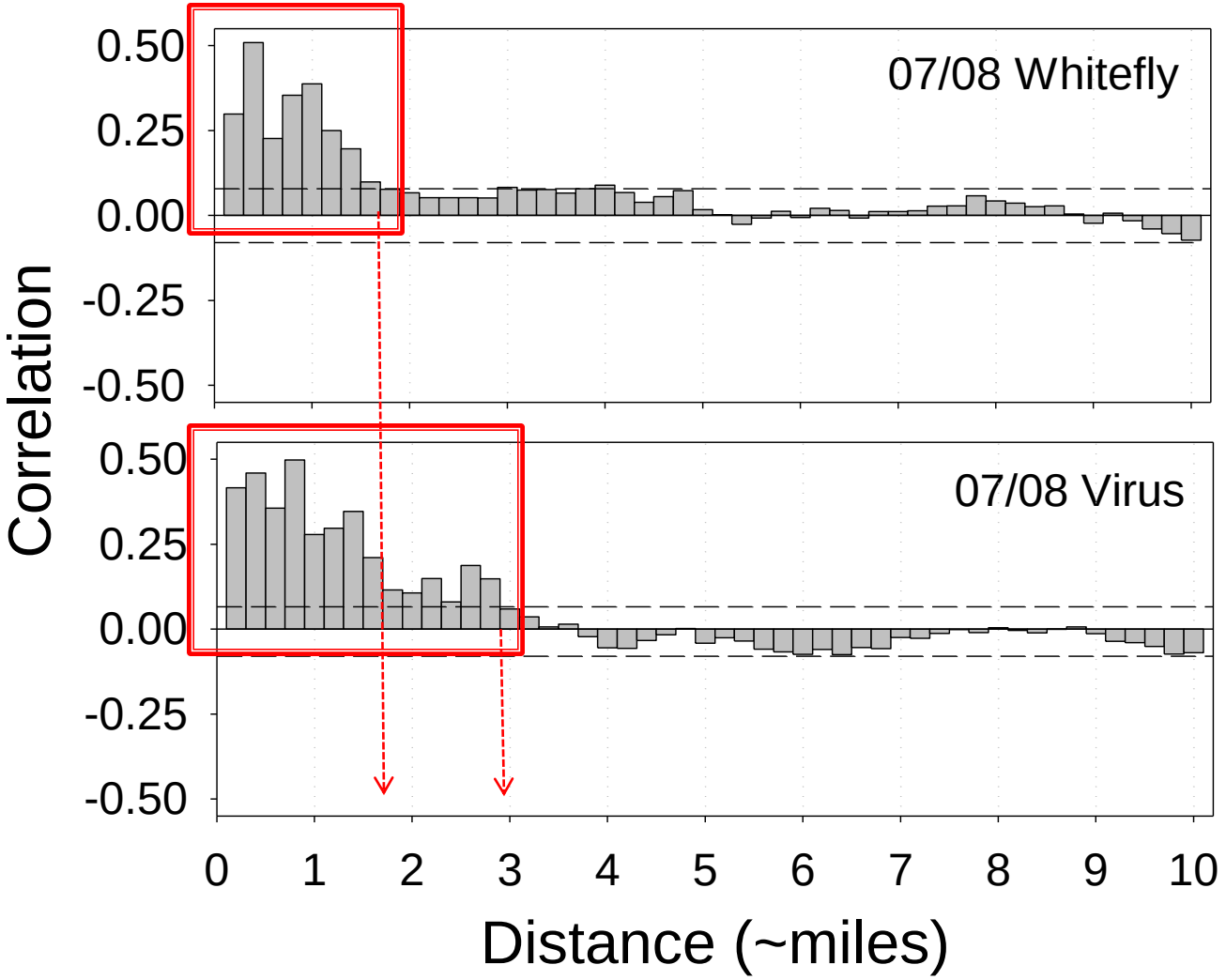
Correlation Analysis



