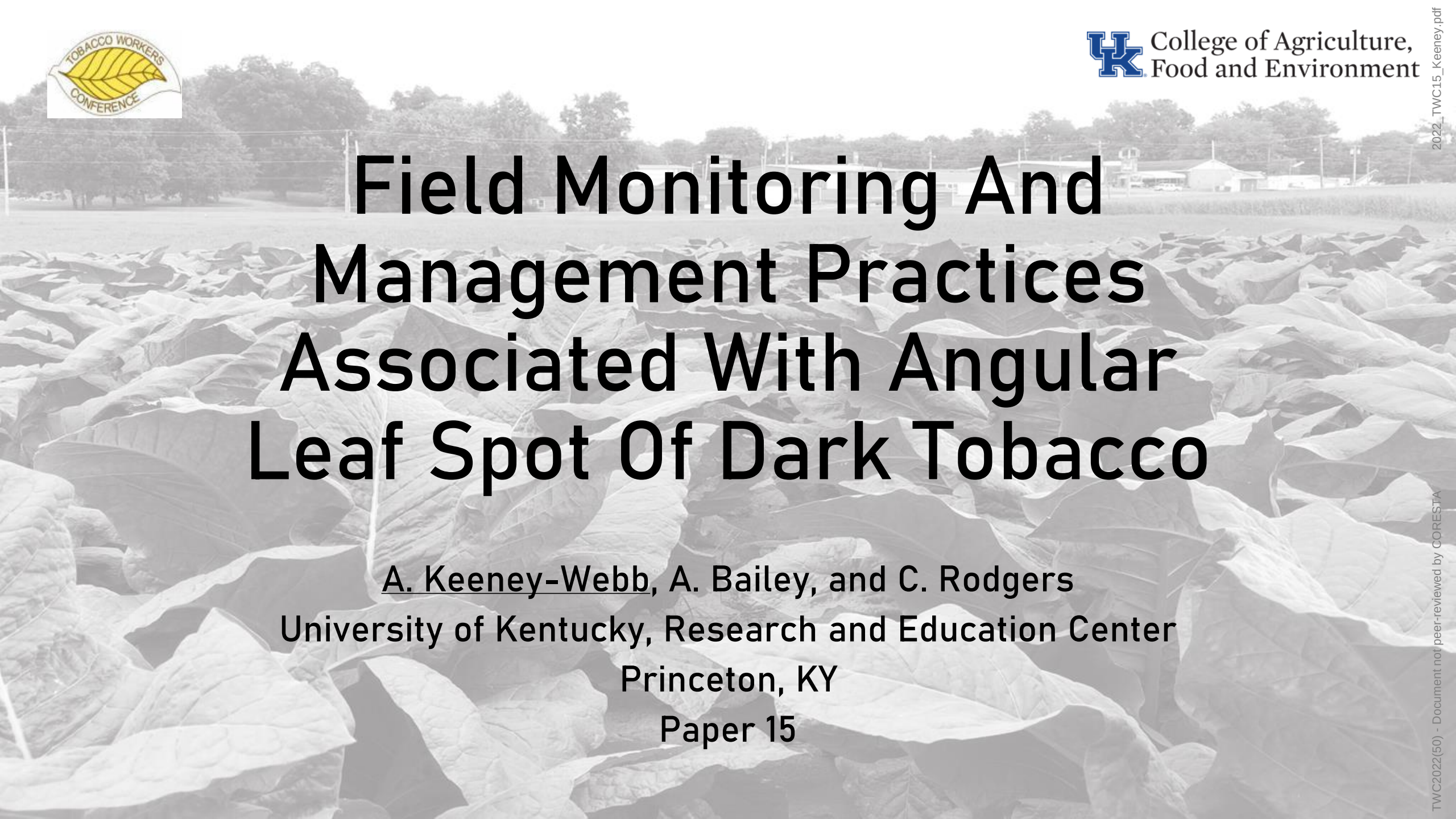


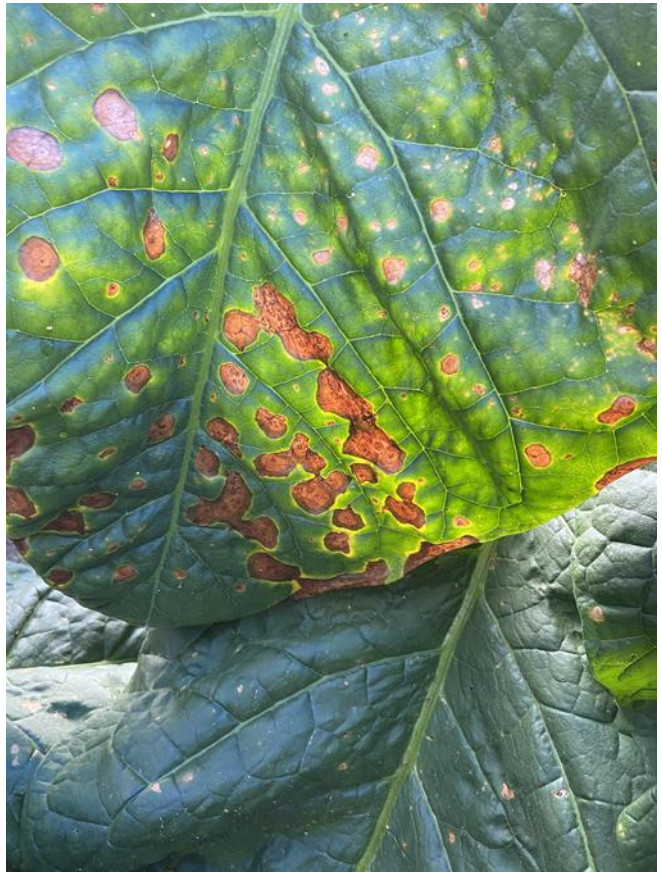
Field Monitoring And Management Practices Associated With Angular Leaf Spot Of Dark Tobacco

A. Keeney-Webb, A. Bailey, and C. Rodgers
University of Kentucky, Research and Education Center
Princeton, KY

Paper 15

Angular Leaf Spot Background

- *Pseudomonas syringae* pv. *tabaci* is the casual agent of ALS, a bacterial disease
- Most significant foliar disease in dark tobacco since 2015 in Kentucky and Tennessee
- Streptomycin has been the standard control
- Documented resistance to Streptomycin
- PDDL 2015-2021 Data: 28 out of 113 samples with resistance to Streptomycin



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Angular Leaf Spot Research

- Field spray trials have been ongoing since 2015, at the University of Kentucky Research and Education Center in Princeton, Kentucky and Murray State University in Murray, Kentucky
- >25 chemicals have been tested for control of angular leaf spot
- Monitoring resistance to Streptomycin
- Dark tobacco variety trial, to test sensitivity of varieties to angular leaf spot
- Conventional vs. no-till system trial

Observational Study Survey

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Integrated Plant and Soil Science

Grower Name: _____

County where field is located: _____

Acers in field: _____

History of Angular Leaf Spot in this field: _____ Yes _____ No

If yes, year documented: _____

Field location (for researcher use): _____

Pre plant chemical control: _____

Pre plant chemical application date: _____

Pre plant fertility: _____

Pre plant fertility application date: _____

Nitrogen applied all up front: _____ Yes _____ No

Previous crop rotation: _____

If previously in tobacco, how many years: _____

If field previously in tobacco (within last three years) has there been documentation of other diseases present: ____ Yes _____ No

If yes, what specific disease was identified: _____

Previous tillage: _____

Variety of Tobacco: _____

Transplants grown on farm: _____ Yes _____ No

If no, where did you receive transplants from _____

Transplant date: _____

Transplant water tank mix: _____

see blue.

