

PRECISION AG/NEMATODE MANAGEMENT IN S. C.

❖ **South Carolina**

- ❖ Ahmad Khalilian
- ❖ Will Henderson
- ❖ John Mueller

❖ **Current Coop.**

- ❖ Terry Kirkpatrick
- ❖ Scott Monfort

❖ **Others**

- ❖ Al Wrathier

**A typical production field in the
Southeastern Coastal Plain**

Sandy Loam

Sand

Sandy Clay Loam

COTTON THRESHOLDS

Species	Nematodes/100cm ³	
	Low	High
Root-knot	100	250
Reniform	250	625
Lance	75	190

COTTON THRESHOLDS

Low Threshold

5 to 6 lbs/acre Temik 15G at
planting

or Avicta

High Threshold

3.0 gals/acre Telone II preplant +
3 - 5 lbs Temik 15G at planting

or 5 lbs Temik 15G at planting +
5 lbs Temik 15G side dressed

or Vydate CLV

or Rotation

4 Farms – 214 Fields

< Threshold	31%
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At low threshold	32%
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> High Threshold	37%
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Primarily Columbia lance and Root-knot Nematodes

NEMATODE DISTRIBUTION

- ❖ **Nematodes are not uniformly distributed within fields.**
- ❖ **Distribution is determined by:**
 - ❖ **Soil texture**
 - ❖ **Soil chemical properties**
 - ❖ **Host distribution**

“NEW TOOLS”

❖ **AVAILABLE**

❖ **G.I.S./G.P.S.**

❖ **S.E.C.M.**

❖ **NEEDED**

❖ **Variable rate
applicator for
Temik 15G**

❖ **Variable rate
applicator for
Telone II**

OBJECTIVE

- ❖ **Determine (predict)
for each grid:**
 - ❖ **Nematode density**
 - ❖ **Yield potential**
- ❖ **Soil texture**
- ❖ **Particle size**
- ❖ **pH**





