

Control Options for Pests in Arizona Cotton Systems

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Discussion Topics

- **Nematodes**
 - **Control options**
 - Velum Total
 - Telone II and EC
 - Precision control
 - Experimental compounds
 - **Cotton Root Rot – *Phymatotrichopsis omnivora***
 - Topguard terra research summary - 2019
 - Application techniques and rates of application
 - Precision control
 - General summary




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Nematode Management

- **Primary pest**
 - Parasitic roundworm
 - Root-Knot Nematode (*Meloidogyne incognita*)
 - Widely distributed in Arizona
 - Typically associated with lighter textured soils
 - Management options
 - Telone
 - Resistant varieties



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RKN Plant Symptomology

- Skippy stands
- Uneven growth
- Stunted and stressed appearance
- Chlorosis (nutrient deficiency)



Photo Courtesy Dr. Tom Allen - MSU



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Cotton Infected with *Meloidogyne incognita*



M.A. McClure



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RKN Root Symptomology



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Nematode Control Options

- **Soil fumigation – Telone II and EC**
 - Very effective – gold standard
 - Expensive and difficult to work with
- **Seed treatments – Avicta, Aeris, NemaStrike**
 - Have been effective in low pressure situations
- **In-Furrow treatments – Velum Total**
 - Effective in controlling nematode populations
 - Variable yield response
- **Varietal resistance/tolerance**



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Velum Total – 2017 Fluopyram Evaluations

- 5 Structured locations
 - 3 in Safford Valley
 - 2 Furrow, 1 SDI
 - Stanfield (SDI)
 - Ak-Chin (Furrow)
- Design
 - Randomized complete block designs
 - Minimum 4 replications
 - Planter width plots (6-8 rows)
 - Full-length runs (700-1800 feet)
 - Treated (14 fl oz/acre)
 - Untreated Control (UTC)
 - Early bloom nematode assays (4 out of 5)
 - Final lint yield and fiber quality



CO₂ Pressurized Application System



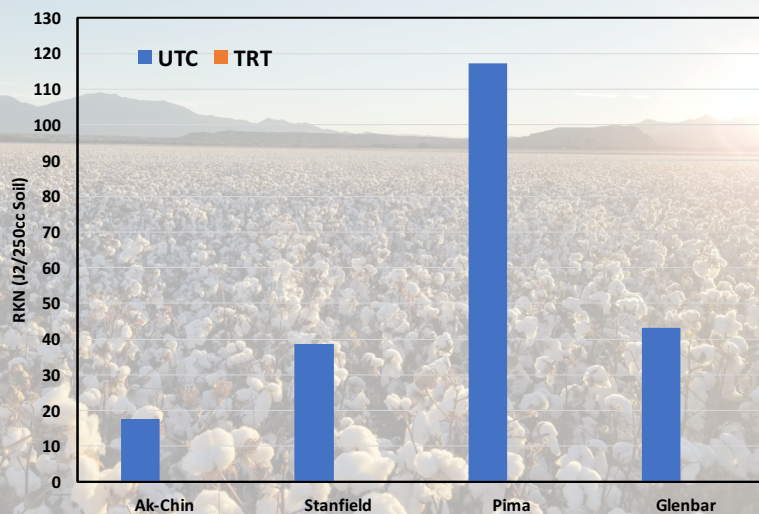
In-Furrow Application



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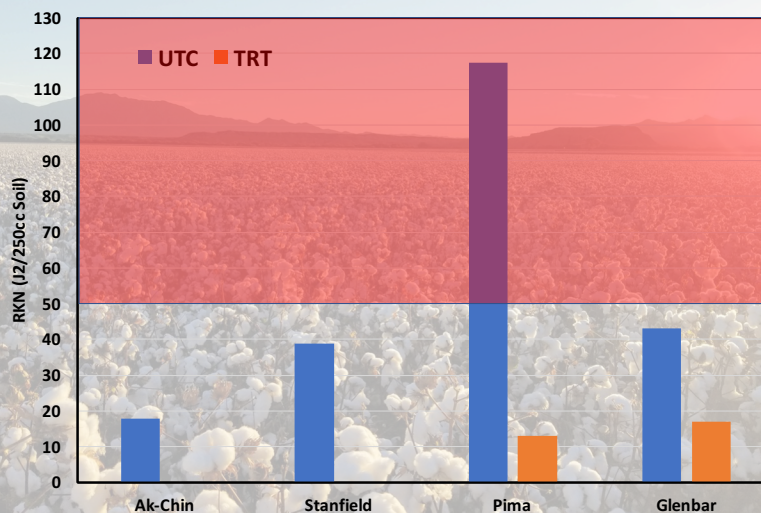
Nematode Assay Results