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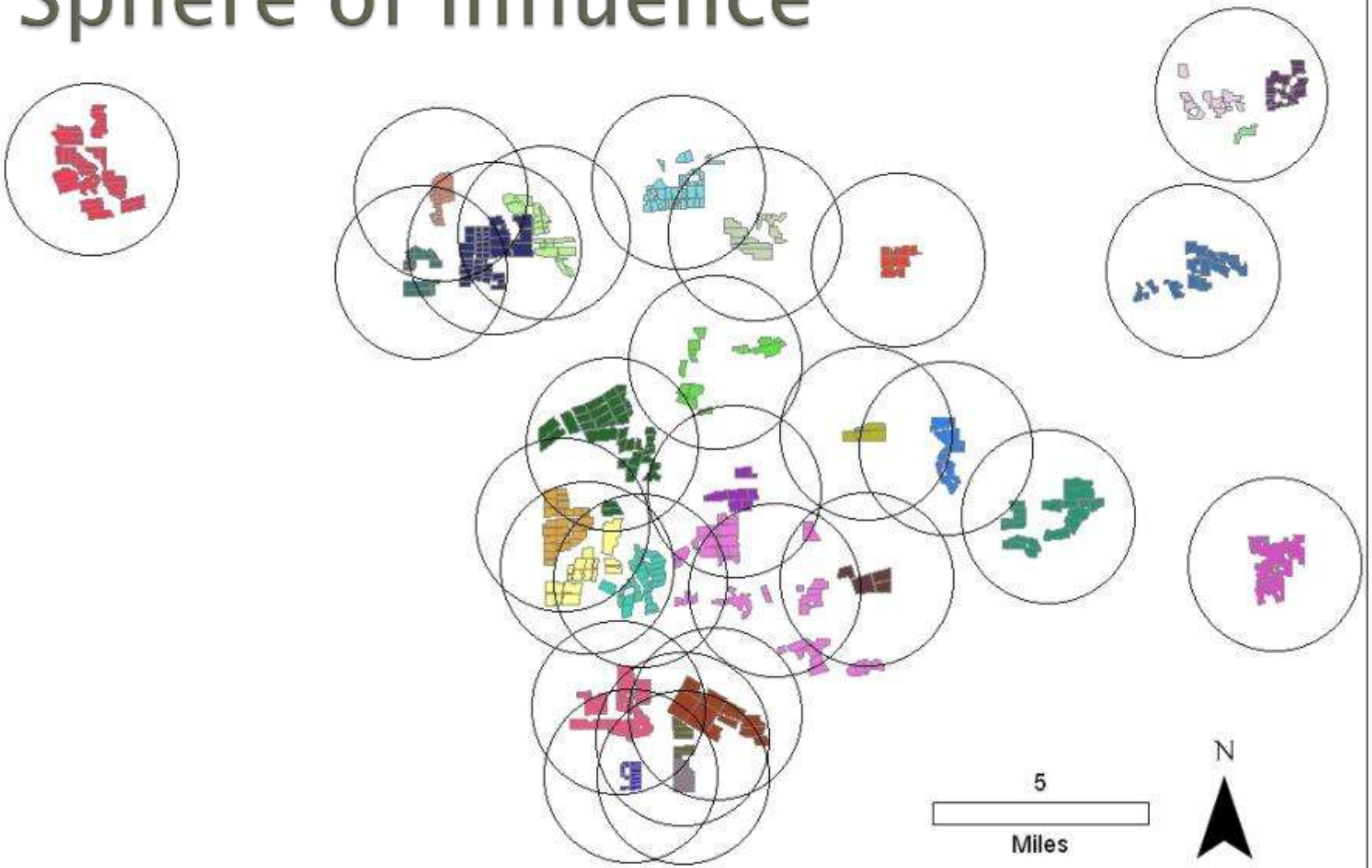
Sphere of Influence



