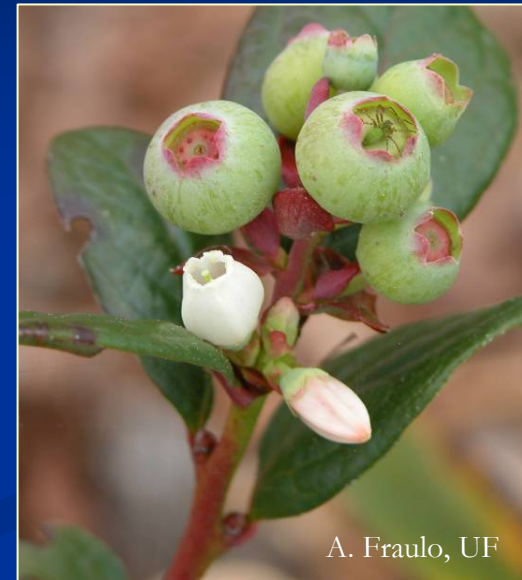


Changes in flower thrips distribution over time on a southern highbush blueberry field in North- central Florida

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Gainesville, Florida

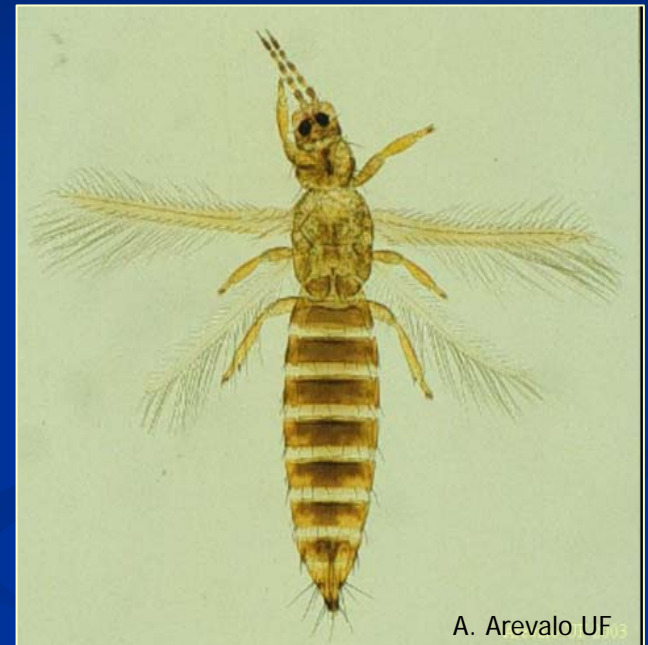
Florida's Southern Highbush Blueberries

- fresh market blueberries
- 2008 (USDA, 2009)
 - 9.8 million lbs
 - 3000 acres
 - Average of \$5.30 per lb



Flower Thrips

- ~90% of thrips captured in FL blueberries are *Frankliniella bispinosa* (Morgan) (Arevalo, 2006)
- Wide host range
- Feed and oviposit in all developing flower tissues



