

# Plant Pest Modeling and Risk Mapping

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# Seeking: collaborative partnerships

- Models and tools have been used to solve many problems
- Create an innovative ecosystem to address new challenges in agriculture
- Provide decision-makers with accessible quantitative tools and data-driven models



Citrus Pest  
Detection Program  
Central California Tristeza  
Eradication Agency

# Introduction: what we do

- Multidisciplinary team **tackling complex problems** through basic/applied research, data analytics, and predictive modeling & simulation
- **Develop analytical models**, decision support systems, and statistical algorithms  
e.g., stochastic, spatially-explicit, agent-based, epidemiological, Bayesian, economic, spatiotemporal risk modeling frameworks, etc.
- Enhance mitigation strategies to **maximize pest and disease control** at multiple scales

# Overview: models & methods

We strive to *address pressing issues* in understanding how to prevent plant pathogens and pests from destroying commercially and *economically significant agricultural and ecological resources*.

## Monitoring, Detection & Eradication at multiple scales:

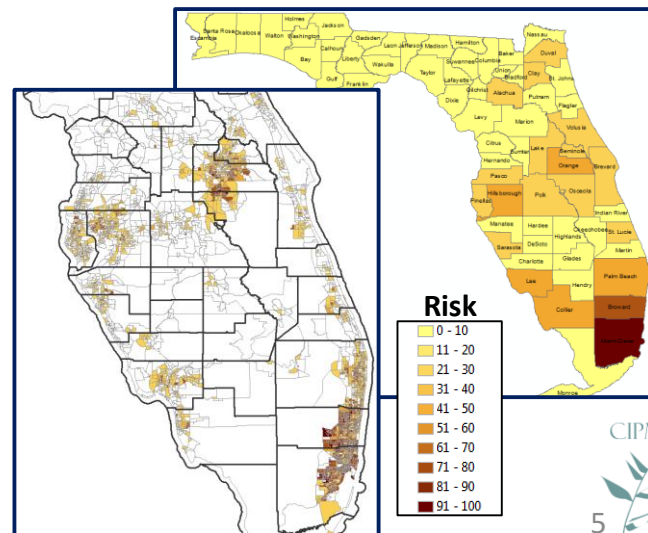
- Predicting points of introduction of exotic pests
- Risk-based models for guiding survey strategies
- Analyzing and refining management approaches
- Simulating pest/disease dynamics

# Introduction risk at multiple scales

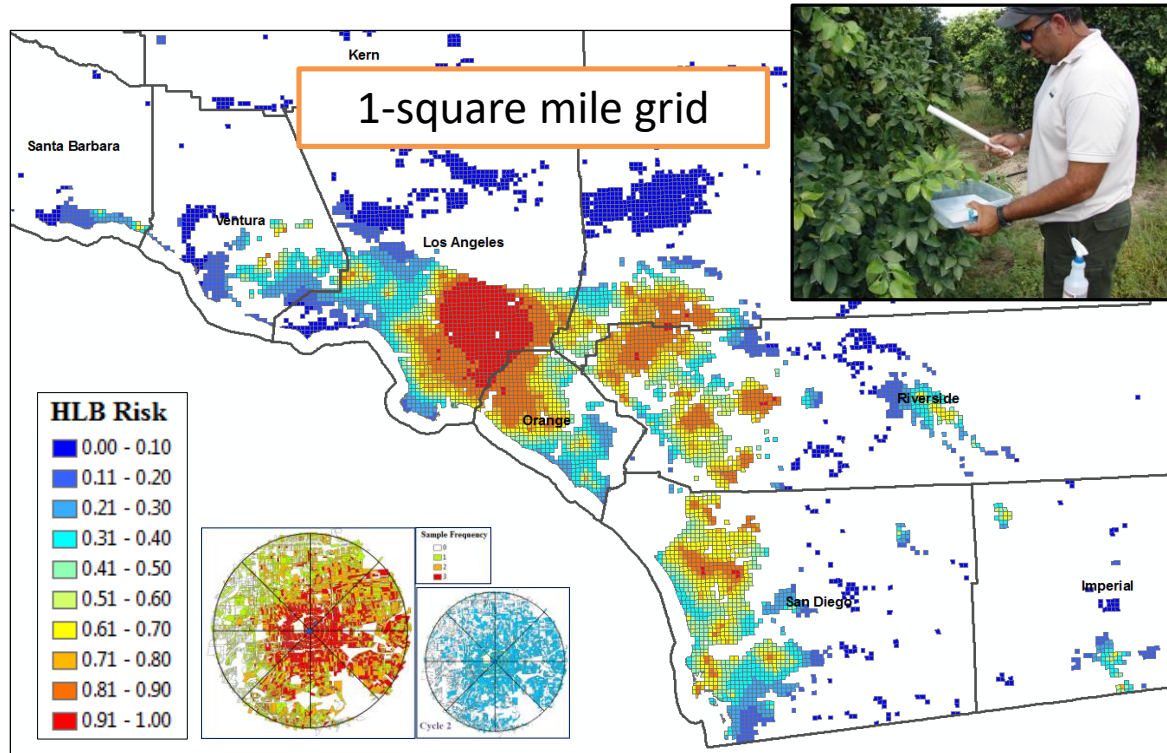
Globalization presents new & recurring pathways for introduction