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Nematode Assay Results



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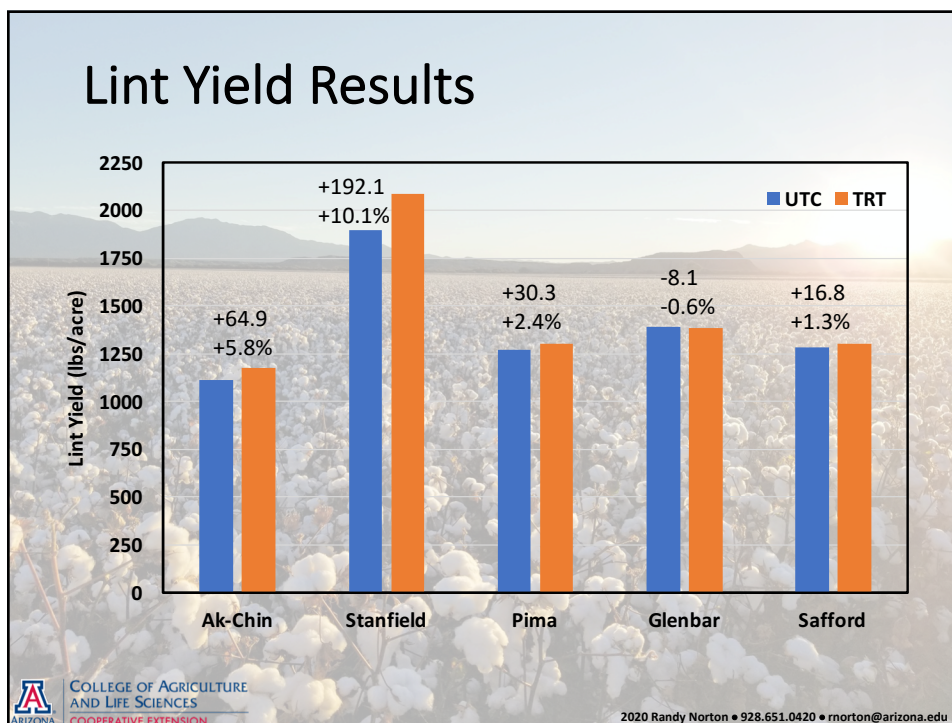
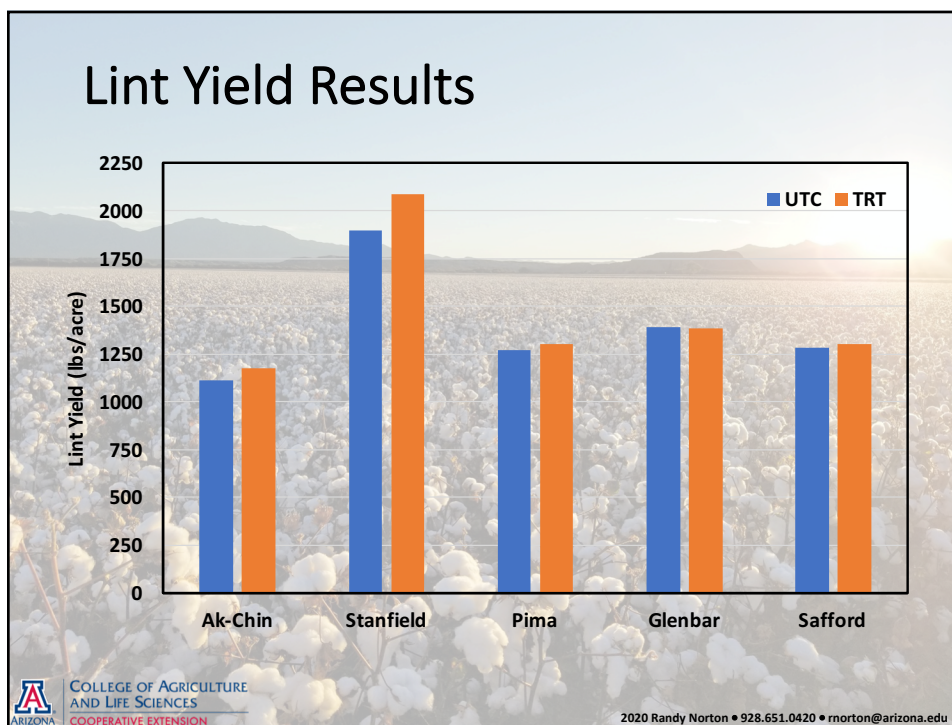
Harvest Results

Location	Yield	Percent Lint	Fiber Length	Fiber Strength	Micronaire	Uniformity
Ak-Chin	NS	---	---	---	---	---
Stanfield	NS	NS	NS	NS	NS	NS
Safford	NS	NS	NS	NS	NS	NS
Glenbar	NS	NS	0.0486	NS	NS	NS
Pima	NS	---	---	---	---	---



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Conclusions

- **Significant effect on RKN populations at all locations**
- **No visual differences in stand or growth and development**
- **No statistically significant lint yield or fiber quality differences**
 - **Positive trends observed in 4 of 5 locations**



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Nematode Control Evaluation - 2019