Feeding injury



Oviposition injury

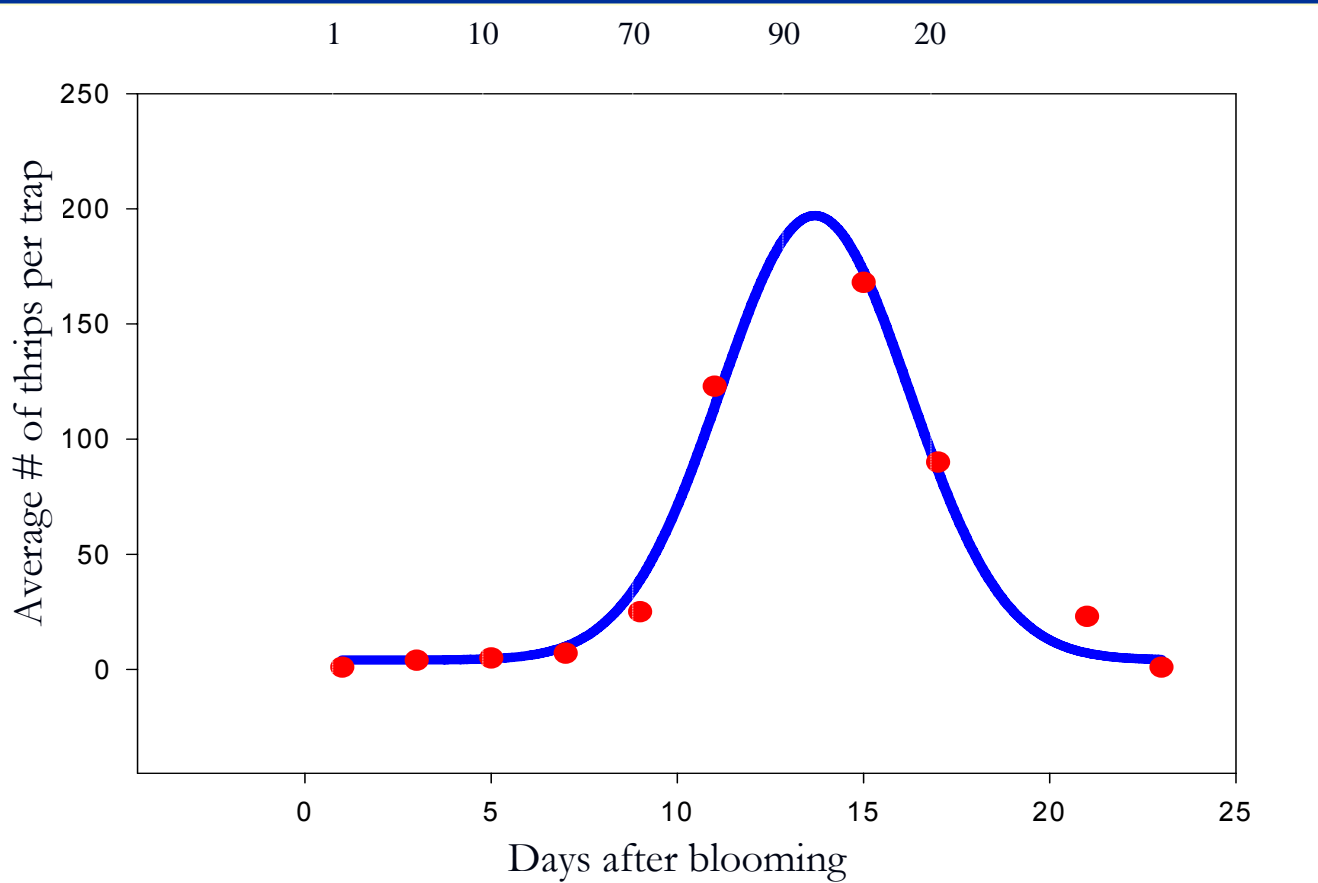


Size of thrips populations in relation to flower phenology



Percentage of open flowers

1 10 70 90 20



Arevalo,
2006

Geostatistics

- “...a set of tools for incorporating the spatial and temporal coordinates of observations in data processing.” – P. Goovaerts, 1997
- Spatial variation among a set of sample points is modeled and the model is used to predict values at unsampled locations

Previous Research

- 15.24 m grid
 - Wide variation in range (distance where populations are spatially independent)
 - 2.51 – 79.80 m
 - Only 1 of the 3 weeks was well modeled
 - Range was 11.04 m

Grid spacing was too wide

Objective

- To model thrips spatial distribution utilizing geostatistical methods
 - To determine optimum trap spacing

HYPOTHESIS: Thrips' populations have a short range of spatial variability

Methods

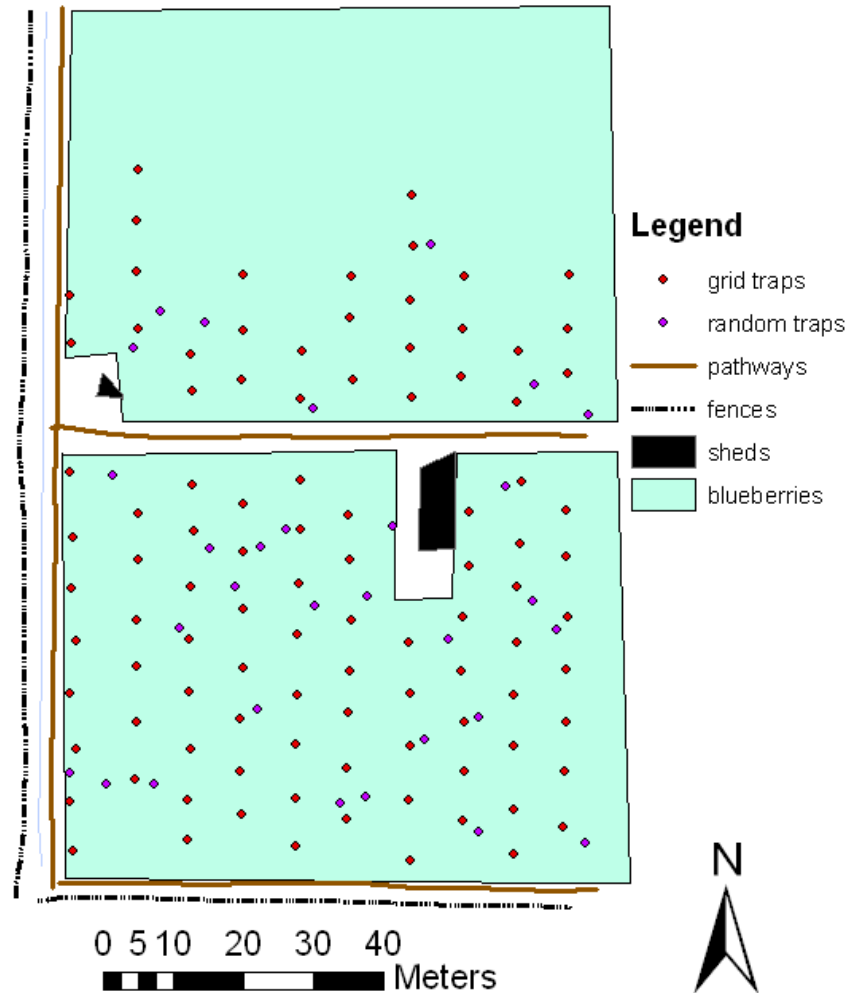
Sampling

- Sampled over a 5 week period
 - Jan. 23, 2009 – Feb. 26, 2009
- 130 white sticky traps
 - 100 on a 7.62 m grid
 - 30 placed randomly



