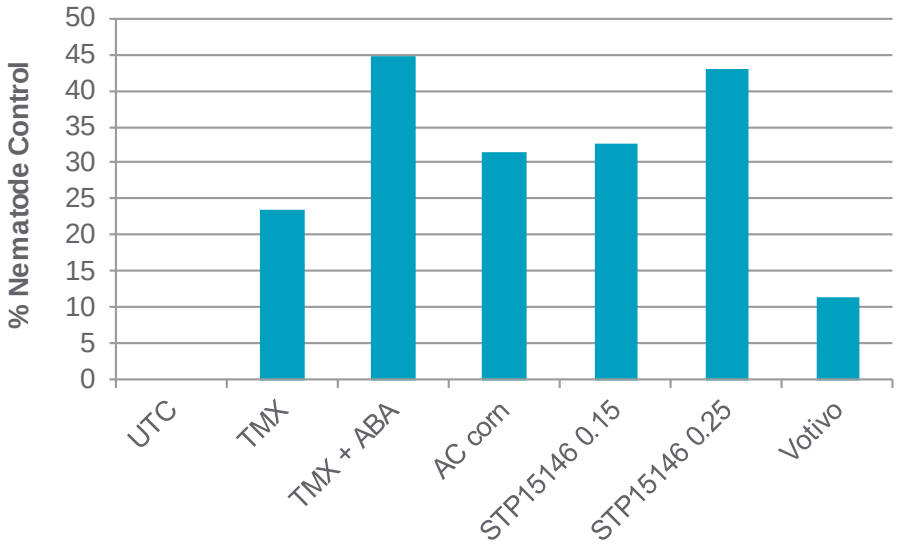
Nematode Trialing: Do it Right, Do it Light

Scott Moore & Amy Holm

RCBD

TMX = 23% nematode control?????

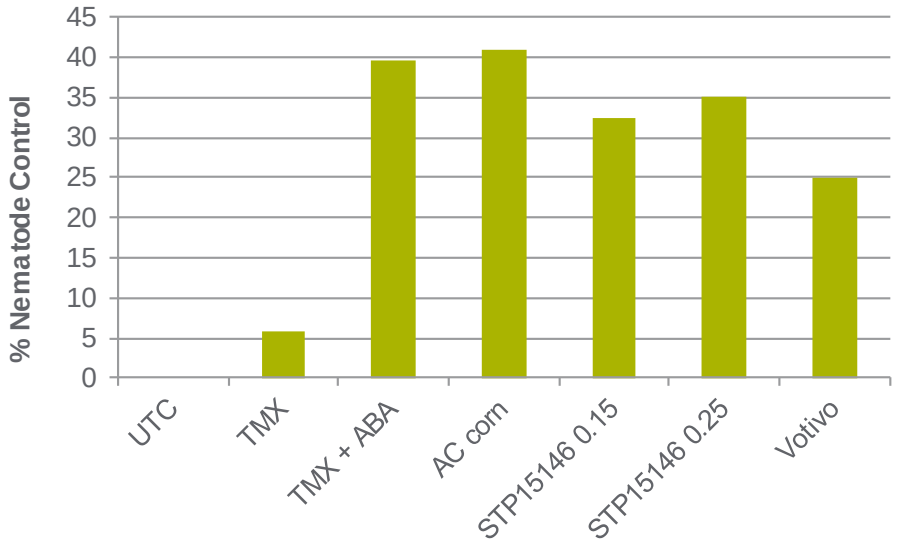
Tank mix vs. Premix of ACC 13% difference????