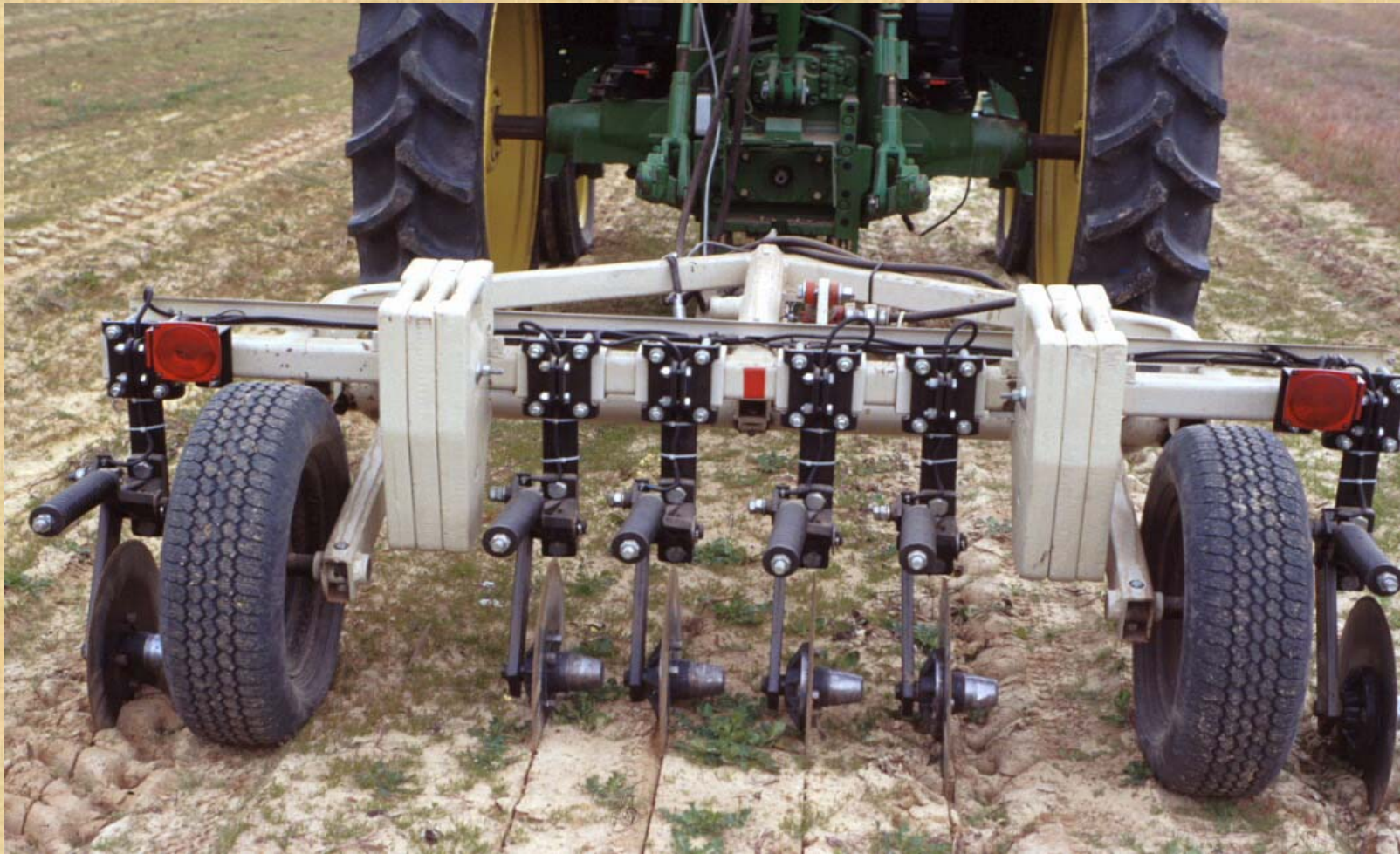
Columbia Lance Nematode



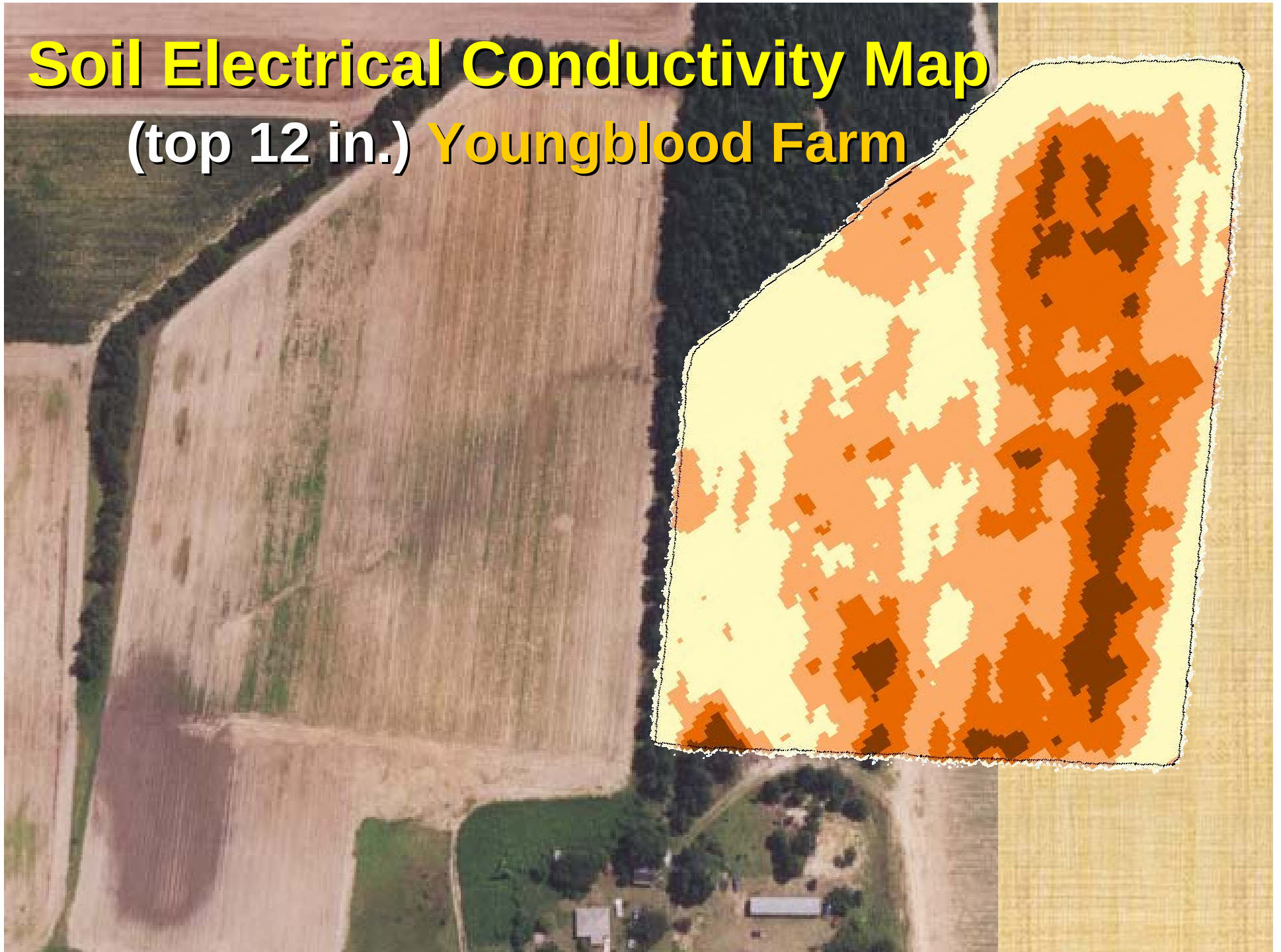
❖ **Soil texture, especially % sand may be the most important factor in determining the distribution of individual nematode species.**