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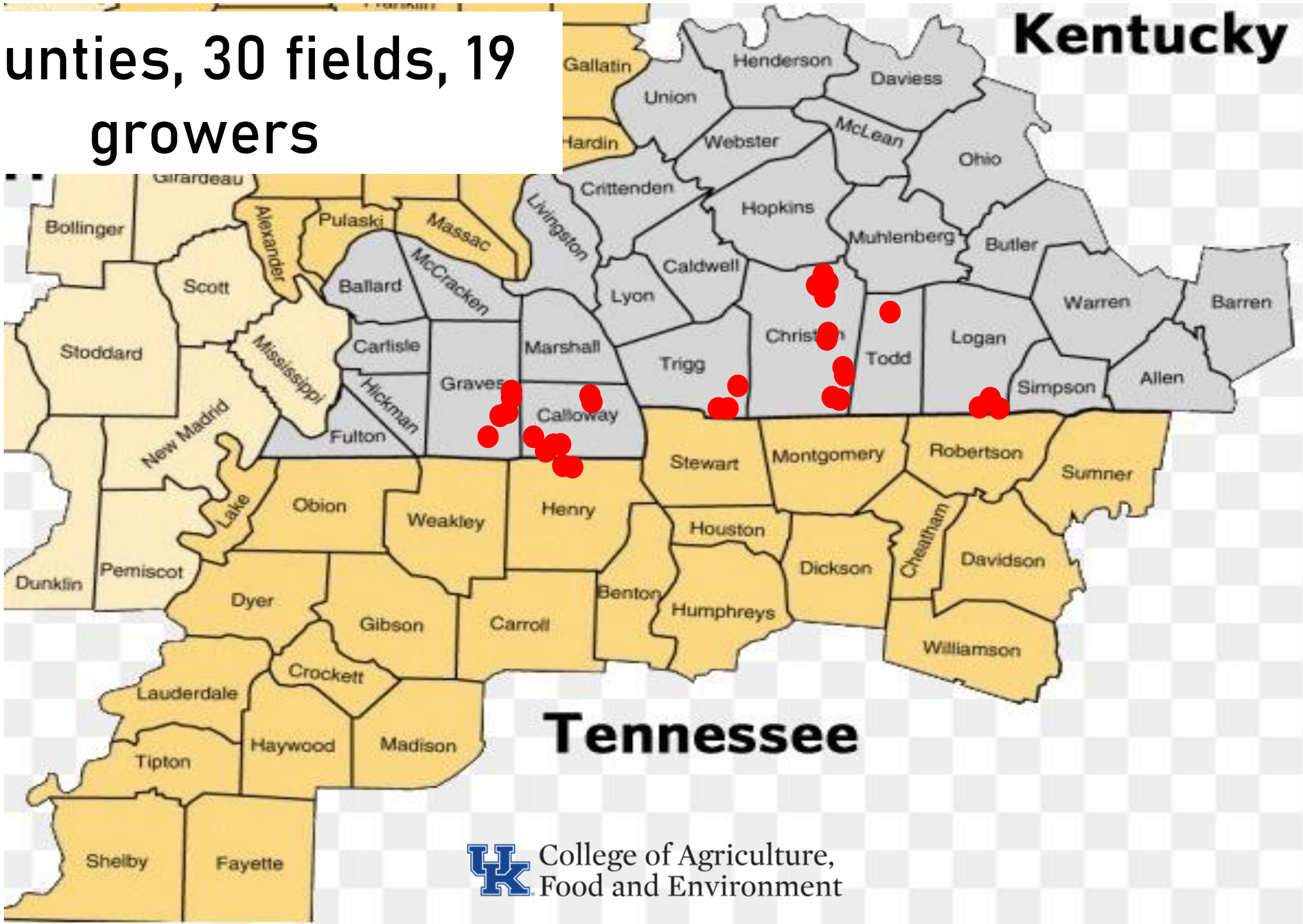
7 counties, 30 fields, 19 growers



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Observational Study Variables of Interest

- Soil Temperature
- Air Temperature
- Rainfall
- Soil Type
- Soil Nutrients
- Tissue Nutrients
- Variety
- General location of plots (ponds, tree line, low lying area in field, etc.)

- Fertilizer Application
- Weed Pressure
- Disease Pressure (other than ALS)
- Insect Pressure
- Tillage
- Pesticide Application
- Transplant tank mix
- History of ALS
- Greenhouse Management

Observational Study Layout

- 3 plots per field (2 rows, 40 ft. long), representative of the entire field
- Plot B → soil/air temperature sensor and rain gauge

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Observational Study Layout

- 3 field visits during growing season
  - 1st visit: layout plots (GPS coordinates), transplant and soil samples, and placed sensors
  - 2nd visit: tissue sample (1st fully expanded leaf), disease ratings (10 plants/plot), weed pressure, insect pressure/damage, if ALS was found a rain gauge was placed
  - 3rd visit: green weights (5 plants/plot), disease rating, weed pressure, and insect pressure/damage, tissue sample with ALS symptoms

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Observational Study Screening

- Collected lesions from individual leaves
- Confirmed collected lesions were *Pseudomonas syringae* pv. *tabaci*
- Screened isolates for resistance to Streptomycin (200 ppm)