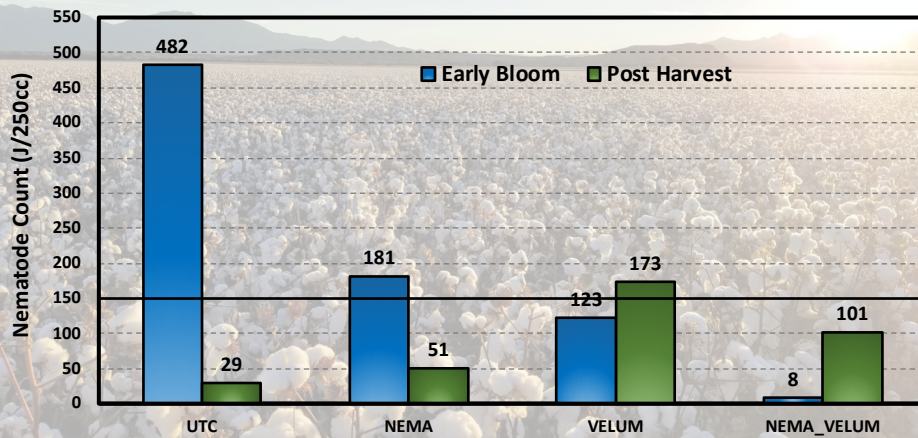
- **Nematode control options evaluation in Buckeye, AZ**
 - **Done in conjunction with 2019 Bayer NPE location**
 - **Flying R Farms – Buckeye, AZ**
 - **Four treatments (DP1646B2XF)**
 - UTC
 - Nemastrike Seed Treatment
 - Velum Total – 14 fl oz/acre (at-planting IFT)
 - Nemastrike + Velum Total
 - **Nematode pressure evaluated**
 - Post treatment (early bloom)
 - Post Harvest
 - **Yield and fiber quality estimates for response analysis**



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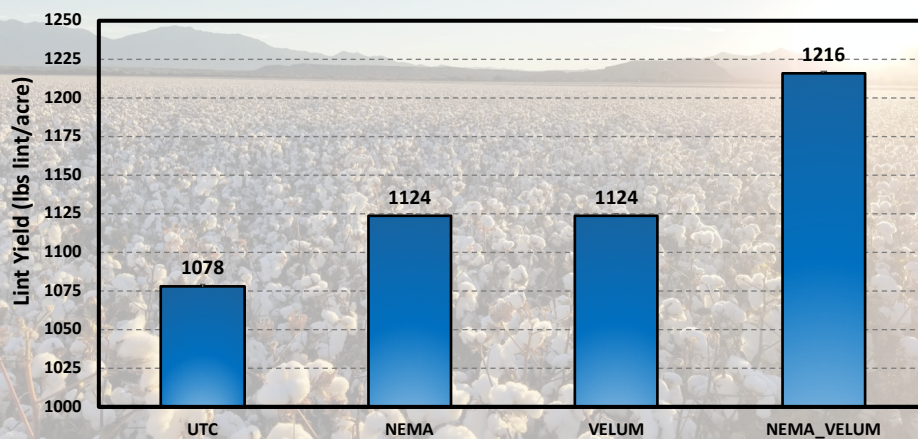
Nematode Pressure Estimates



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Yield Response



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2019 Nematode Evaluation

Treatment	Lint Yield (lbs/acre)	Lint (%)	Color Grade	Staple (32nds)	Micro	Strength (g/tex)	Length (in.)	Leaf Grade	Uniformity Index (%)	Premium (cents/lb)	Value (\$/acre)
NEMA_VEL	1216.6	34.6	41	37	5.0	30.8	1.15	3	81.5	2.0	657.9
VELUM	1124.3	34.1	41	38	4.7	30.6	1.18	4	81.8	2.2	609.6
NEMA	1124.2	33.9	41	37	4.9	29.5	1.15	3	81.2	0.4	586.8
UTC	1078.6	34.1	41	37	4.9	31.6	1.16	4	82.3	1.2	572.5
Mean	1135.9	34.2	---	37	4.9	30.6	1.2	3.3	81.7	1.5	606.7



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Precision Placement

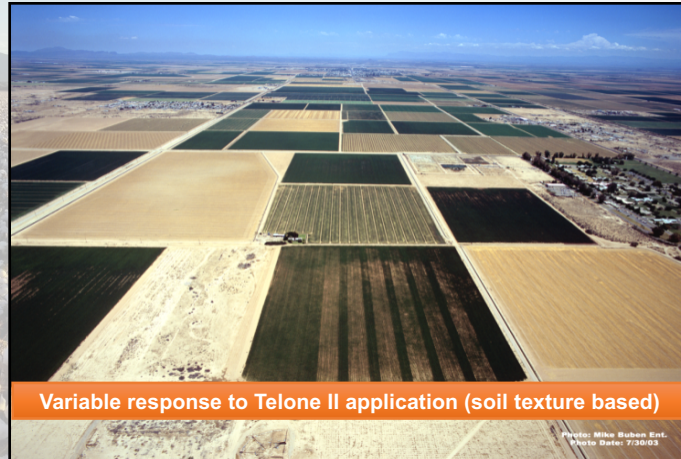
- **Correlations exist between coil properties and nematode populations**
 - Coarser textured soils ↑ Nematode density ↑
 - Exploit that relationship
 - Apply nematicide (control options) in areas of highest population densities
- **How to quantify (measure/document) variability**
 - Aerial/satellite imagery – multi-spectral
 - Crop stress
 - Soil texture – direct measurement
 - Veris or EM38
 - USDA Soil Survey data (Web Soil Survey)