Regional Survey

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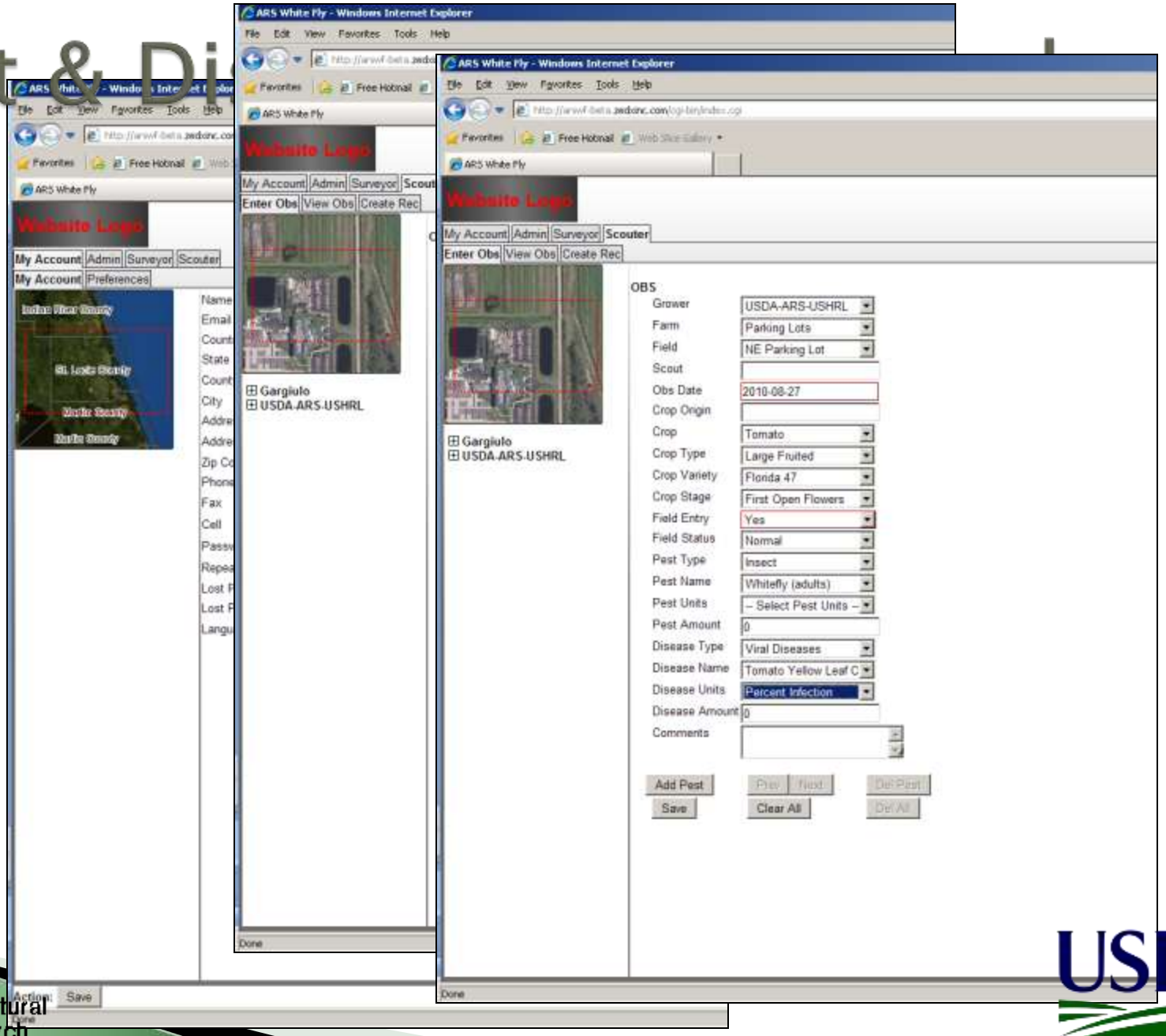
Pest & Di