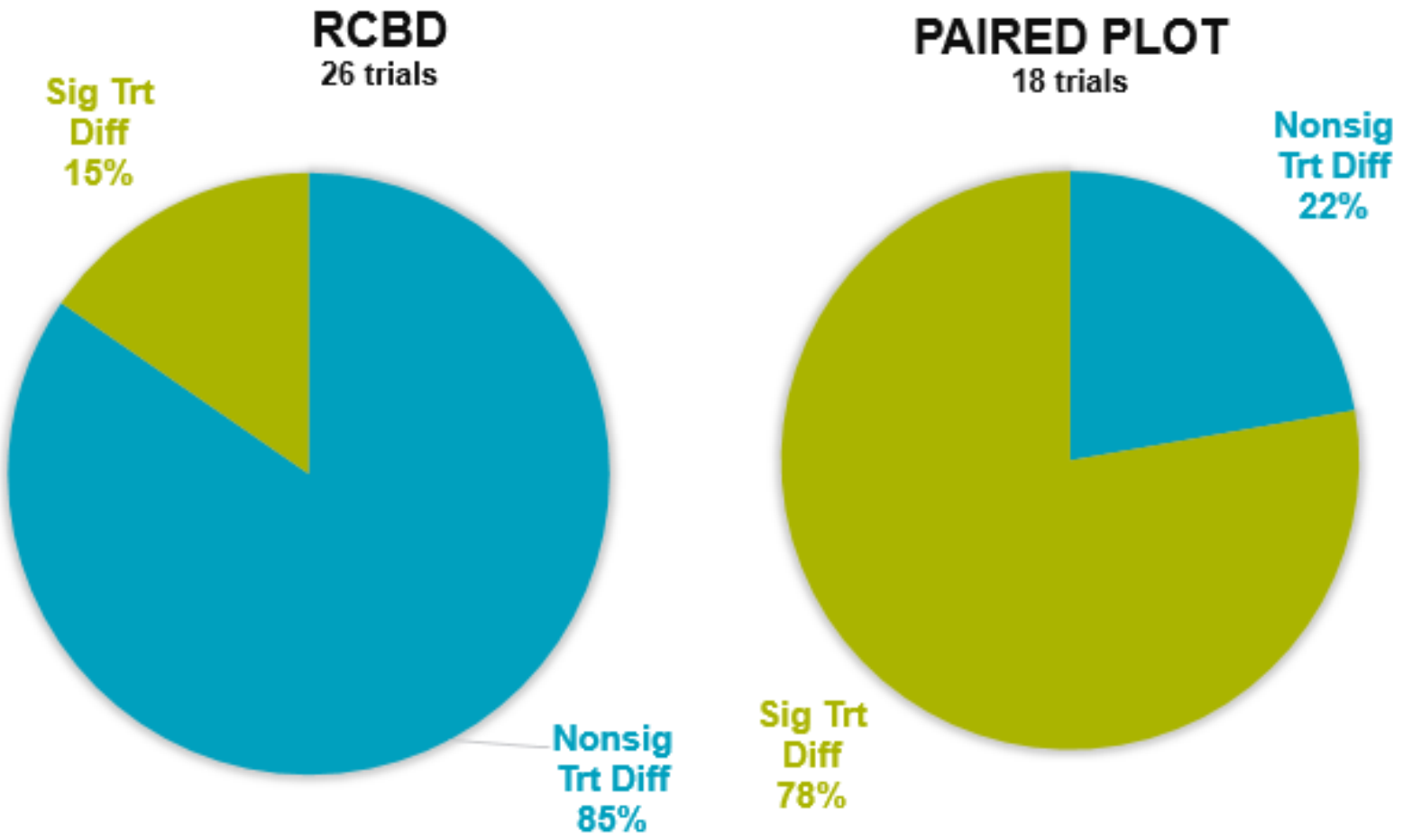
Paired Plot Design

Minimal effect of TMX

Tank mix vs. Premix of ACC 1.3% difference



% of Trials with Significant Treatment p-value for Nematode Ratings



NMG810G1- 2015US, UAB001A2- 2015US, UPA051A2- 2015US, UPA100A2- 2015US, UAB100A2- 2015US, NMG800G1-2016US & NMGC10G2-2017US

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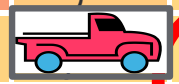
SCN egg count variation – real life example

Inside an area, approximately the size of two pick-up trucks, SCN egg counts can go from 0 to 6,400 eggs/100 cc of soil.

1/3 acre

11,000	5,100	2,900	3,200	350	250	750	2,200
11,000	5,100	2,900	3,200	350	250	750	2,200
4,100	1,900	1,900	5,900	1,000	2,600	0	100
32,600	19,500	23,700	11,600	8,200	6,400	10,900	3,400
37,000	7,600	9,400		6,400	6,200	10,700	1,700
16,500	17,600	6,000		0	3,700	3,700	6,100
19,700	7,600	2,300	50	450	700	250	1,600
12,600	10,600	100	50	0	0	0	50
9,000	4,800	850	0	250	0	0	500

Trial Set-Up: "Aggregation of SCN egg population densities in a small area of naturally infested field research plots near Ames, Iowa. Each small rectangle represents a plot measuring 10 feet by 20 feet. The number in each rectangle is the number of SCN eggs per 100 cc soil as determined from a 10-core soil sample from each plot." [1]