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Holland Farm Test Plot - 2003

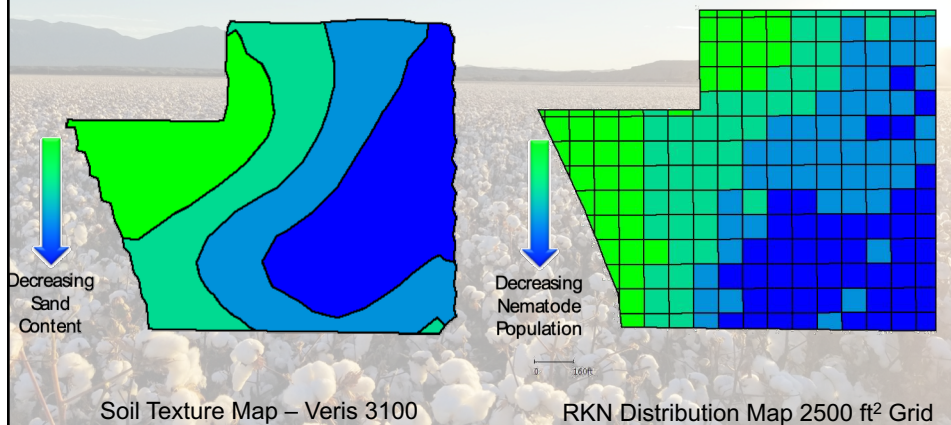


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2006 Nematode Distribution Patterns, Safford, AZ



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Sensor Based Control – Trial Layout

- **Field selection based upon baseline nematode levels and grower's experience**
- **Conduct Veris 3100 (soil EC) survey**
 - **Develop soil management zones (4 zones)**
 - Zone 1 to Zone 4 decreasing sand content
 - **Develop prescription based upon management zones**
 - Zones 1 and 2 treated
 - Zones 3 and 4 untreated



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Trial Layout

- **Verification strips**
 - Full length strips – treated and untreated
 - Placed across field to cross all four management zones
 - Evaluate crop response within each management zone
- **Yield data obtained from yield monitor**
 - Evaluated full-length strips
 - Yield response within each zone (treated vs. untreated)
- **Apply economic data (ROI)**



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Summary of Locations

Year	Location	Soil Survey	Application	Planted	Harvested
2006	Safford	None	4/20/06	4/30/06	10/23/06
2007	Safford	02/27/07	03/15/07	04/16/07	11/08/07
2007	Coolidge	02/22/07	03/14/07	03/30/07	11/20/07
2009	Bonita ¹	03/02/09	04/06/09	05/05/09	09/18/09
2009	Safford	03/05/09	04/20/09	04/18/09	11/20/09
2010	Safford	01/18/10	03/19/10	04/21/10	10/28/10
2010	Buckeye	02/09/10	03/18/10	04/01/10	12/02/10
2011	Sunizona ²	12/07/09	04/05/11	04/28/11	12/27/11
2013	Glenbar	11/08/12	02/13/13	04/22/13	10/22/13
2014	Thatcher	2/28/14	3/24/14	4/19/14	11/12/14
2014	Bonita ¹	2/11/14	3/27/14	5/2/14	9/30/14

¹Com

²Yield significantly impacted by early freeze (10/10/11) – data not included.



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Veris 3100 Equipment



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Injecting Telone II Pre-Plant