Study Area

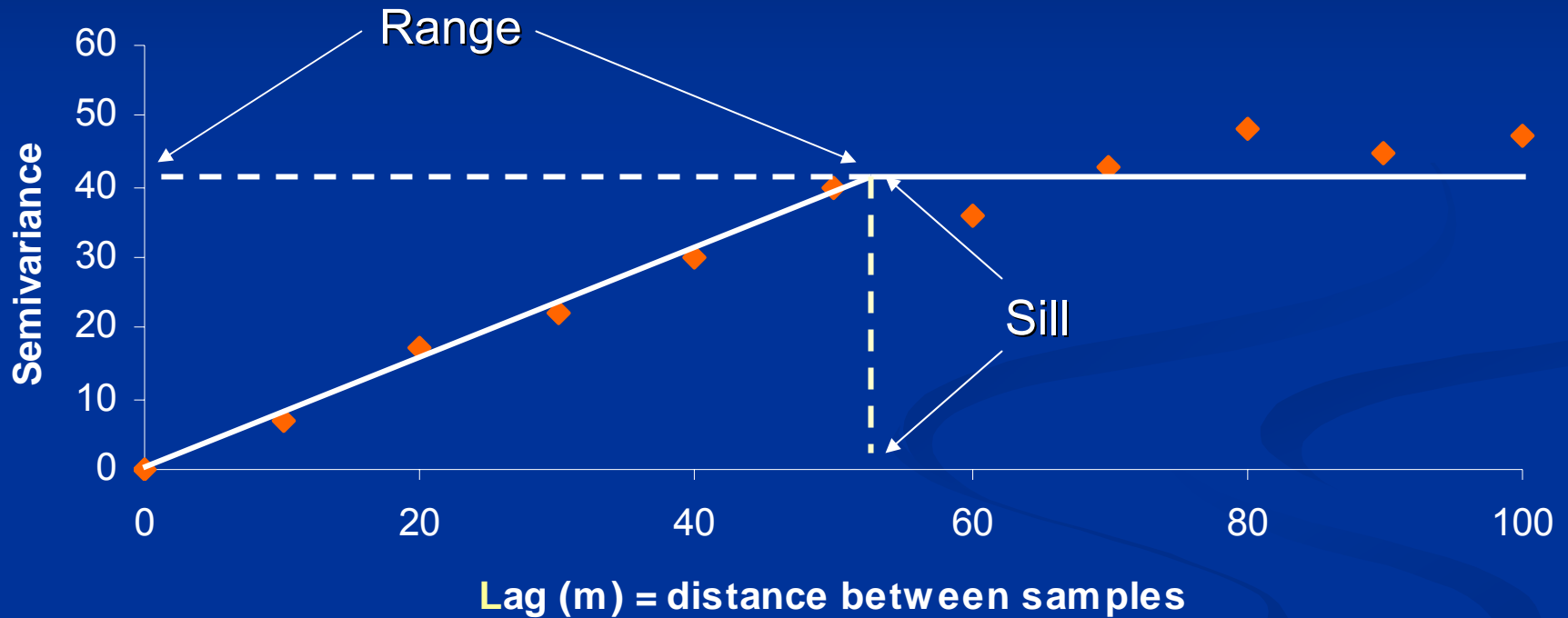
Study site on a blueberry farm Inverness, FL



Data source: Small Fruit and Vegetable IPM Laboratory
University of Florida, Gainesville, FL
Date: Feb. 26, 2009
Data collection: Trimble GPS receiver
Created by: Elena M. Rhodes