[1] Greg Tylka, Iowa State University

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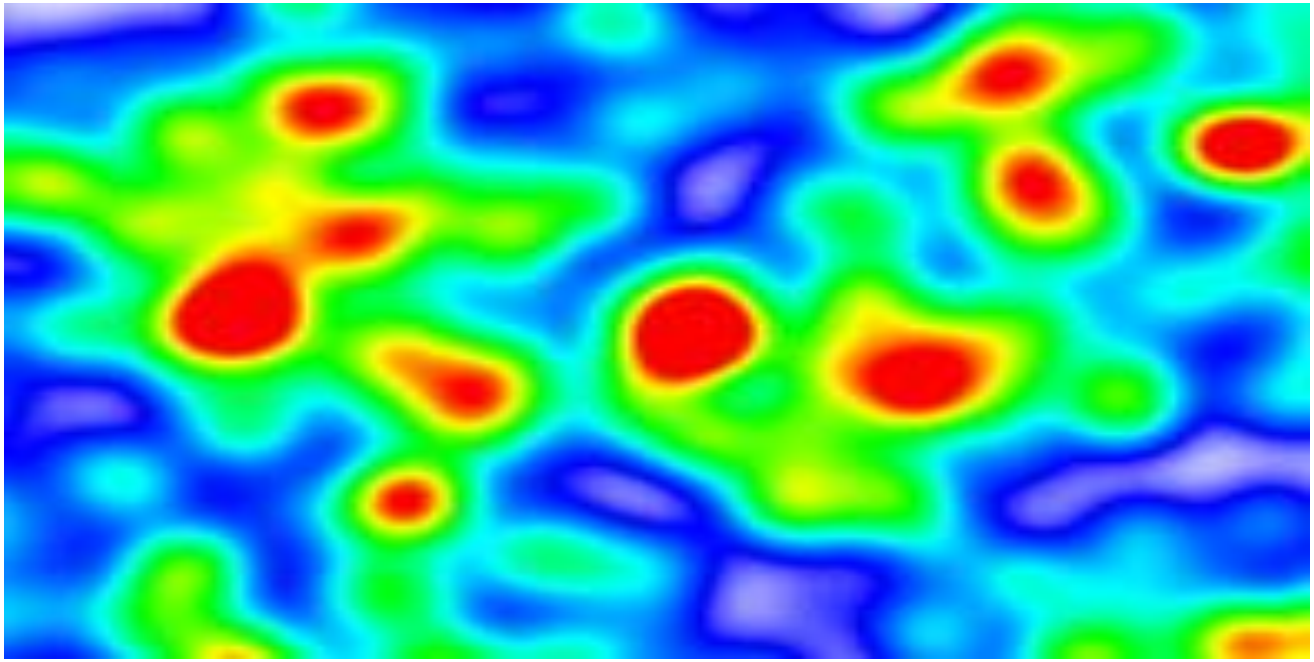
Trial Area Nematode Distribution



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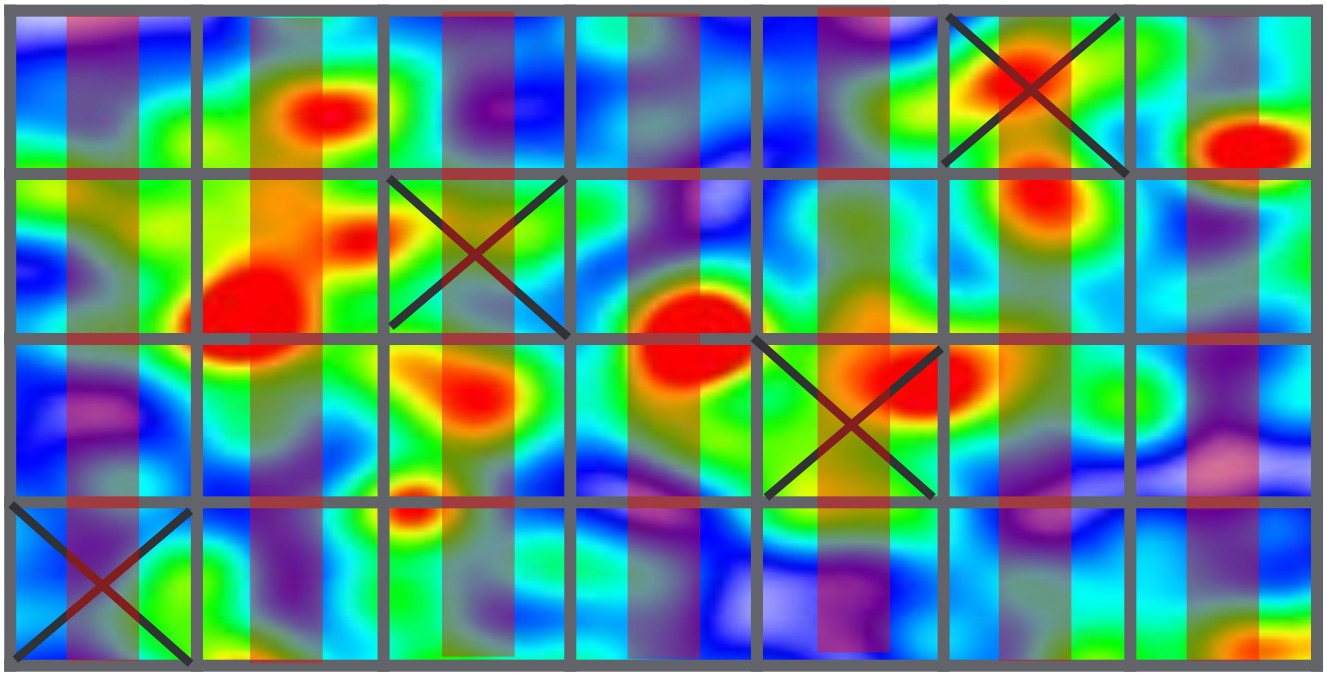
Trial Area Nematode Distribution