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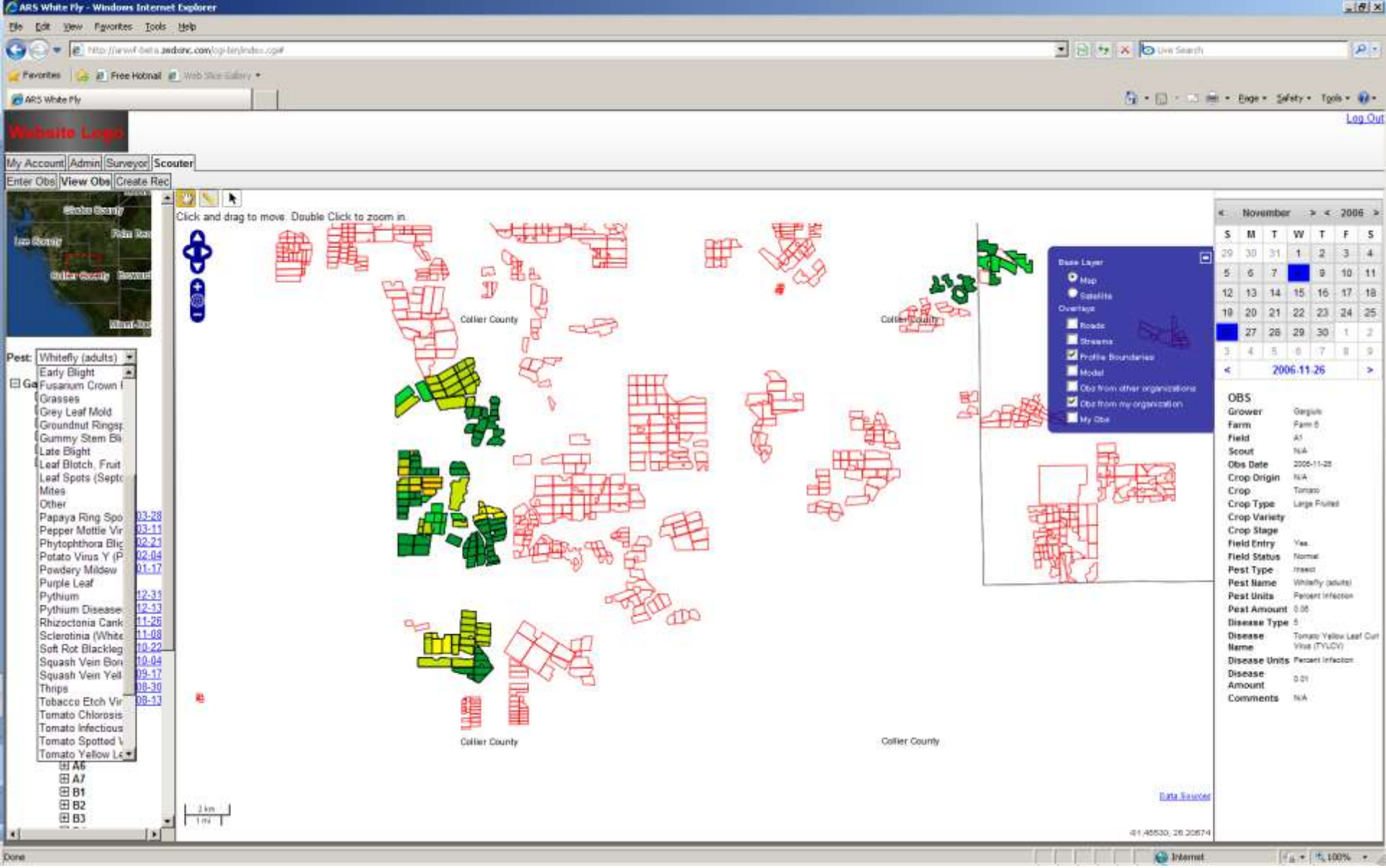