Semivariogram Modeling

Semivariance = a measure of the difference between two data points



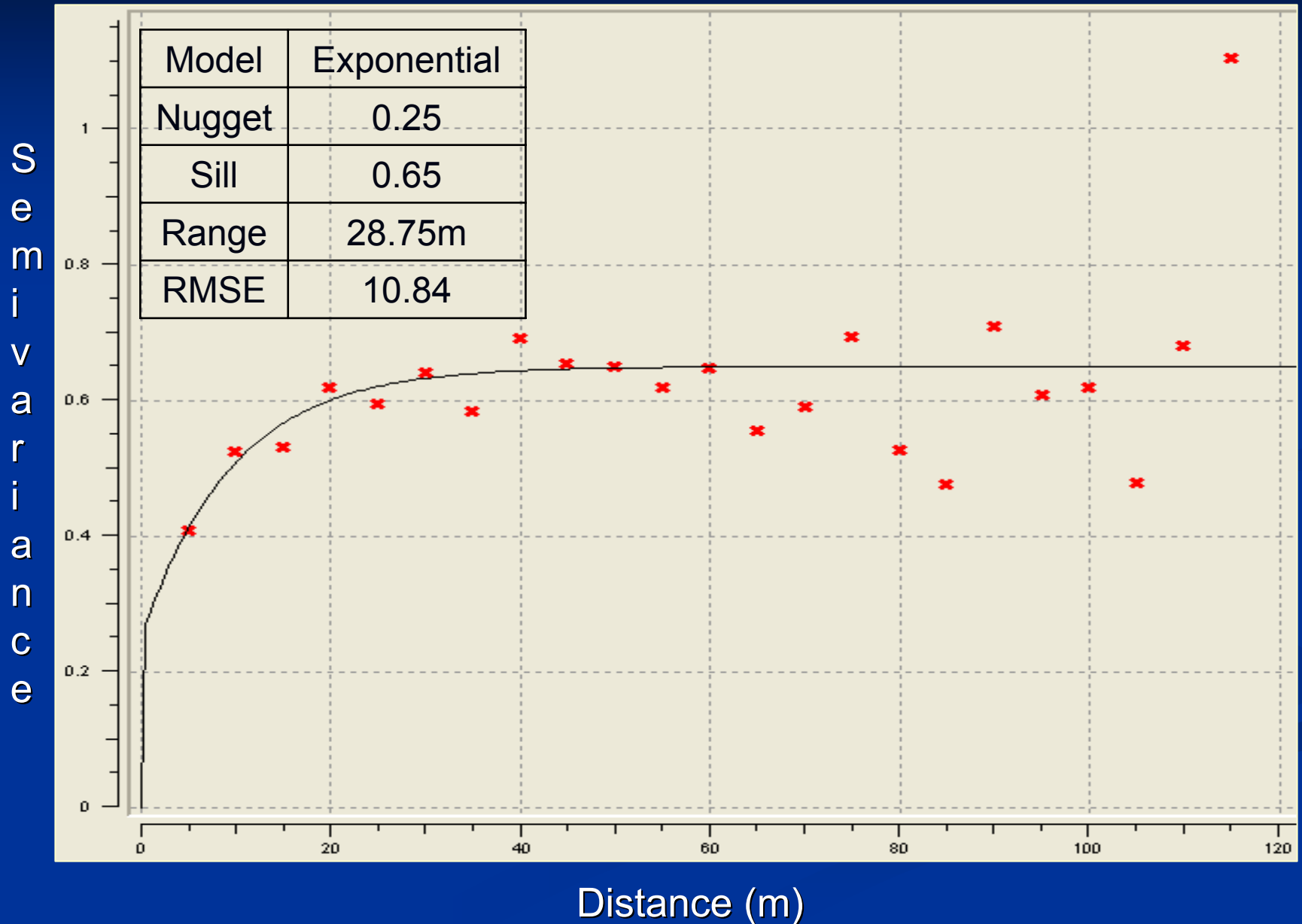
Nugget = the semivariance at 0 lag

Semivariogram Modeling

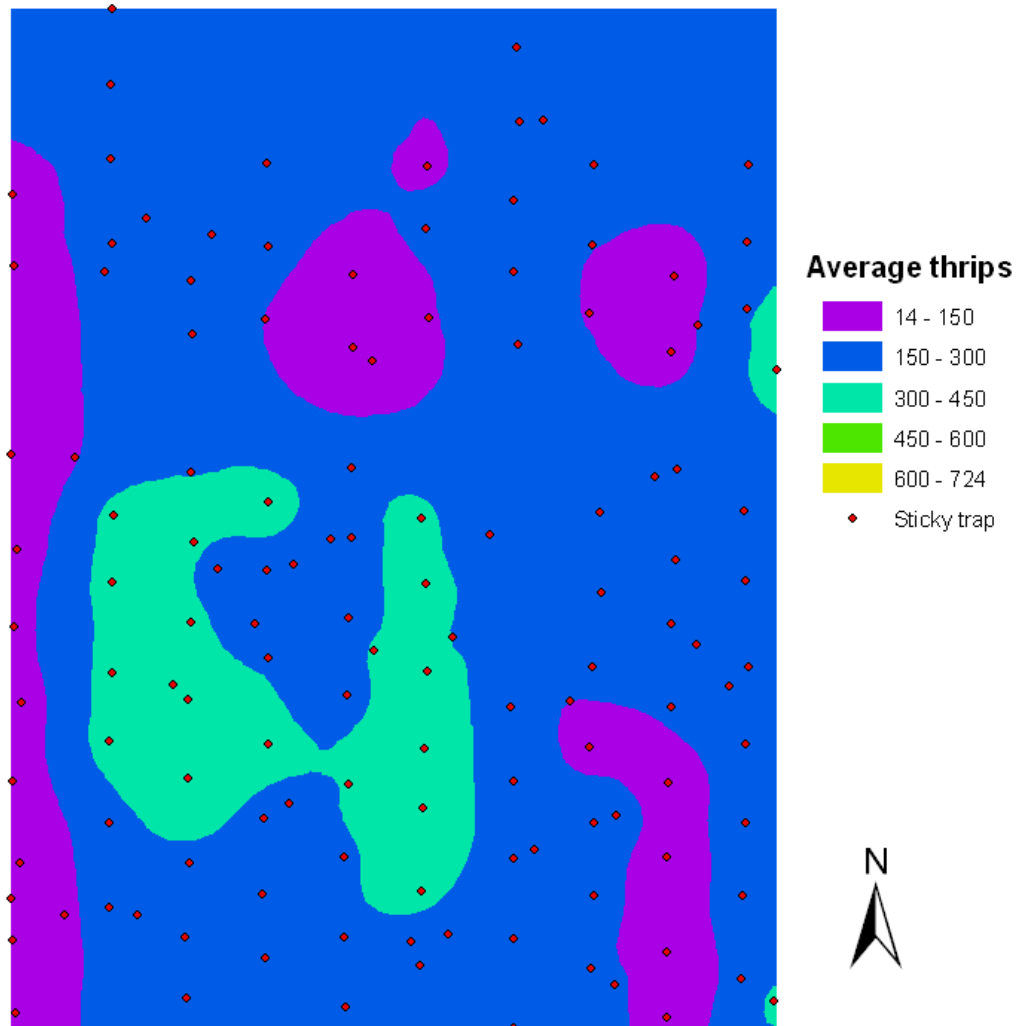
- Semivariograms were constructed for each week
 - SGeMS (Remey 2006)
 - 5 m lags (total of 23)
 - Isotropic (directional independence)
- Ordinary kriging was performed for each week utilizing the semivariogram models

Results

Jan. 30, 2009 (\log_e transformed)