❖ **Soil electrical conductivity correlates strongly to soil particle size and texture.**

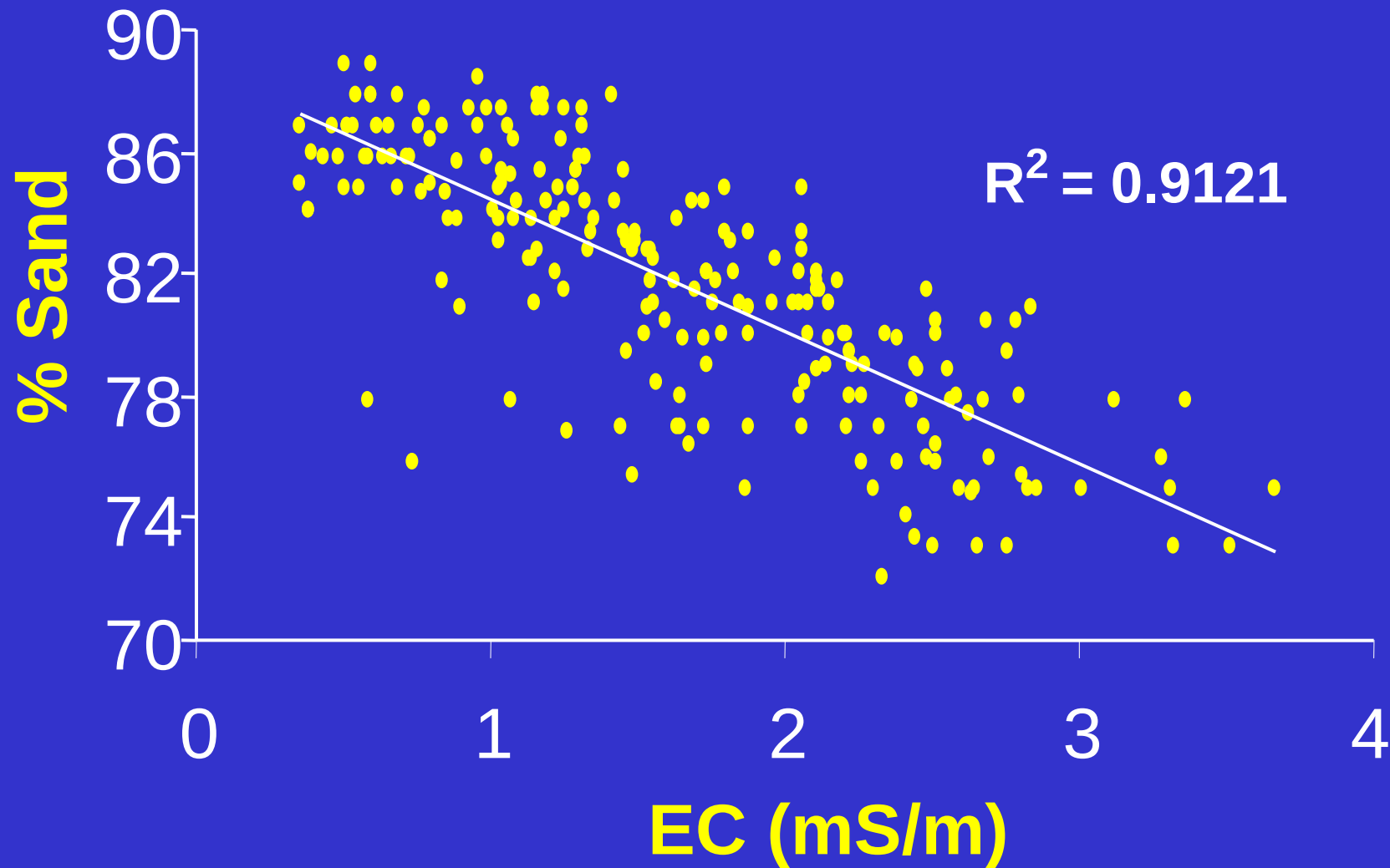
Determine the potential for predicting nematode distribution and density using soil electrical conductivity.