RCBD: 7 treatments, 4 row plots, sample center 2



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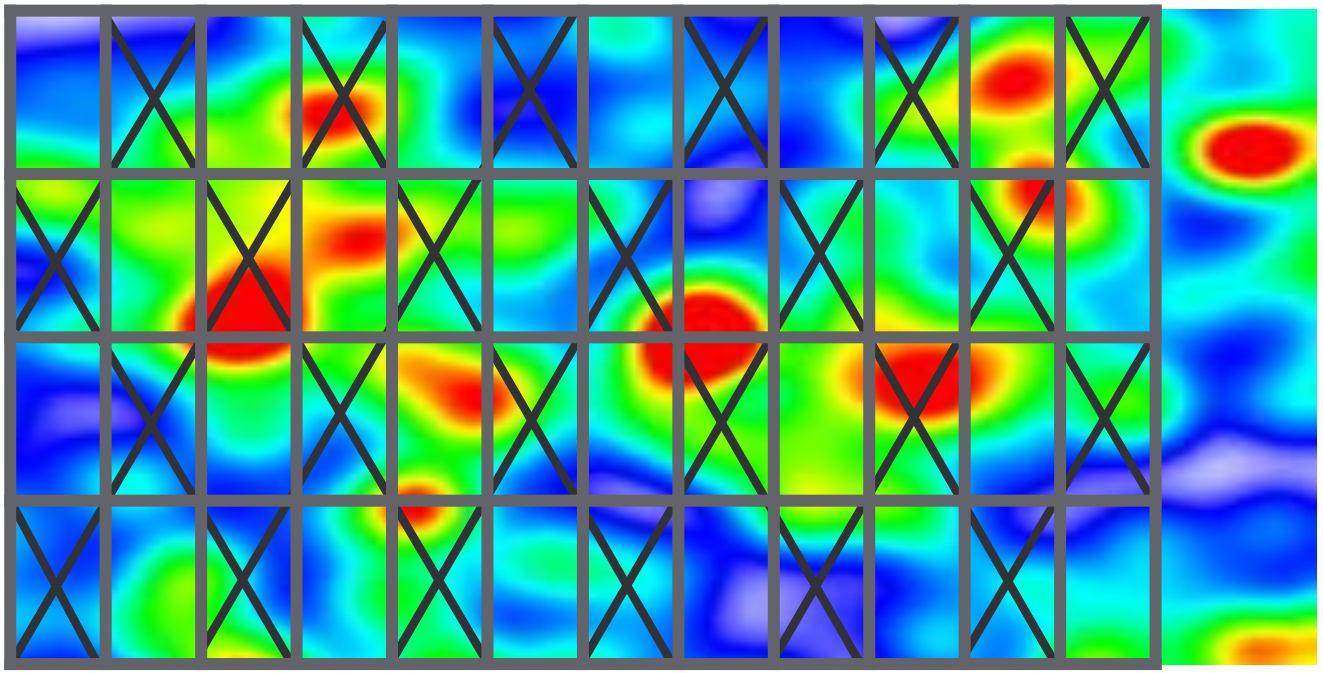
Trial Area Nematode Distribution