Early Warning System for plant, animal & human diseases and pests



# Targeted surveillance strategies



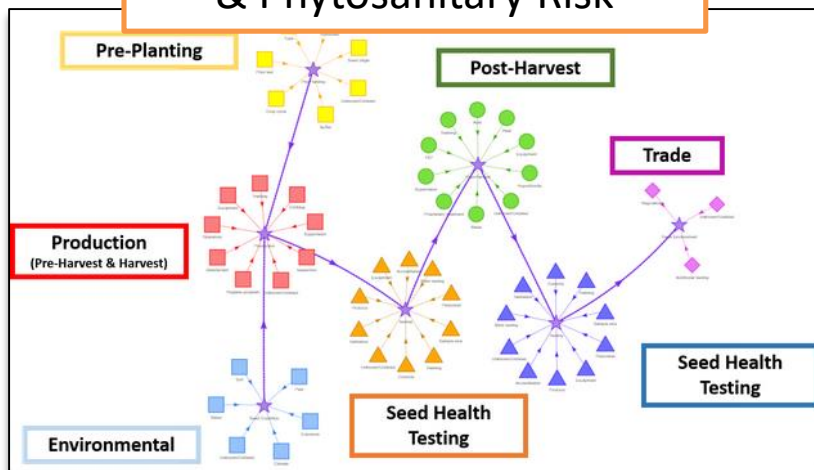
## State-wide Survey Designs

Numerous risk factors affect pest/disease progression dynamic

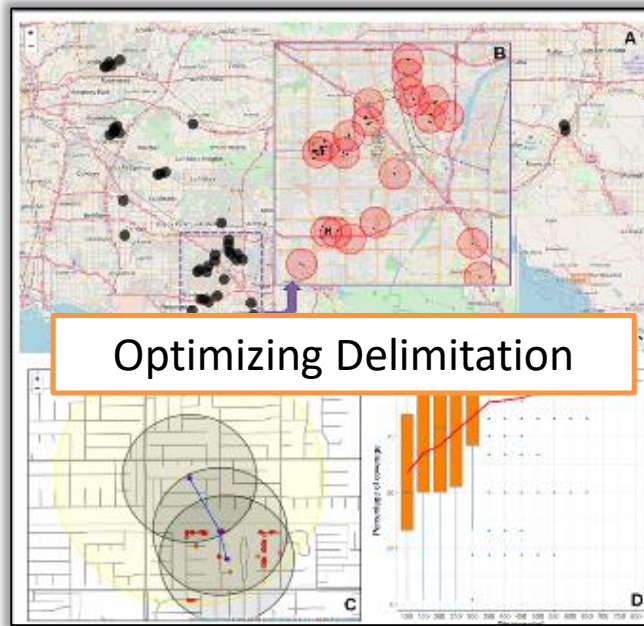
Deploy manpower efficiently and effectively for early detection and mitigation