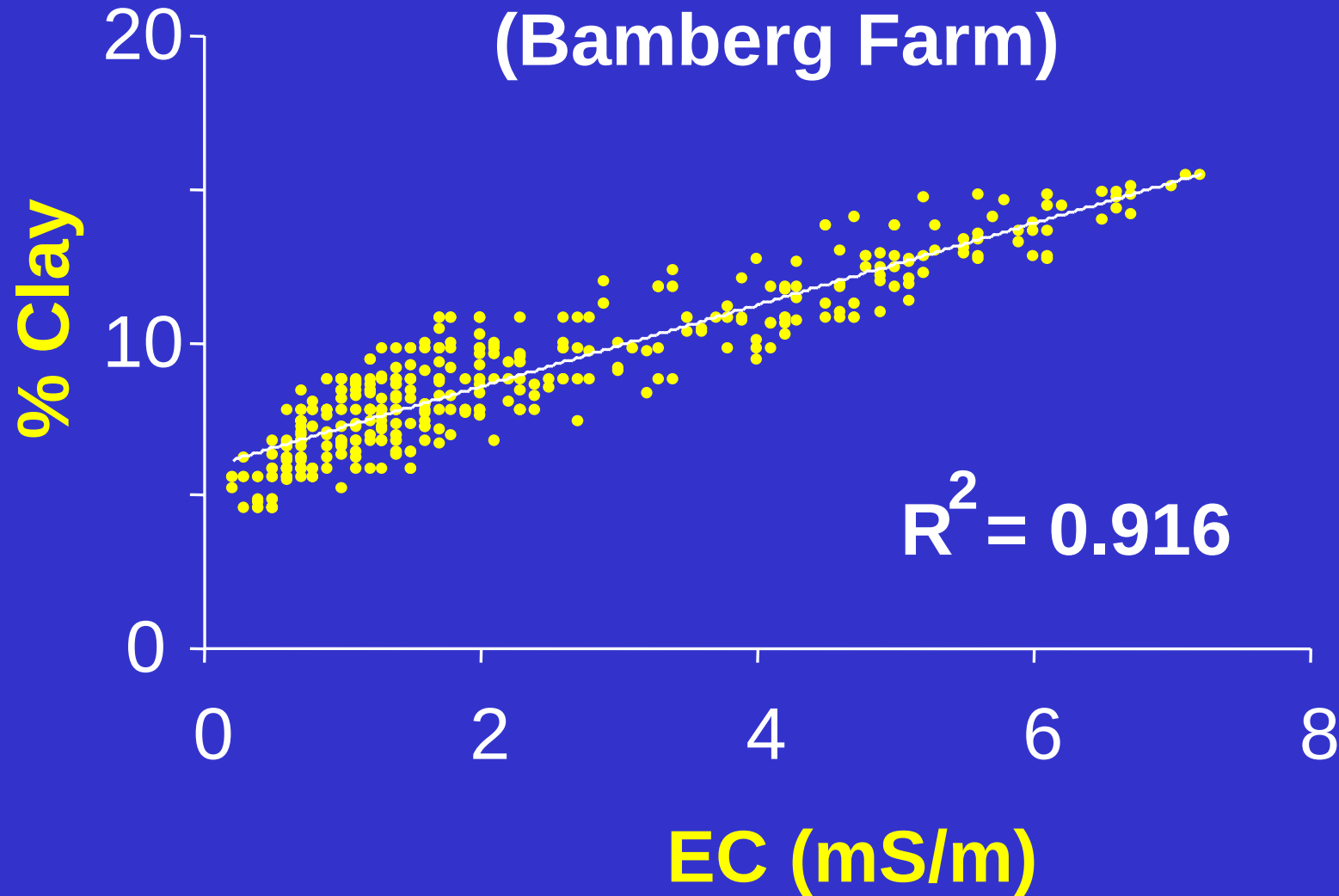
Soil Electrical Conductivity Map (top 12 in.) Youngblood Farm



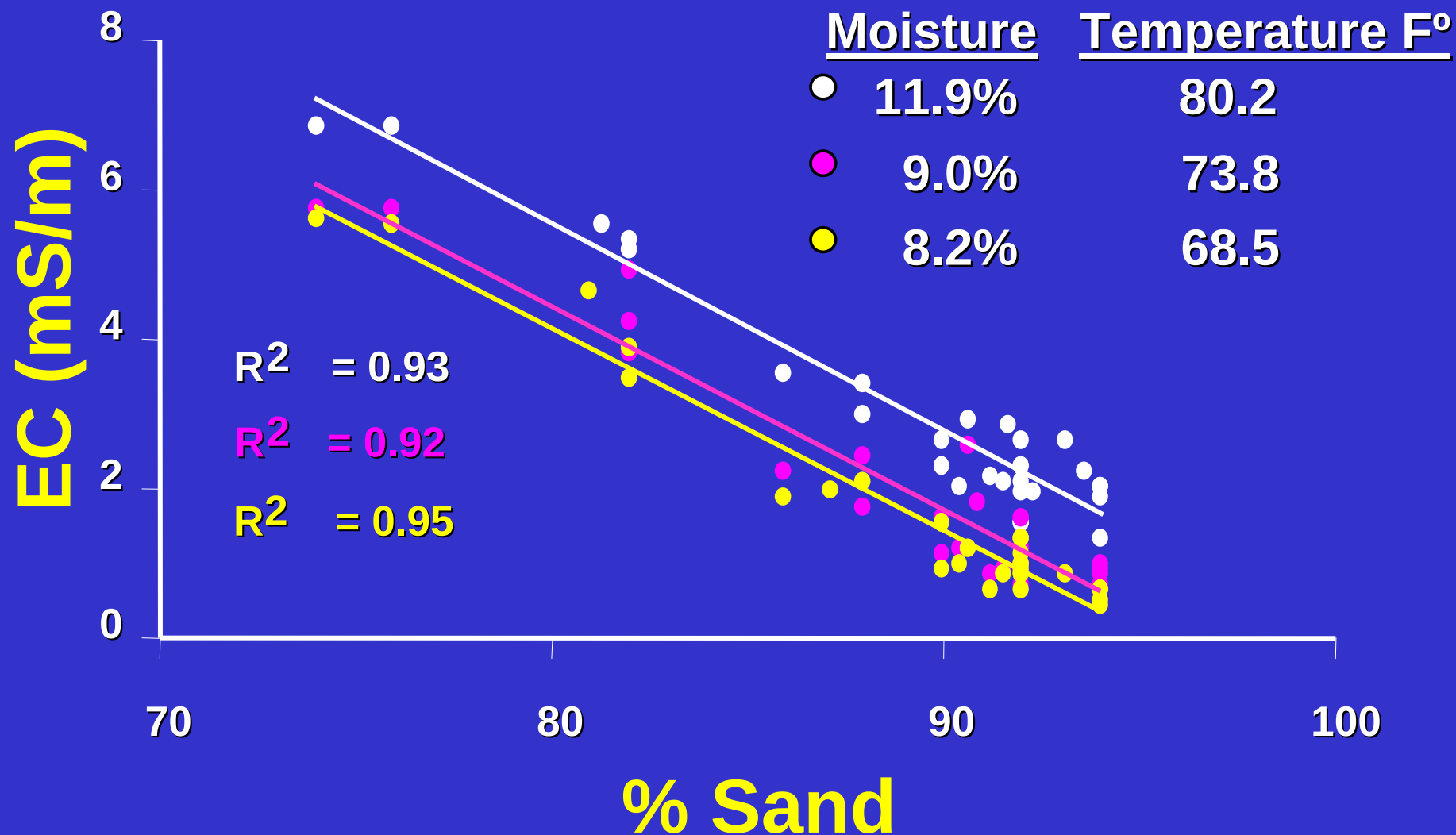
Effects of Soil Texture (% Sand) on Soil Electrical Conductivity