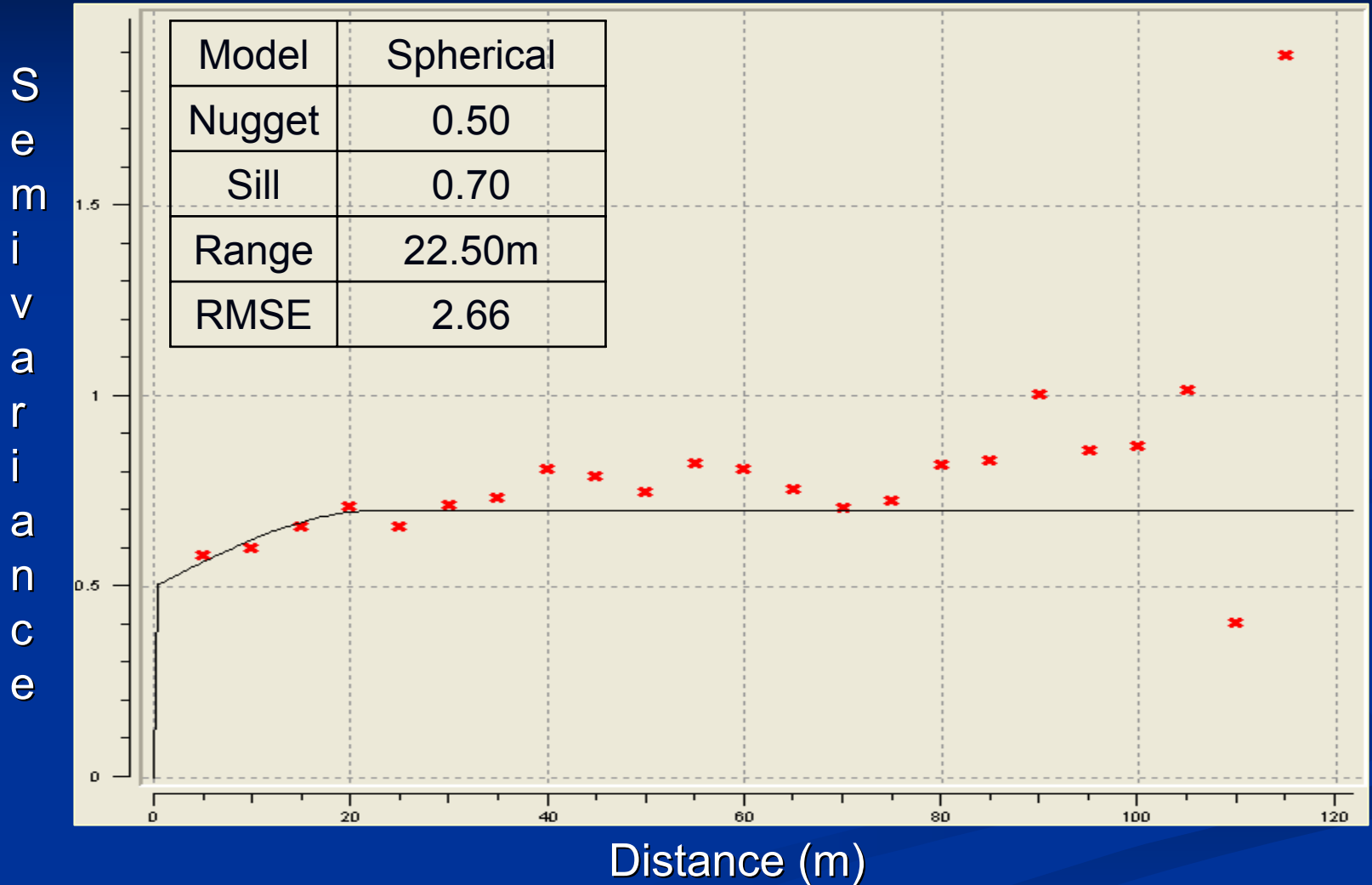
Average thrips per flower on a blueberry farm in Inverness FL Jan. 30, 2009



Data Source: Small Fruit and
Vegetable IPM Laboratory
Entomology and Nematology
Department, UF
Traps collected: Jan. 30, 2009
Map produced by: E. Rhodes
Method: Ordinary Kriging