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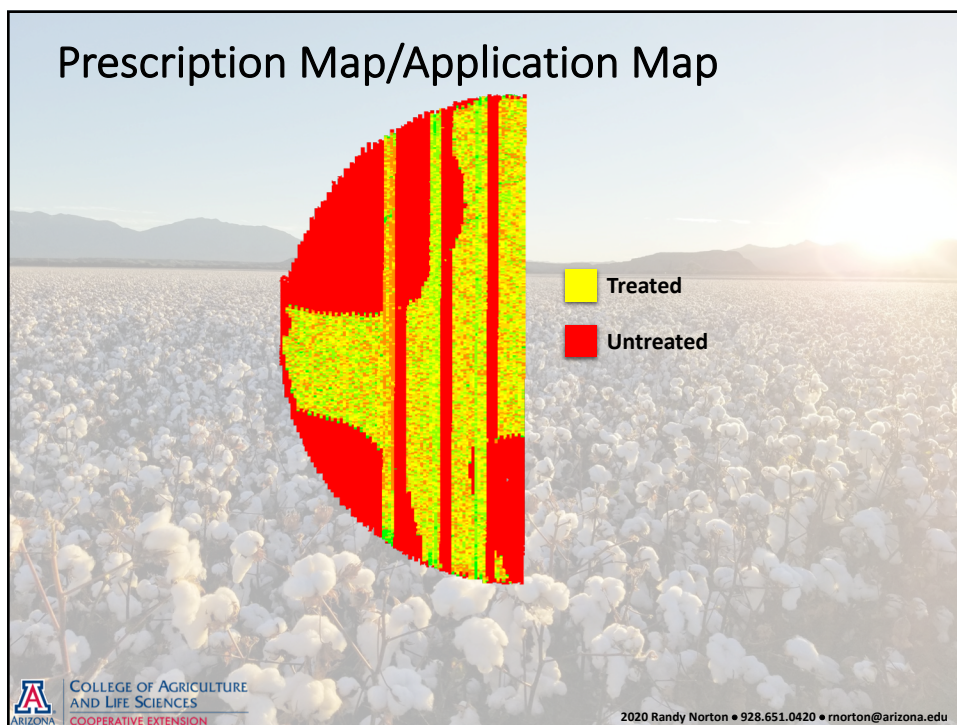
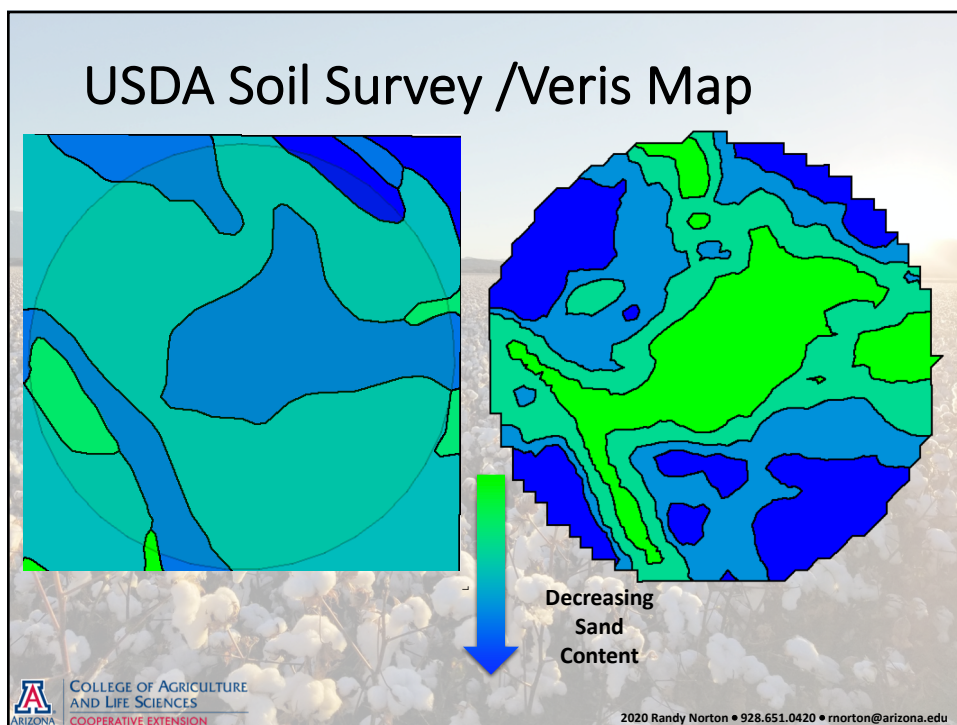
Bonita Location 2009