Effects of Soil Texture (% Clay) on Soil Electrical Conductivity (Bamberg Farm)

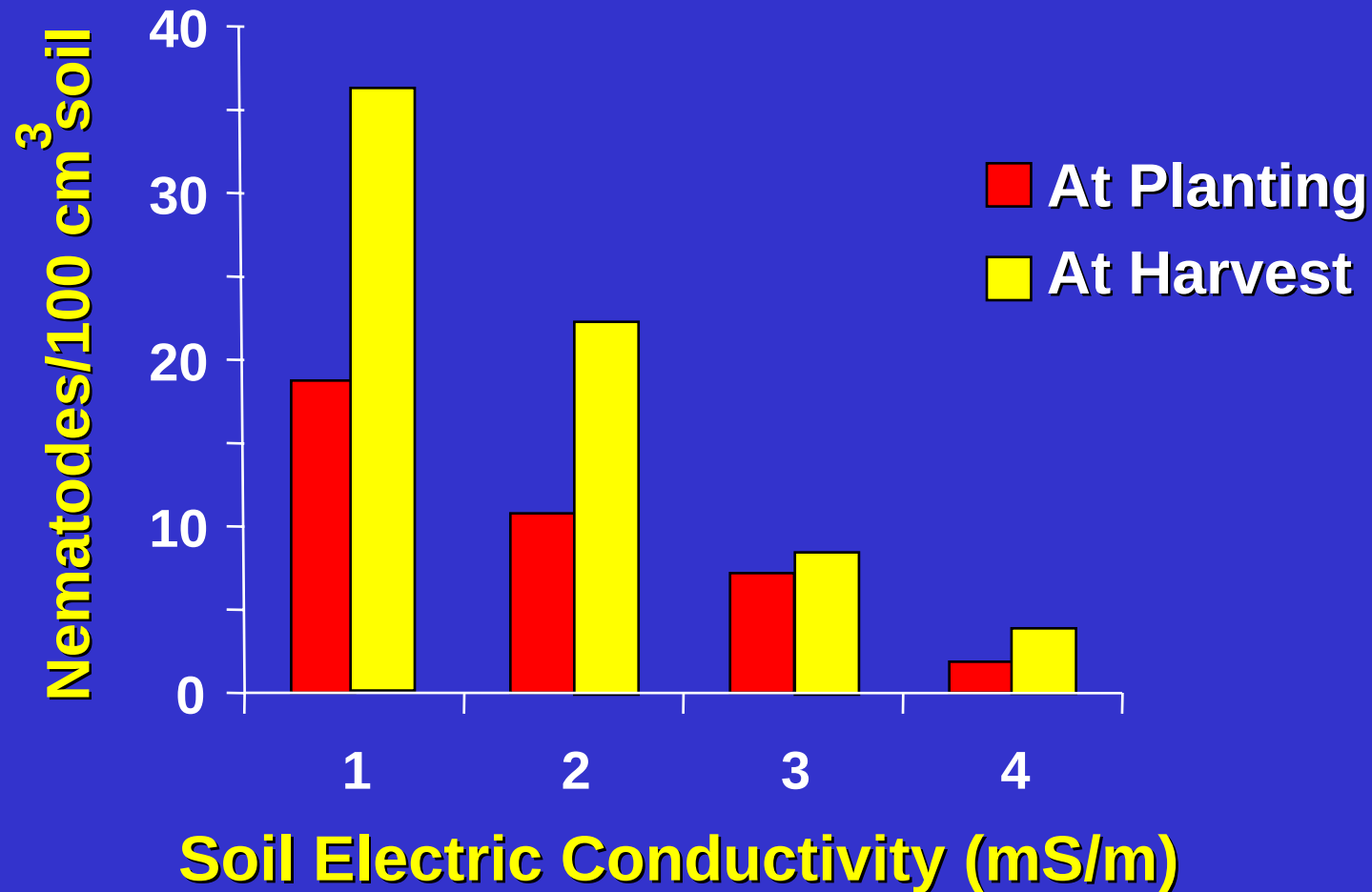


Effects of moisture & temperature on soil EC



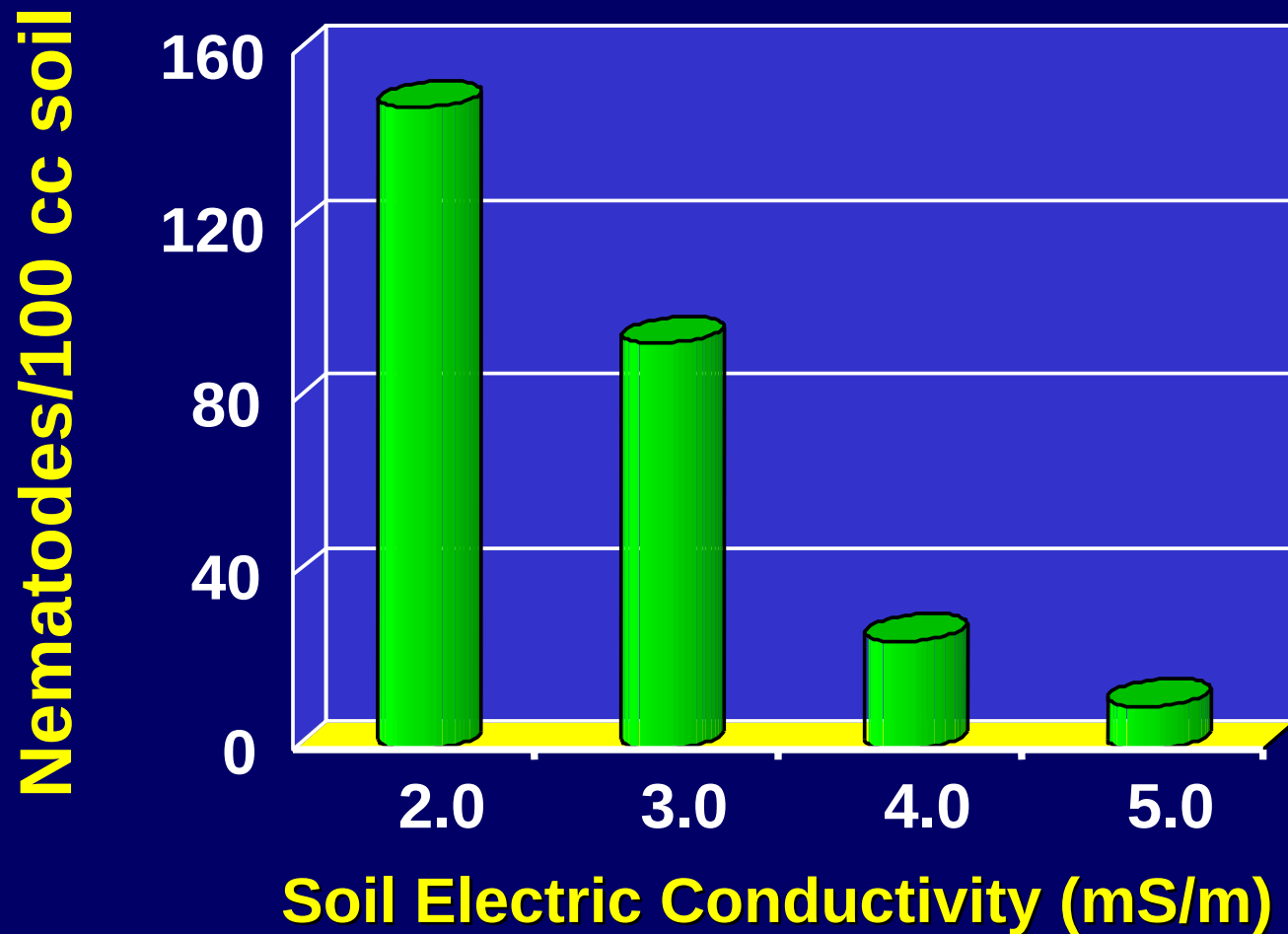
Effects of Soil Texture on Columbia Lance Nematode