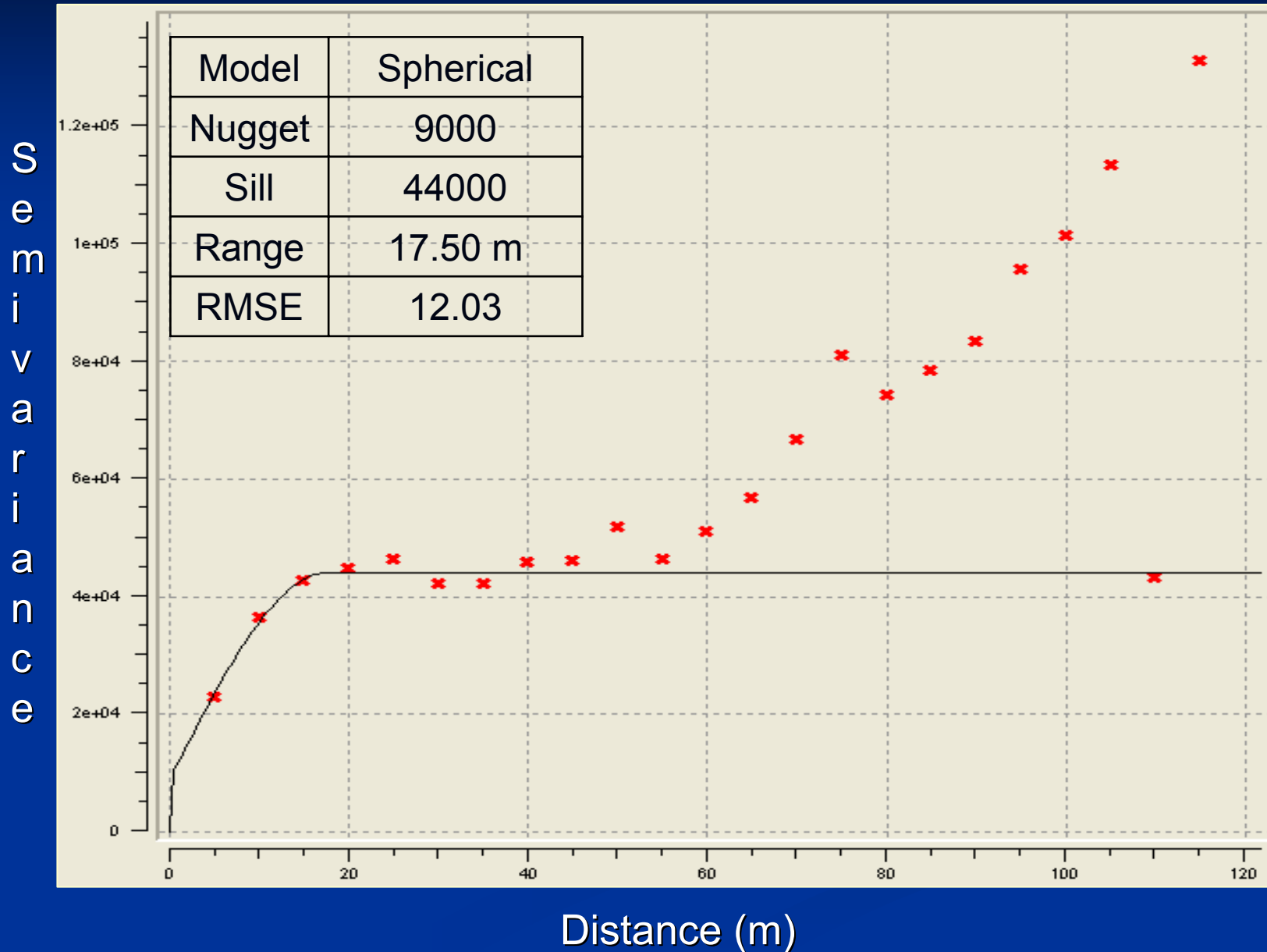
0 5 10 20 30 40
Meters

Feb. 5, 2009 (\log_e transformed)

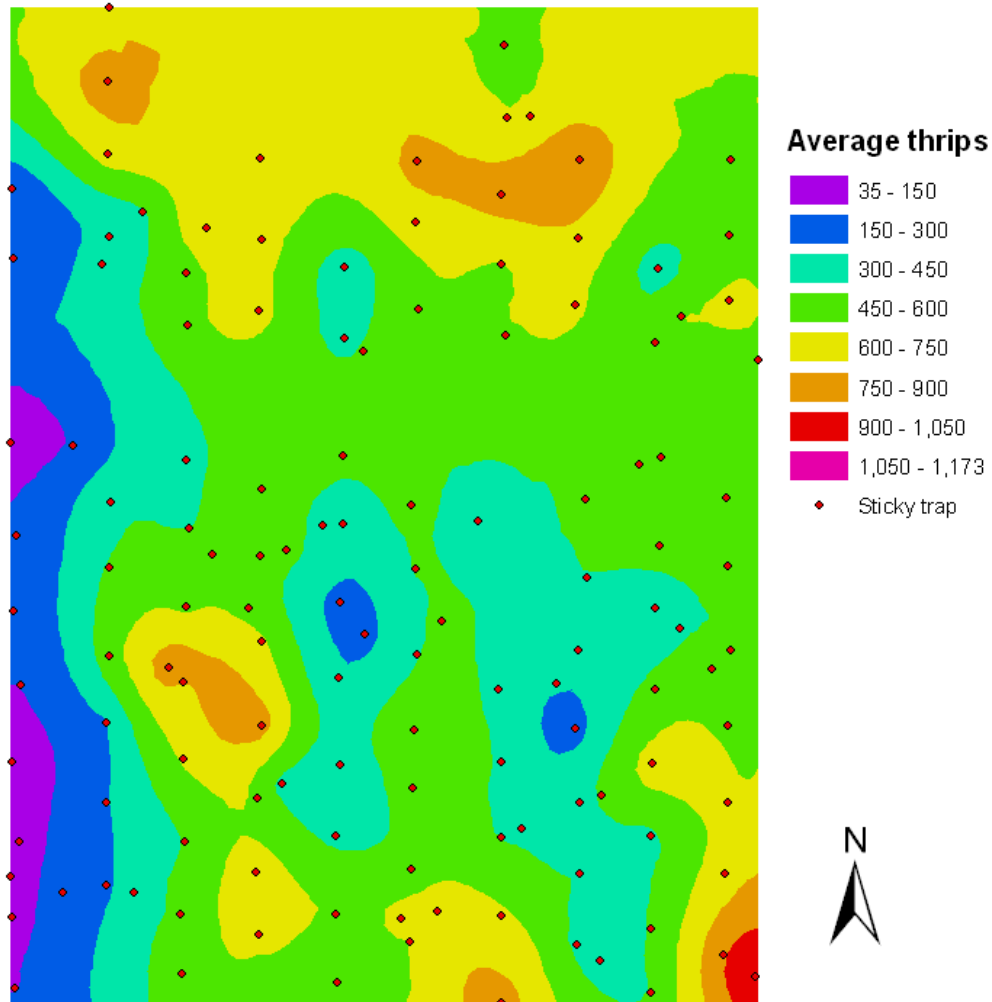


< 30 thrips per trap were found throughout the sampling area

Feb. 13, 2009 (untransformed)