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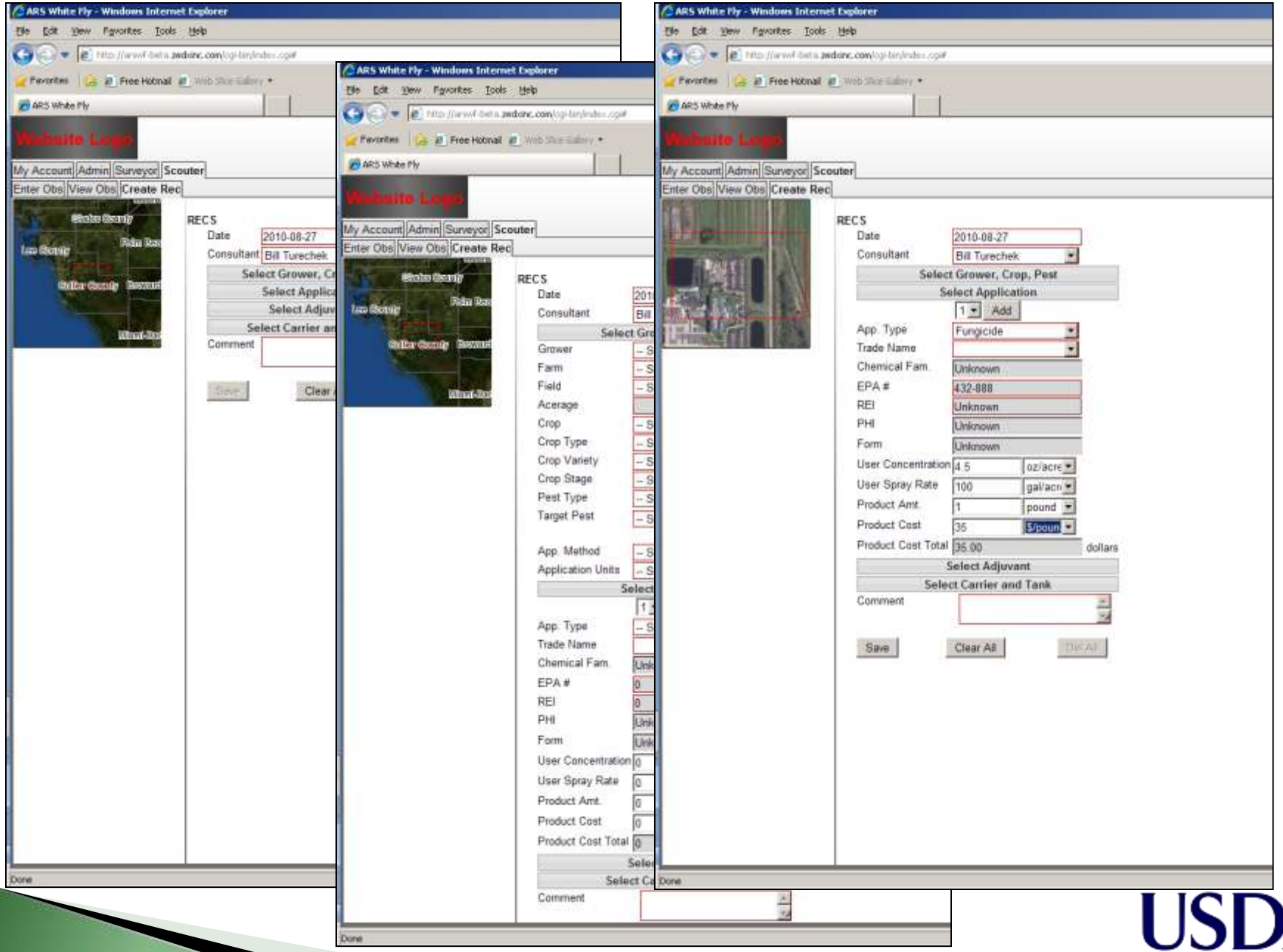