Youngblood Farm



Effects of Soil Texture on Columbia Lance Nematode at Harvest

Bamberg Farm



Objective 2

To develop a variable-rate applicator for Telone II & Temik 15G.





Objective 3

To determine the accuracy of the variable-rate application systems.

Targeted Telone II Rate

**Telone II
Rate (gal./A)**

 1.0

 1.5

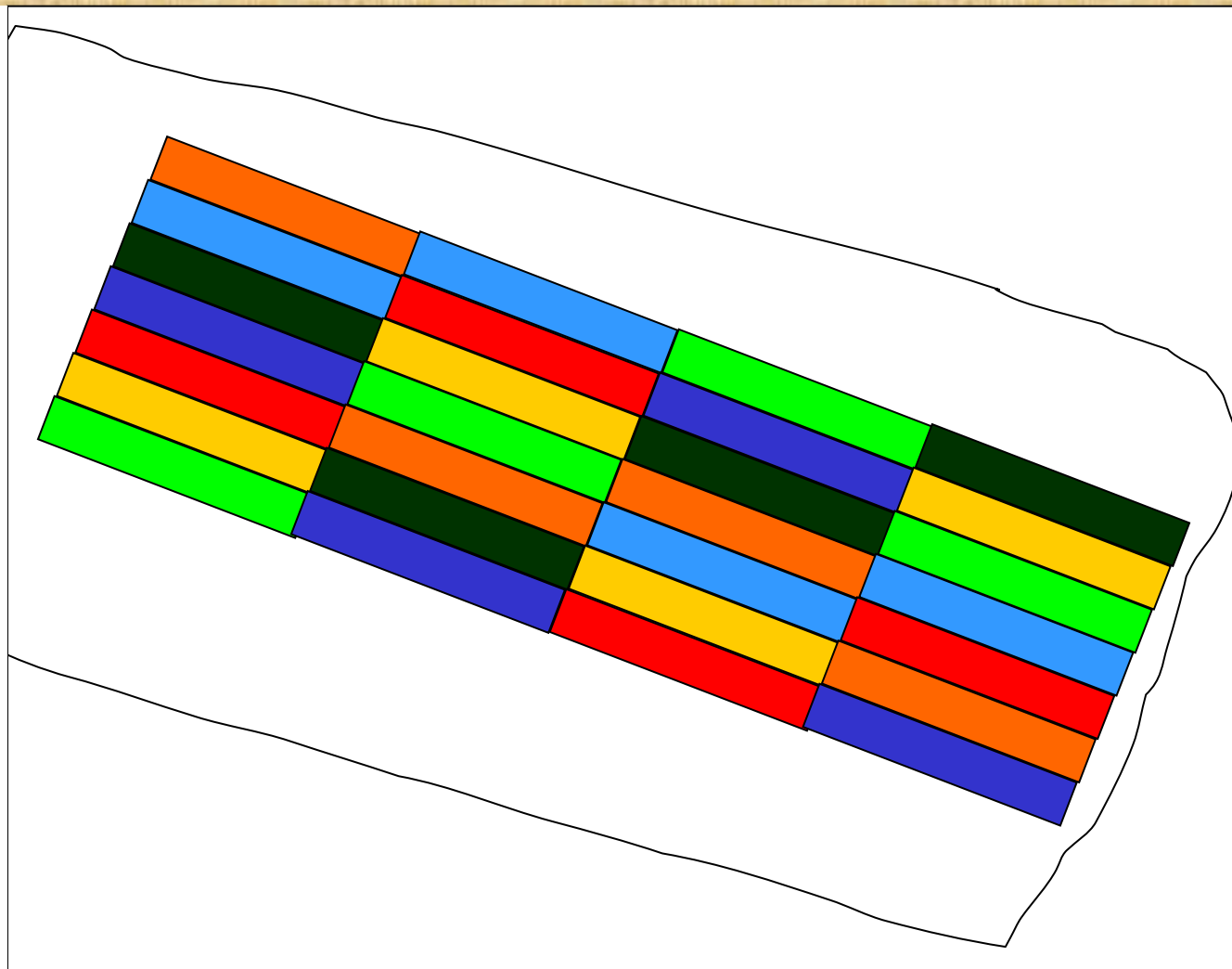
 2.0

 2.5

 3.0

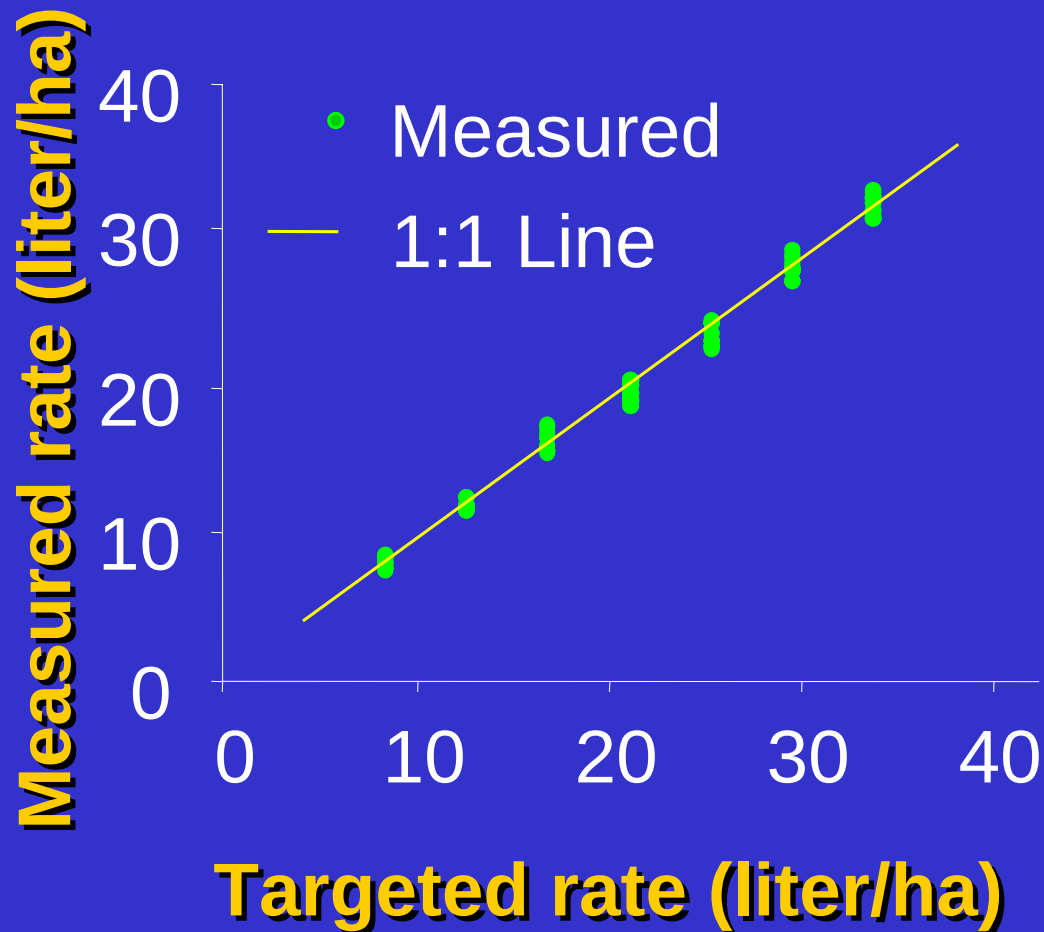
 3.5

 4.0





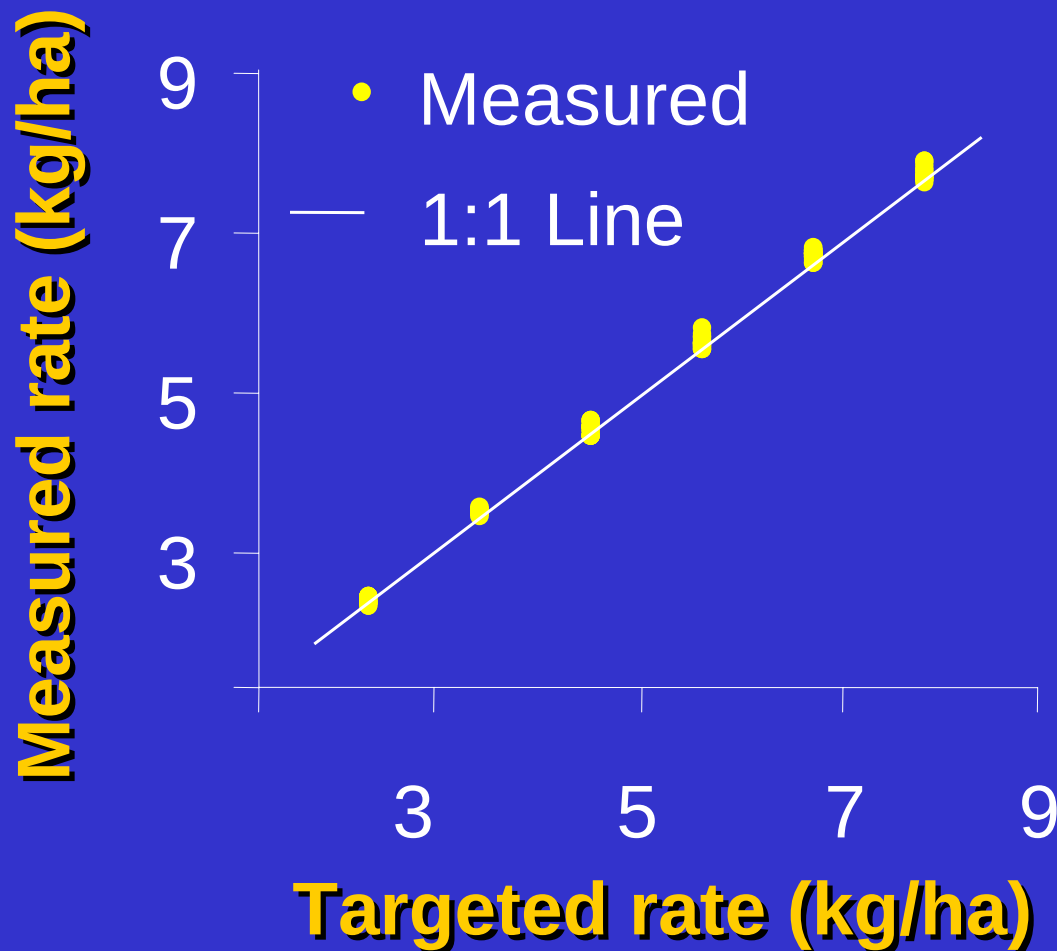
Variable-Rate Telone II Application Equipment Uniformity Test