Average thrips per flower on a blueberry farm in Inverness FL Feb. 13, 2009

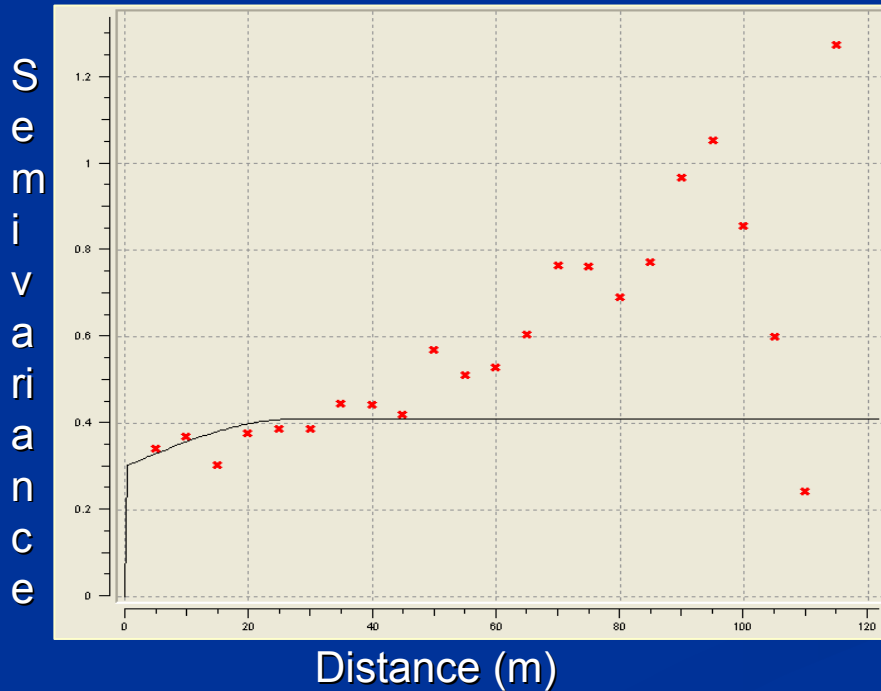


Data Source: Small Fruit and
Vegetable IPM Laboratory
Entomology and Nematology
Department, UF
Traps collected: Feb. 13, 2009
Map produced by: E. Rhodes
Method: Ordinary Kriging

Feb. 20

(log_e transformed)

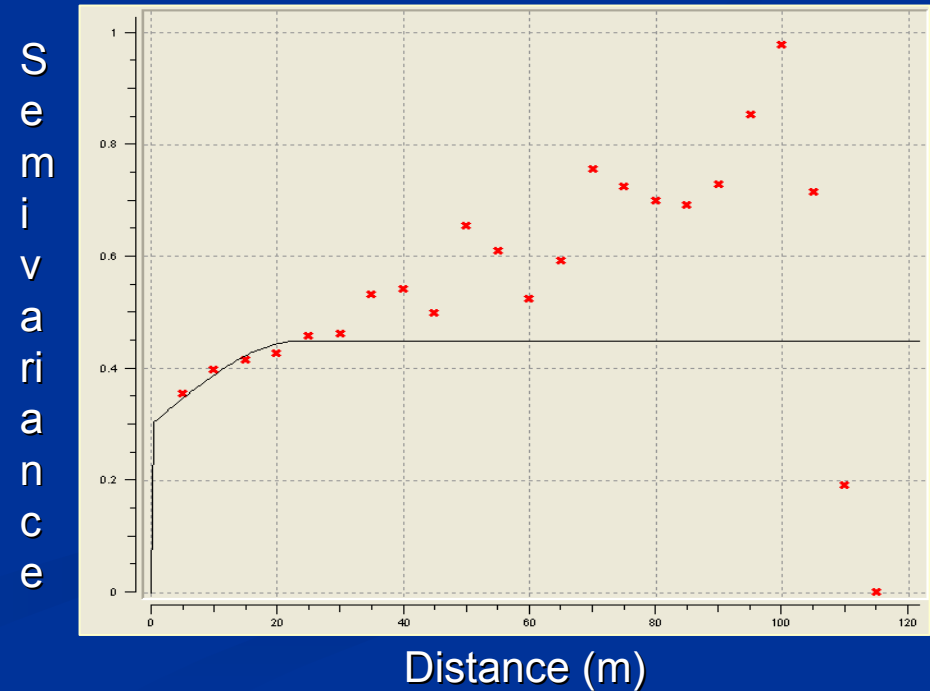
Model	Spherical
Nugget	0.30
Sill	0.41
Range	27.50 m
RMSE	16.13