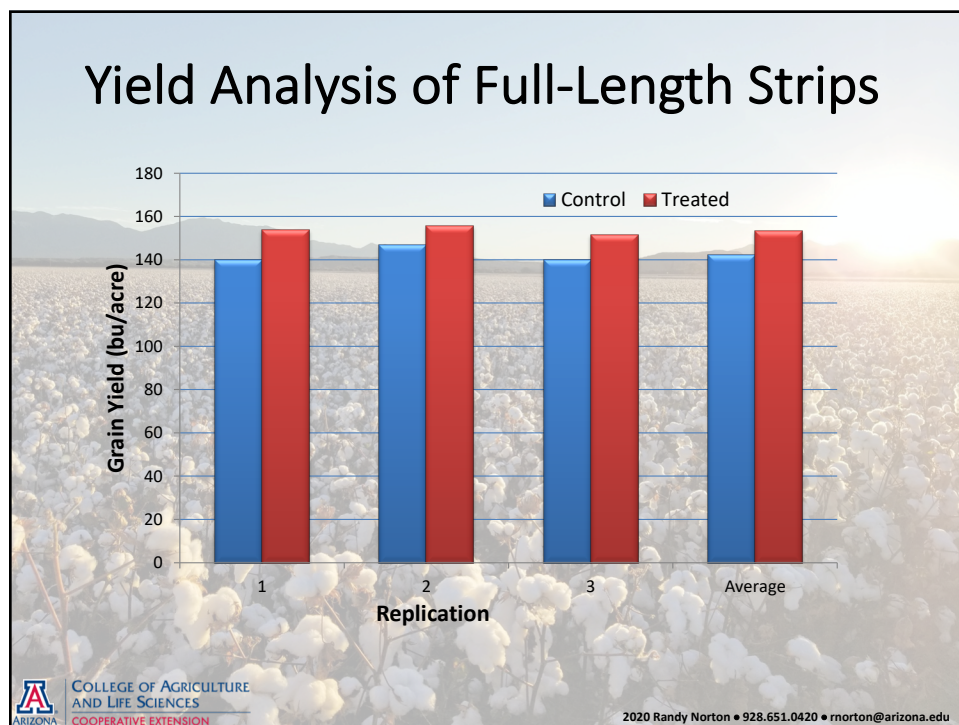
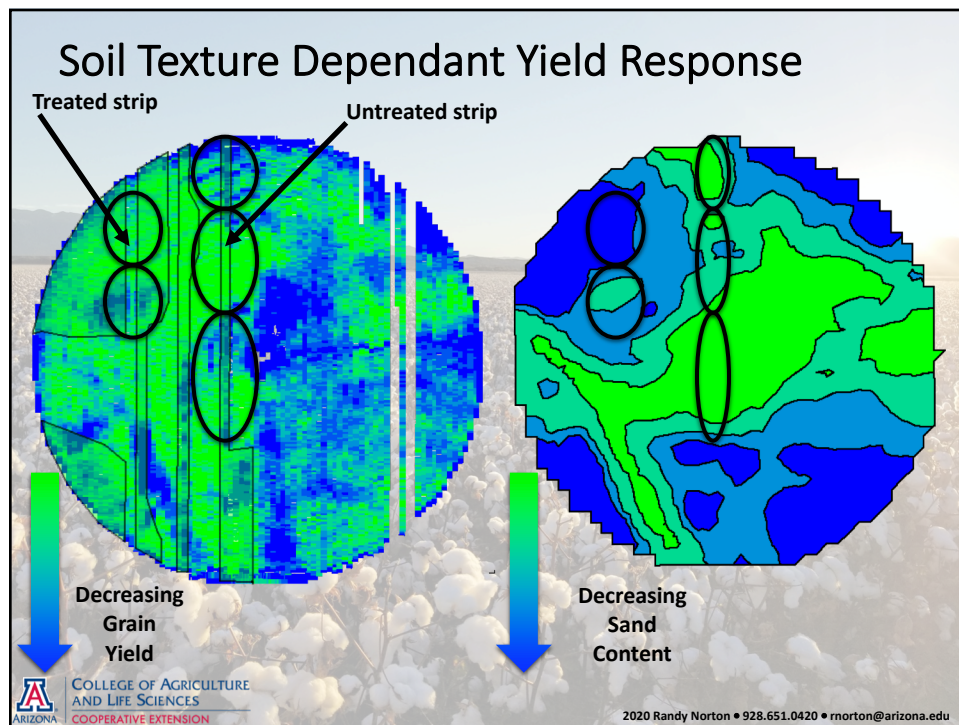
- **Grain corn**
 - 0 and 5 gpa rates employed
 - High degree of soil texture variability
 - Range of sand percentages: 3 – 75%
 - History of high nematode pressure
- **Population estimates (250cc⁻¹ soil):**
 - Zone 1 – 440
 - Zone 2 – 240
 - Zone 3 – 250
 - Zone 4 – 18