Average Overall
Error = - 2.1 %

Row	% Error	
	Max.	Ave.
1	- 6.7	- 3.3
2	5.5	0.5
3	- 6.7	- 3.5
4	5.3	- 1.9

Variable-Rate Temik 15G Application Equipment Uniformity Test



**Average Overall
Error = 1.1 %**

Row	% Error	
	Max.	Ave.
1	- 3.0	0.5
2	4.2	1.6
3	- 3.0	0.9
4	4.0	1.5

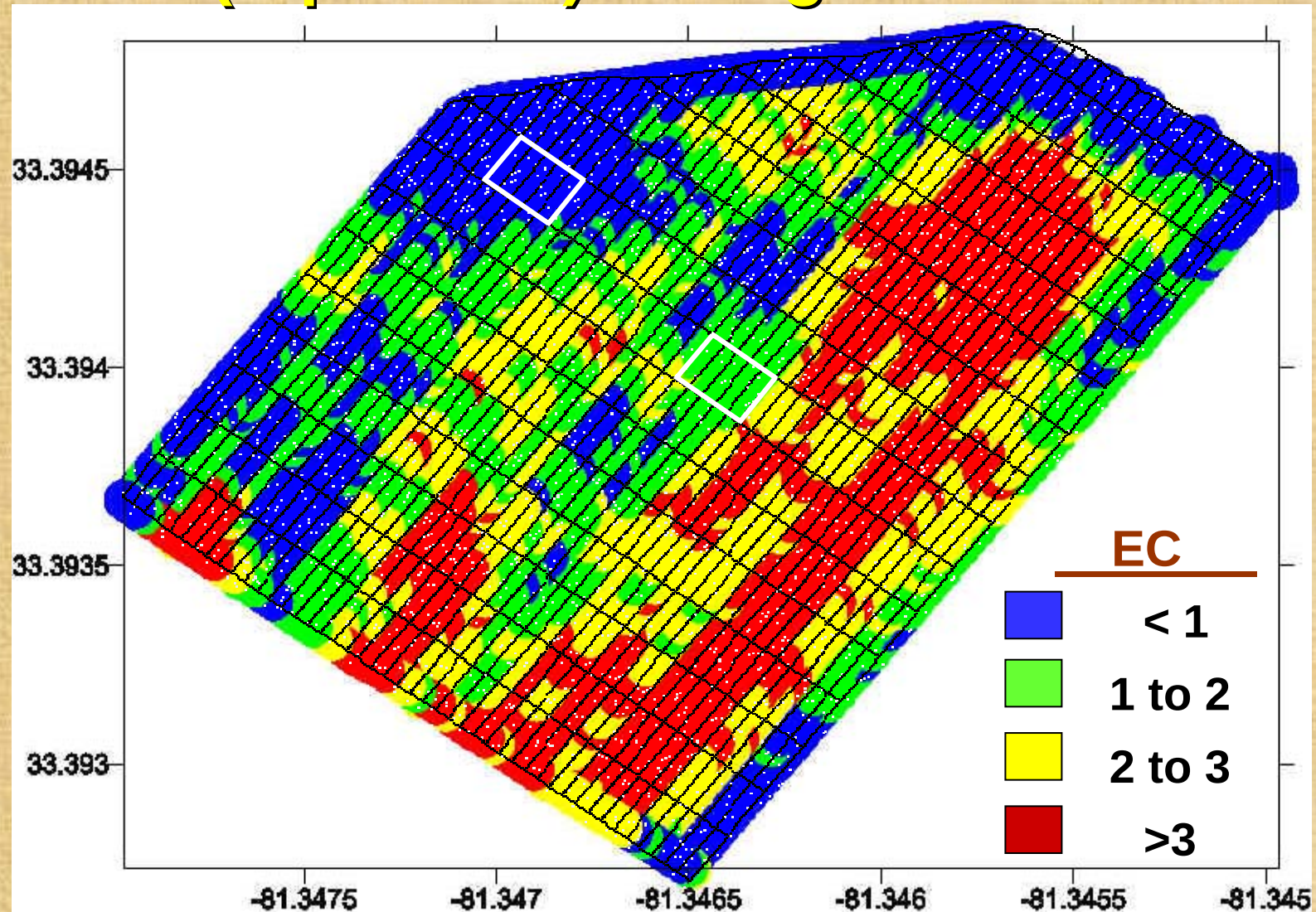
Objective 4

**To compare efficacy of
variable-rate vs. uniform-rate
nematicide application.**

Rates Compared

Treatment	Temik (lbs/A)	Telone (gal./A)
STD Temik	6.0	0.0
VAR Temik	3.0 to 7.0	0.0
STD Telone	3.0	3.0
Var. Telone	3.0	0.0 to 3.0
Control	0.0	0.0

Soil Electrical Conductivity Map (top 30 cm) Youngblood Farm



Variable Rate Nematicide Application Guidelines

Temik 15 G
(lbs/A)

Columbia lance
per 100 ml soil

3.0

Less than 51

5.0

51 to 125

7.0

More than 125

Variable Rate Nematicide Application Guidelines

Telone II
(gal/A)