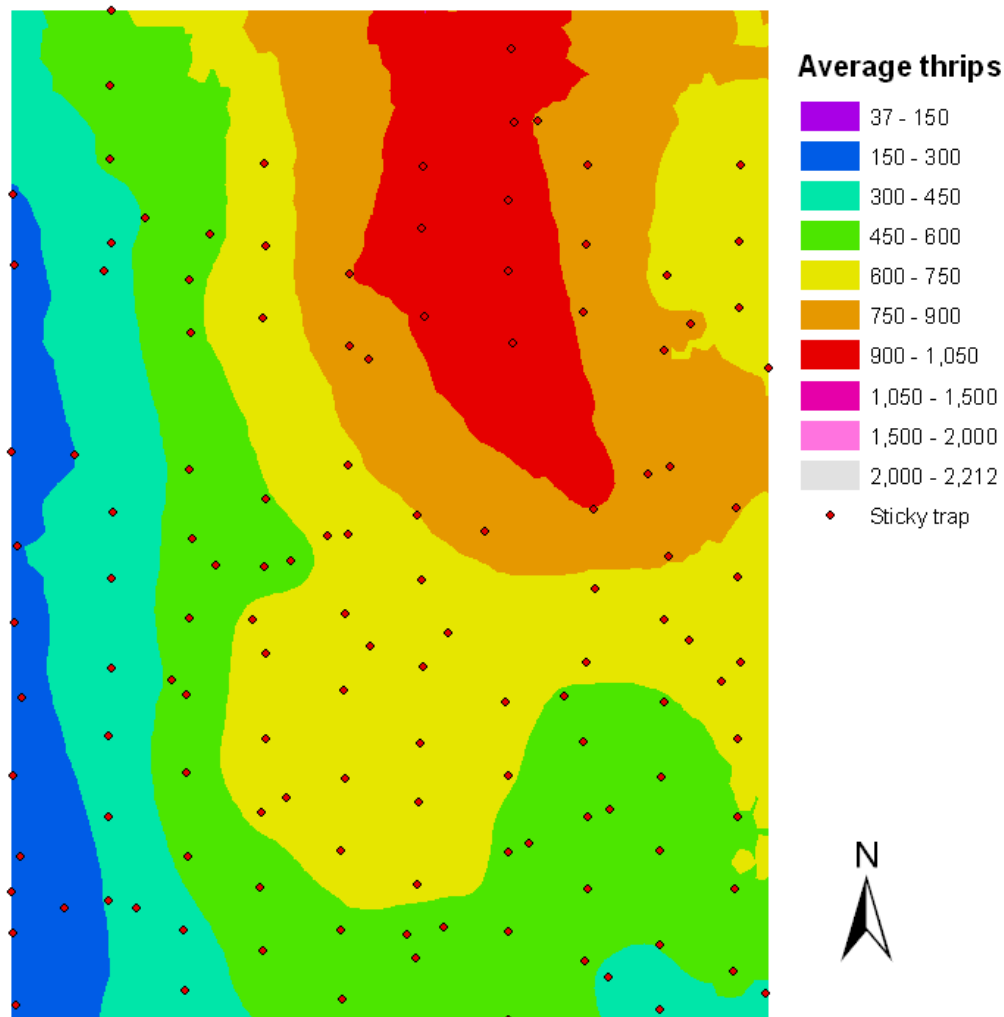
Feb. 26

(log_e transformed)

Model	Spherical
Nugget	0.30
Sill	0.45
Range	23.75 m
RMSE	18.31

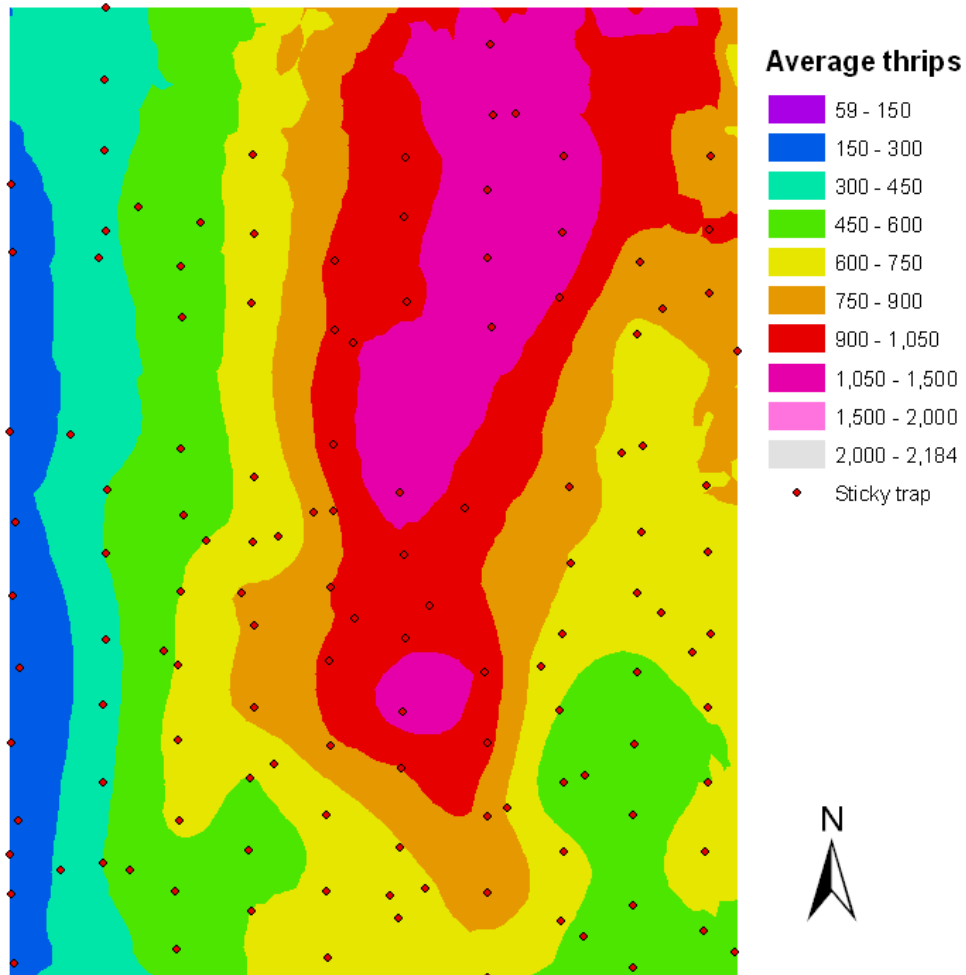


Average thrips per flower on a blueberry farm in Inverness FL Feb. 20, 2009



Data Source: Small Fruit and
Vegetable IPM Laboratory
Entomology and Nematology
Department, UF
Traps collected: Feb. 20, 2009
Map produced by: E. Rhodes
Method: Ordinary Kriging

Average thrips per flower on a blueberry farm in Inverness FL Feb. 26, 2009



Data Source: Small Fruit and
Vegetable IPM Laboratory
Entomology and Nematology
Department, UF
Traps collected: Feb. 26, 2009
Map produced by: E. Rhodes
Method: Ordinary Kriging

Summary

- The thrips population dropped to < 30 thrips per trap on Feb. 5
- The large hot spot was located in the Northeast quadrant of the sample area, which was the middle of the blueberry field
- Ranges varied from 17.50 – 28.75 m
 - Optimum trap spacing is ≥ 28.75 m

Acknowledgements

- Dr. Oscar Liburd
- Dr. Joseph Funderburk
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- Dr. Sabine Grunwald

- Florida Blueberry Grower's Association

- Small Fruit and Vegetable IPM laboratory staff and students



Questions?