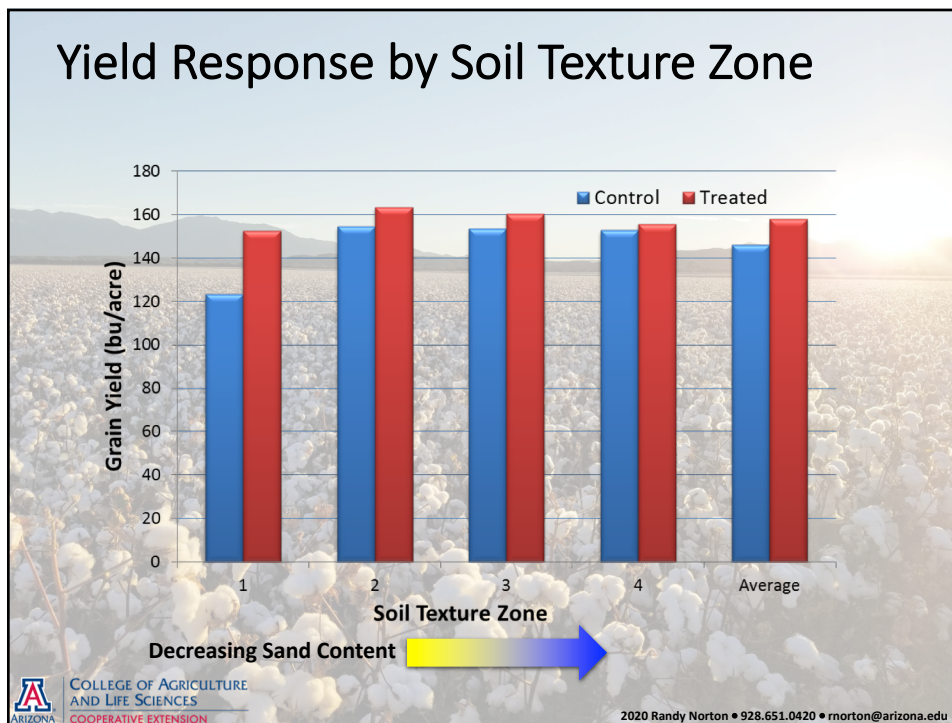


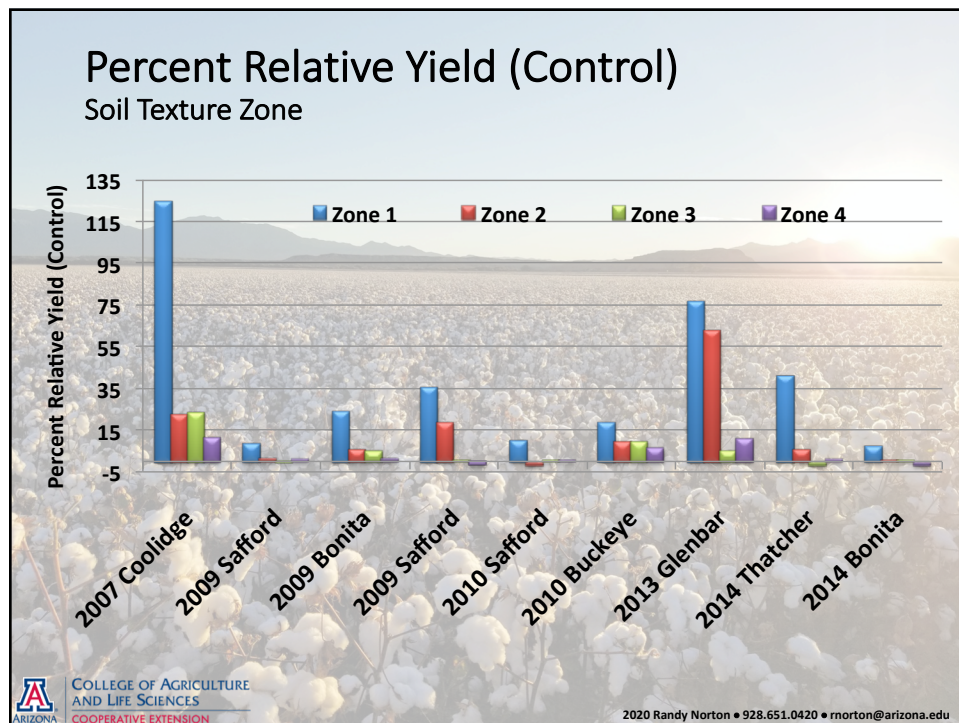
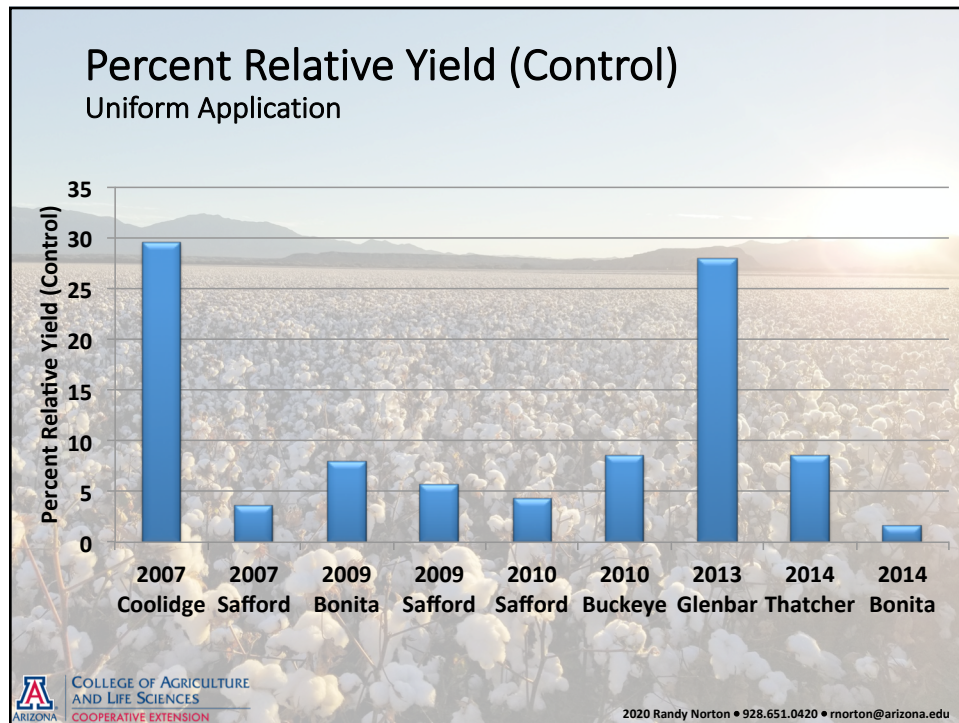
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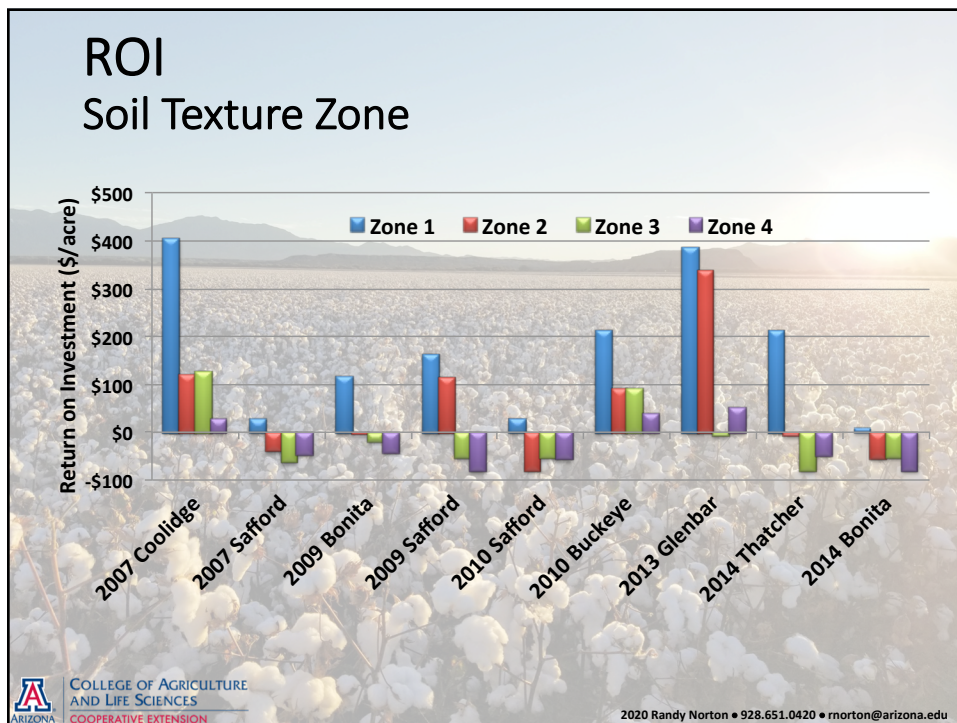
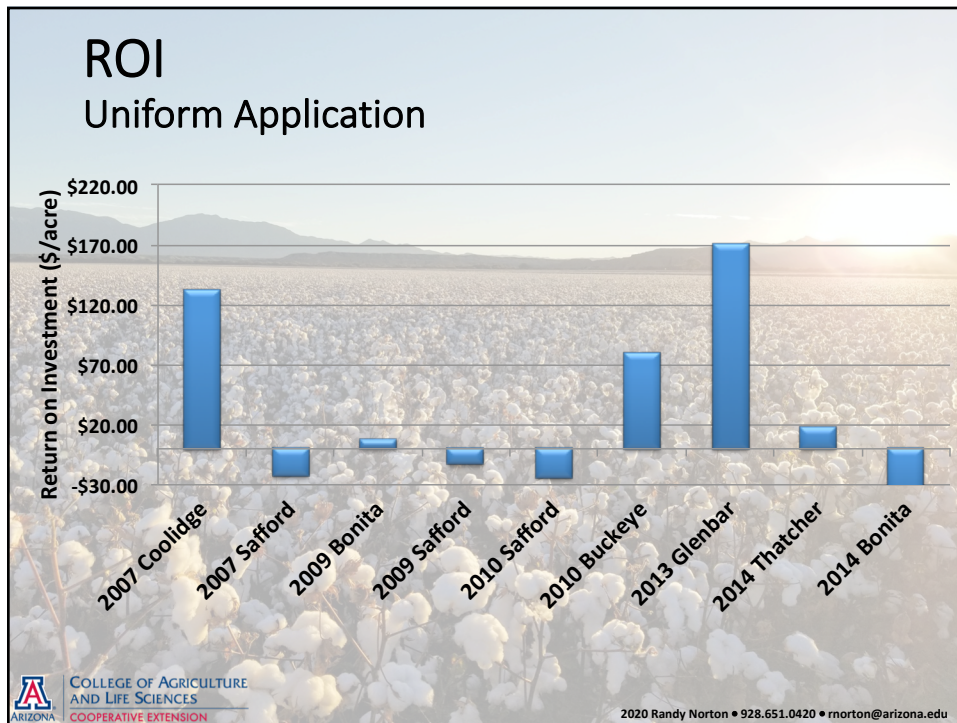
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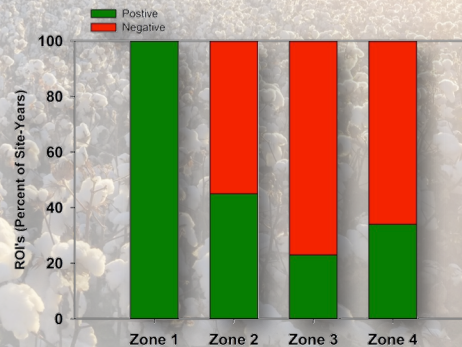






The Story...

- Consistent yield increase with the application of Telone II under heavy nematode populations
- Consistently predict higher response areas with Veris soil surveys
 - Zone 1 in all locations
 - Zone 2 in most locations
- Differential ROI's
 - Zone 1 in all locations (+)
 - Zone 2 45% (+); 55% (-)
 - Zone 3 23% (+); 77% (-)
 - Zone 4 34% (+); 66% (-)



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Summary

- Experimental compounds –
 - Syngenta – 2020
 - Corteva – hopefully 2021
- NCC Beltwide Nematode Protocol – Dr. Alex Hu (Extension Plant Pathologist)
 - Seed treatment and in-furrow treatments
- Good products for control under various level of pressure
 - Test for levels
 - Exploit variability
 - Select control technique that fits your system



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 - Assistants in Extension and other Agents (Blase Evancho and Naomi Pier)
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- **Growers/Cooperators**



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