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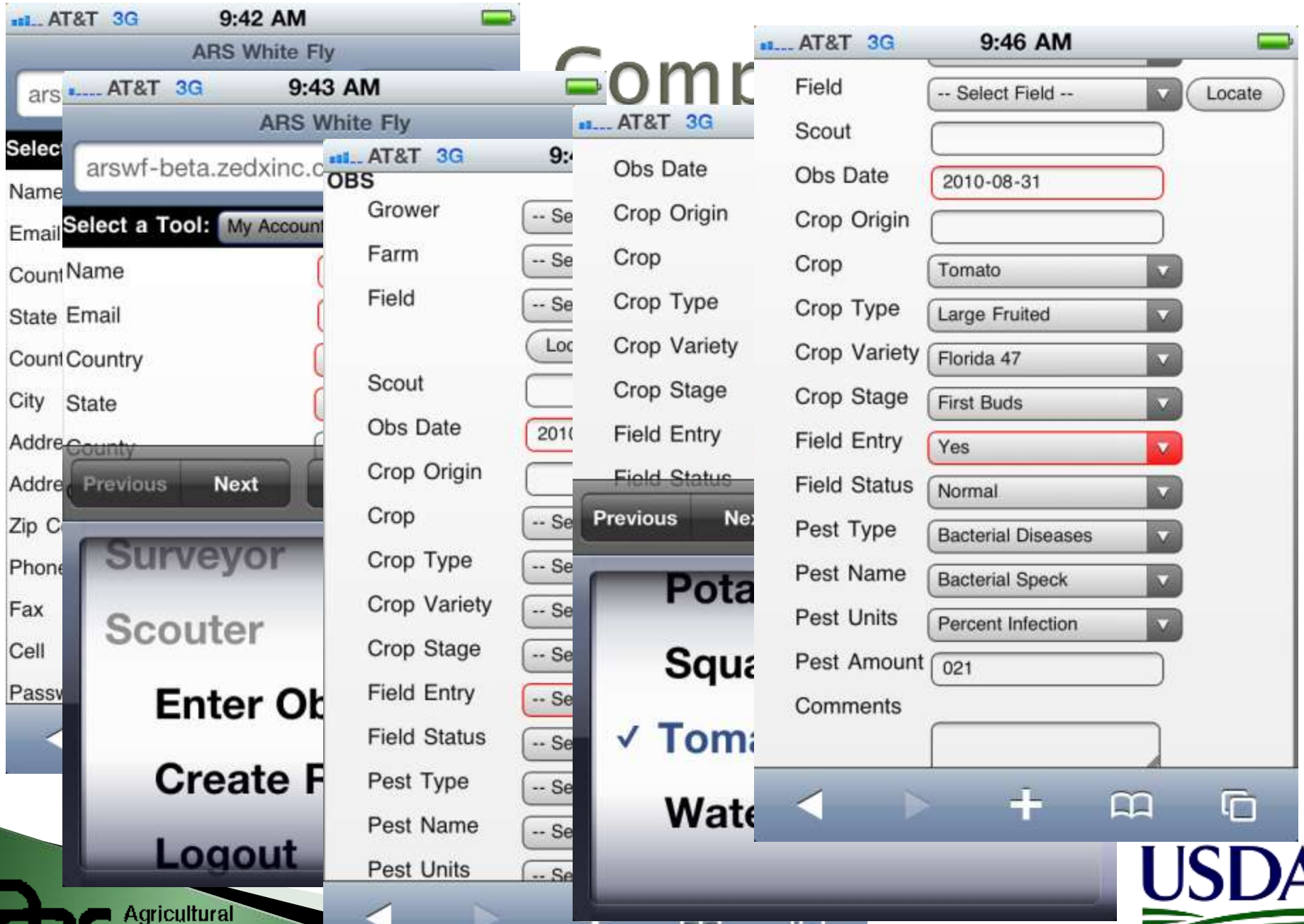