# Management program evaluation

## Analyzing Seed Health QM & Phytosanitary Risk



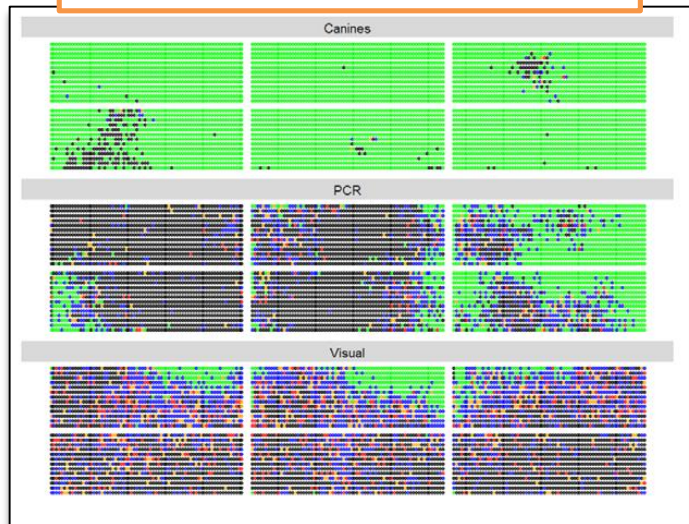
## Optimizing Delimitation



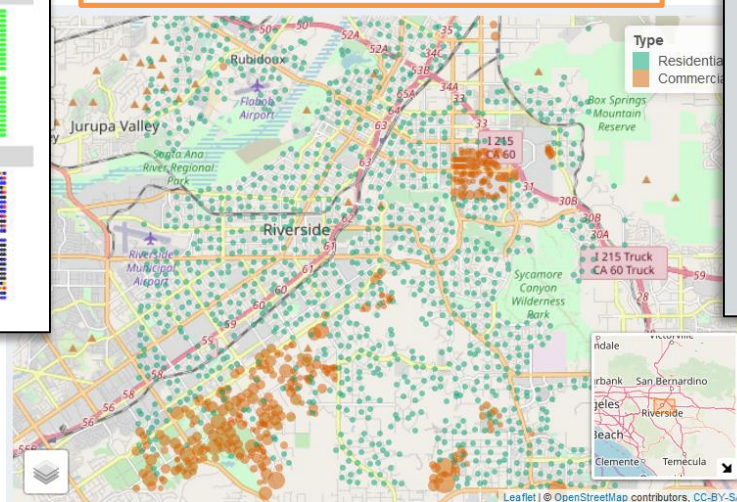


# Simulation modeling for spread & mitigation

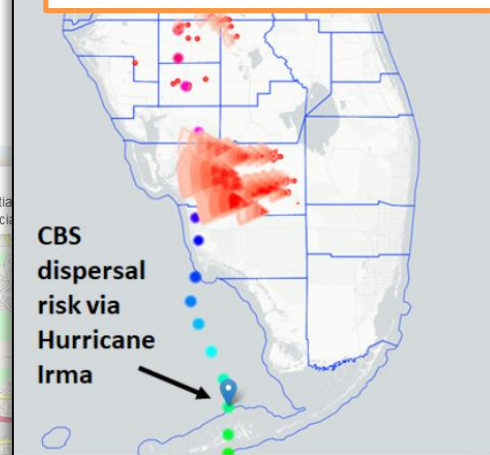
## Farm Level dynamics



## Regional Landscape dynamics



## State-wide dynamics & climate modeling

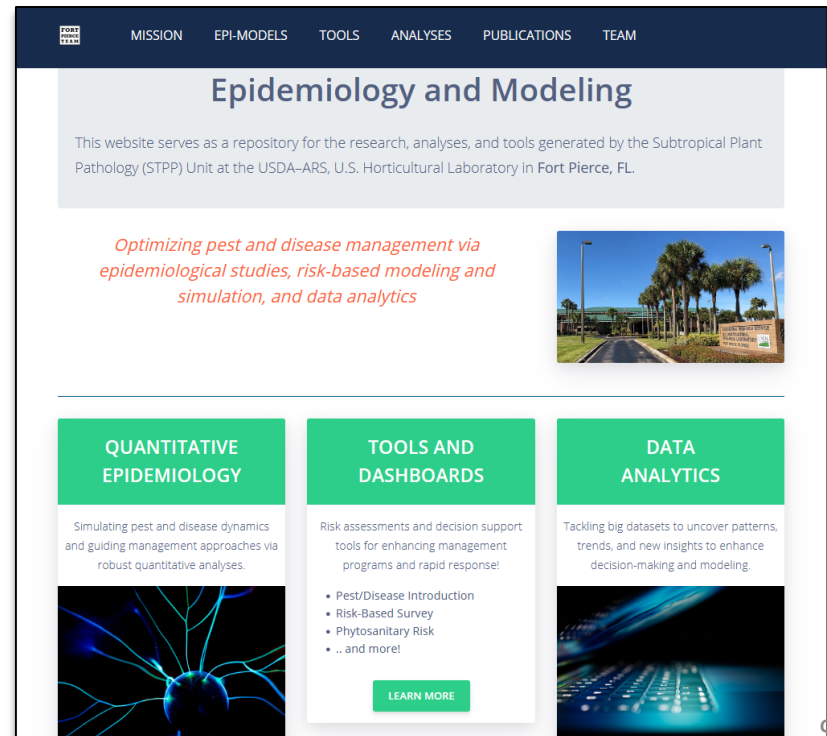




# Additional information

Models, Tools, Dashboards  
and Statistical Analyses

<https://agriskmodels.com>



# Conclusions & Next Steps

- Innovative and proactive management strategies that have been deployed across a number of severe pathosystems of economic importance
- Create and extend plant pest/disease modeling and risk mapping frameworks to solve new problems and challenges
- Aim to build partnerships to supply decision-makers with the best quantitative models and tools