Paired Plot - Checkerboard: 7 treatments, 2 row plots



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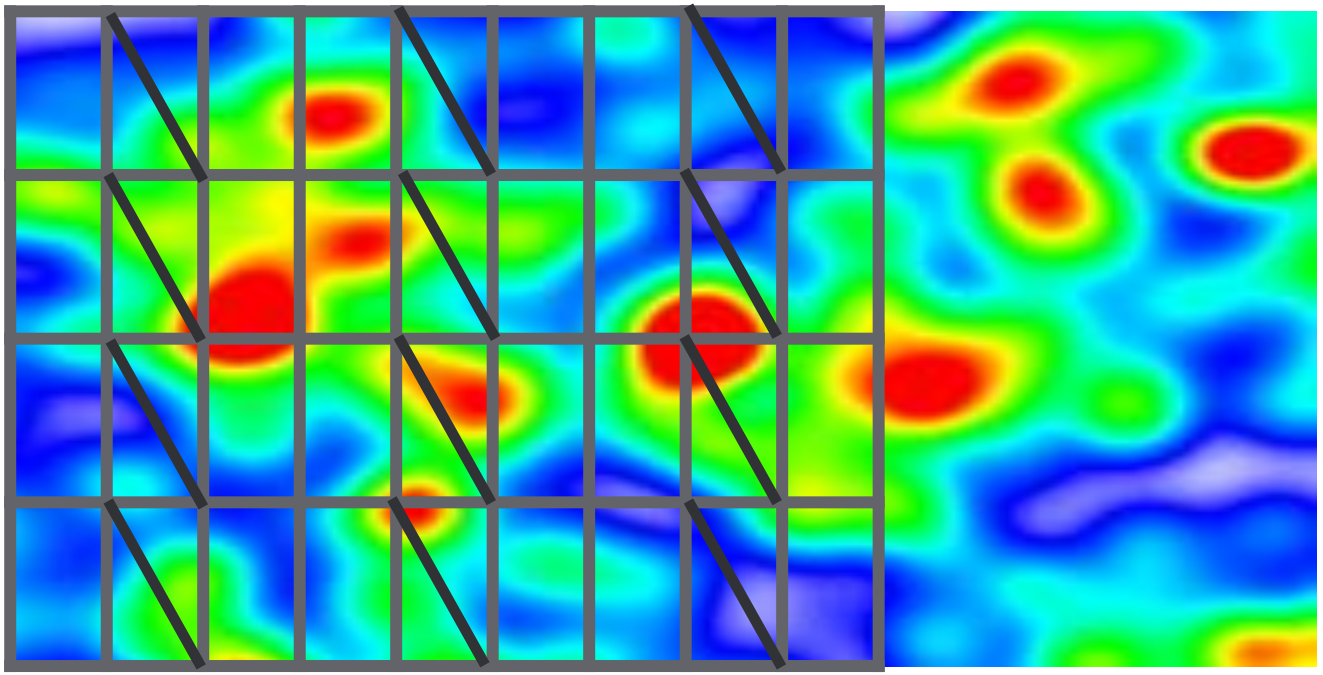
Trial Area Nematode Distribution

Paired Plot - Modified: 7 treatments, 2 row plots



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Potential Benefits and Applicability

- **Potential Benefits**
  - Reduced experimental error
  - Increased Power
  - Independence of plots (buffer) in case of checkerboard
  - Ability to identify gradients across the trial area (checkerboard)

- **Areas of applicability**
  - Nematode trialing: Row crops
    - Trial area is continuous
  - Any other pest that cannot be predicted or has an uneven distribution
  - Trial areas that have major shifts in soil composition

Potential Drawbacks and Non-applicability

- **Potential Drawbacks**
  - If the trial area is fixed then multiple check plots are included at the expense of more replication of treatments
  - Increasing experiment area can lead to increase in heterogeneity within trial
    - Depends on crop

- **Paired Plot Design Will NOT Improve:**
  - Very low/no nematode pressure
  - Poor sampling conditions
  - Improper sampling techniques
  - Small scale variability
  - Sampling bias

Cost Analysis:

3 trials with significant treatment difference

7 treatments, 4 replicates					
External trial					
RCBD				**PP checkerboard**	
$1000/treatment				$1000/treatment	
$7000/trial				$12,000/trial	
21 trials				**4** trials	
$147,000				**$48,000**	
Internal trial					
RCBD				**PP checkerboard**	
$10/sample				$10/sample	
$280 trial				$480/trial	
21 trials				**4** trials	
$5,880				**$1,920**	