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Conclusions

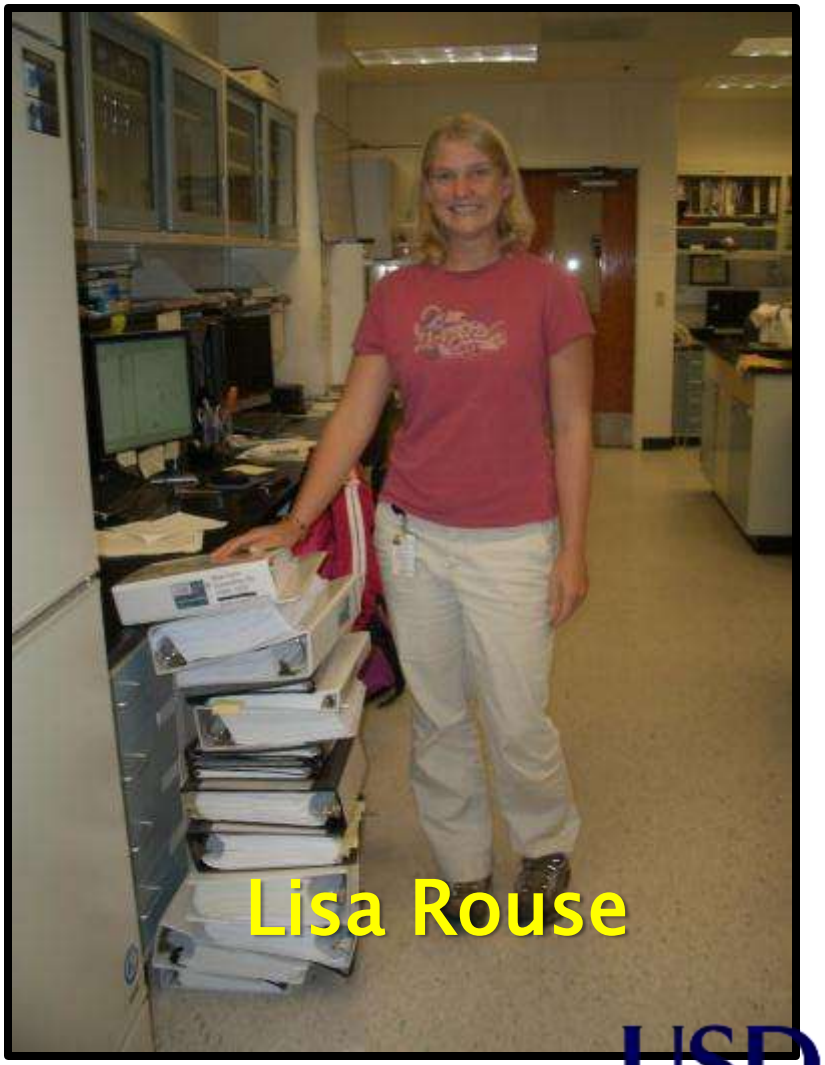
- It is possible to predict the severity of TYLCV & whitefly density with select weather variables
  - Cold events
- Geographical features are perhaps the best predictor of these pests
  - Natural scale of these pests is regional
- Developing or coordinating an area-wide pest management protocol is perhaps the best bet for maximizing control
  - The ***Decision Support Tool*** could facilitate such an effort.

Groundnut ringspot virus (GRSV)

- Relative of *Tomato spotted wilt virus* (TSWV)
  - Thrips vectored
- Found in south Florida tomatoes in fall 2009 and spring 2010
  - Glades Crop Care
  - Dr. Scott Adkins

Acknowledgements

- Agmart
- Gargiulo
- Glades Crop Care
- Immokalee Tomato Growers
- Pacific Tomato
- Red Gator Consulting
- Six L's
- West Coast Tomato
- Wolf Island



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