Columbia lance
per 100 ml soil

0.0

Less than 51

18.7

51 to 125

28.0

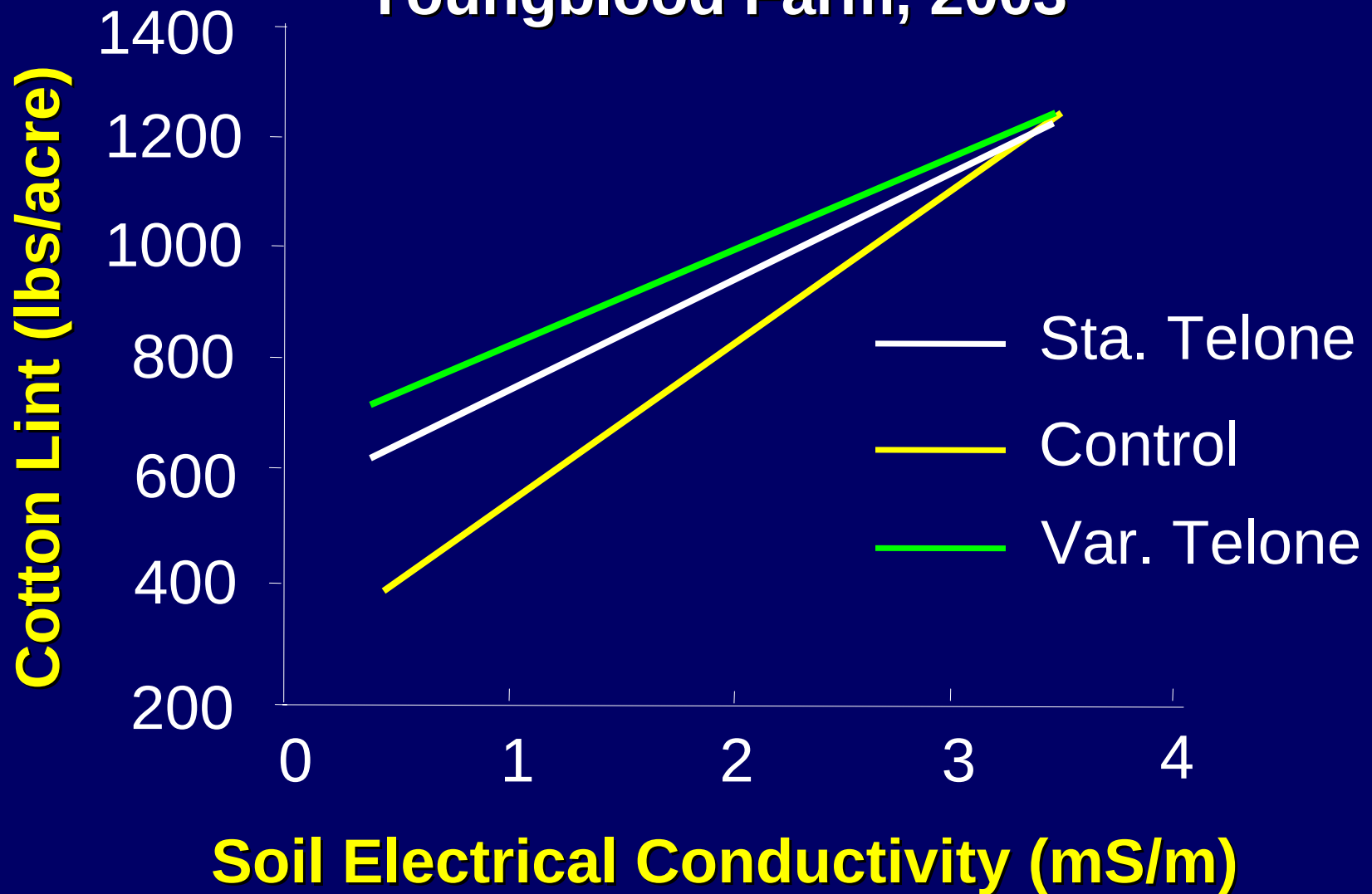
125 to 200

37.4

More than 200

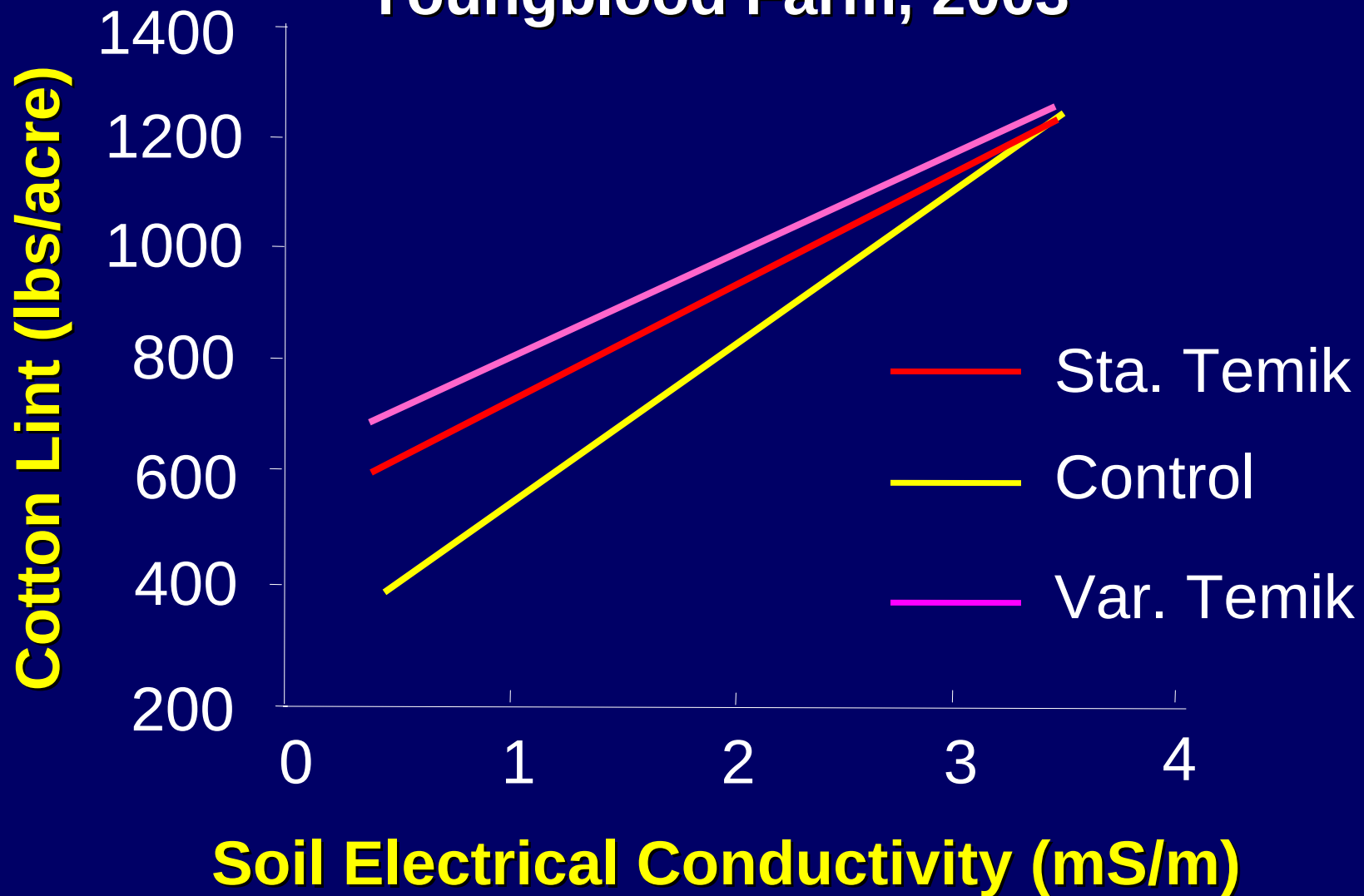
Effects of Soil EC and Telone Application Method on Lint Yield

Youngblood Farm, 2003



Effects of Soil EC and Temik Application Method on Lint Yield

Youngblood Farm, 2003



Effects of variable-rate nematicide application on lint yield and chemical use

Treatment	Temik (lbs/A)	Telone (gal/A)	Lint yield (lbs/A)
Sta. Temik	6.0	0.0	650
Var. Temik	4.0	0.0	687
Sta. Telone	3.0	3.0	663
Var. Telone	3.0	0.6	696
Control	0.0	0.0	566

Conclusions

- Var.-rate Temik system resulted in 5% higher yield and 34% lower nematicide usage compared to single rate.
- Var.-rate Telone increased lint yield by 5% with 78% reduction in nematicide usage compared to single rate.

WHERE TO GO??

- ❖ CLN was easy, direct relation of % sand to nematode density (size matters).
- ❖ Distribution = damage.
- ❖ Immense variation in a field. Easy to i.d. where to put Telone II.
- ❖ Columbia lance is a “strong pathogen”
- ❖ Columbia lance particle size is possibly not an issue.
- ❖ Problems will come in “mixture” fields.

Root-knot & reniform

- ❖ Much weaker pathogens on a unit basis
- ❖ Distribution does not = damage
 - ❖ Rely more on stress
 - ❖ Particle size more important??
 - ❖ Will need data on interaction of
 - ❖ Yield potential * nematode density
 - ❖ How to predict density or stress??

NEW GRANT FOR SC & AR

Demonstration of Site-Specific Nematicide Placement in Cotton for Water Quality Enhancement, Higher Lint Yields, and Increased Farm Profits.

3 year grant to work with growers to promote the use of site specific application technology.







Arkansas

- **Investigators:** Terry Kirkpatrick, Scott Monfort, and Andy Mauromoustakos
- **Interrelationship of soil texture and root-knot nematode on yield.**



Spatial Data Evaluation

Field divided into 4 soil-texture classes:

- 1.) 0-30 % Sand
- 2.) 31-45 % Sand
- 3.) 46-60 % Sand
- 4.) > 60 % Sand

Within Soil classes - plot data averaged based on Telone application:

- 1.) 0
- 2.) 1.5 gal.
- 3.) 3.0 gal.
- 4.) 4.5 gal.