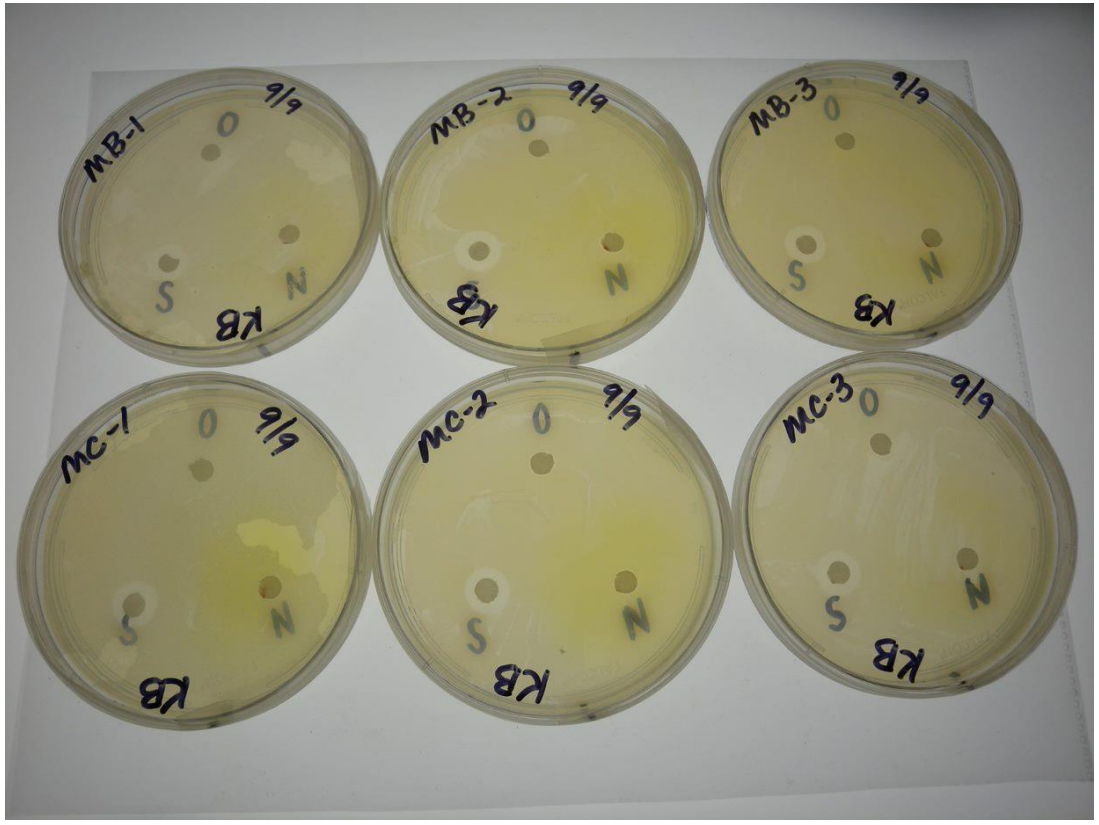

Photo and plating assay: Brenda Kennedy UKREC

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2020-2021 Observational Study Summary

2020:

- 4 out of 30 fields with ALS
- 1 of 4 fields had Streptomycin resistance at the field rate (200 ppm), 3 separate isolates

2021:

- 8 out of 30 fields with ALS
- 3 of 8 fields had Streptomycin resistance at the field rate (200 ppm), not all isolates per field were resistant like 2020

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Best Management Plan

- Streptomycin can still help in fields with susceptible ALS
- For streptomycin resistant ALS:
  - Copper products have been best alternative:
    - Nordox: copper oxide, 3 to 5 lbs/A
    - Copper sulfate products: Phyton 27AG, KOP-5, Instill, 15 to 20 oz/A
    - Cueva: copper octanoate, 1 to 2 gal/A
  - Surface sterilants:
    - Oxidate (hydrogen peroxide + peroxyacetic acid) – 8 to 26 oz/50 gal
    - PAA (peroxyacetic acid + hydrogen peroxide) – 32 oz/A
- Alternate sprays with streptomycin, copper, and oxidate/PAA may be best spray plan.

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Questions we have and how we are answering them in 2021:

- Does ALS start in transplants/greenhouse?
  - We do not think so, no ALS has been seen in greenhouses. ALS is normally seen approximately 6 weeks after transplant.
  - Currently, taking transplant samples from fields to screen for *P. syringae pv. tabaci*
- Does tillage matter?
  - Possibly, the bacteria is said to over winter on plant residue (no-till systems could be worse)
  - A trial investigating ALS pressure in no-till systems and in conventional systems. Also, an objective in my monitoring project.

2021 Angular Leaf Spot Tillage Trial

Untreated control	Conventional #1	No-Till #1	Conventional #2	No-Till #2

Based on field observations and trials there are no clear differences in tillage systems

- Trial size: 1 ac, each block 75 ft. width by 100 ft. length
- 20, 6" soil cores/block
- Analyze for casual agent of ALS to determine if there is a difference in a no-till vs. conventional system

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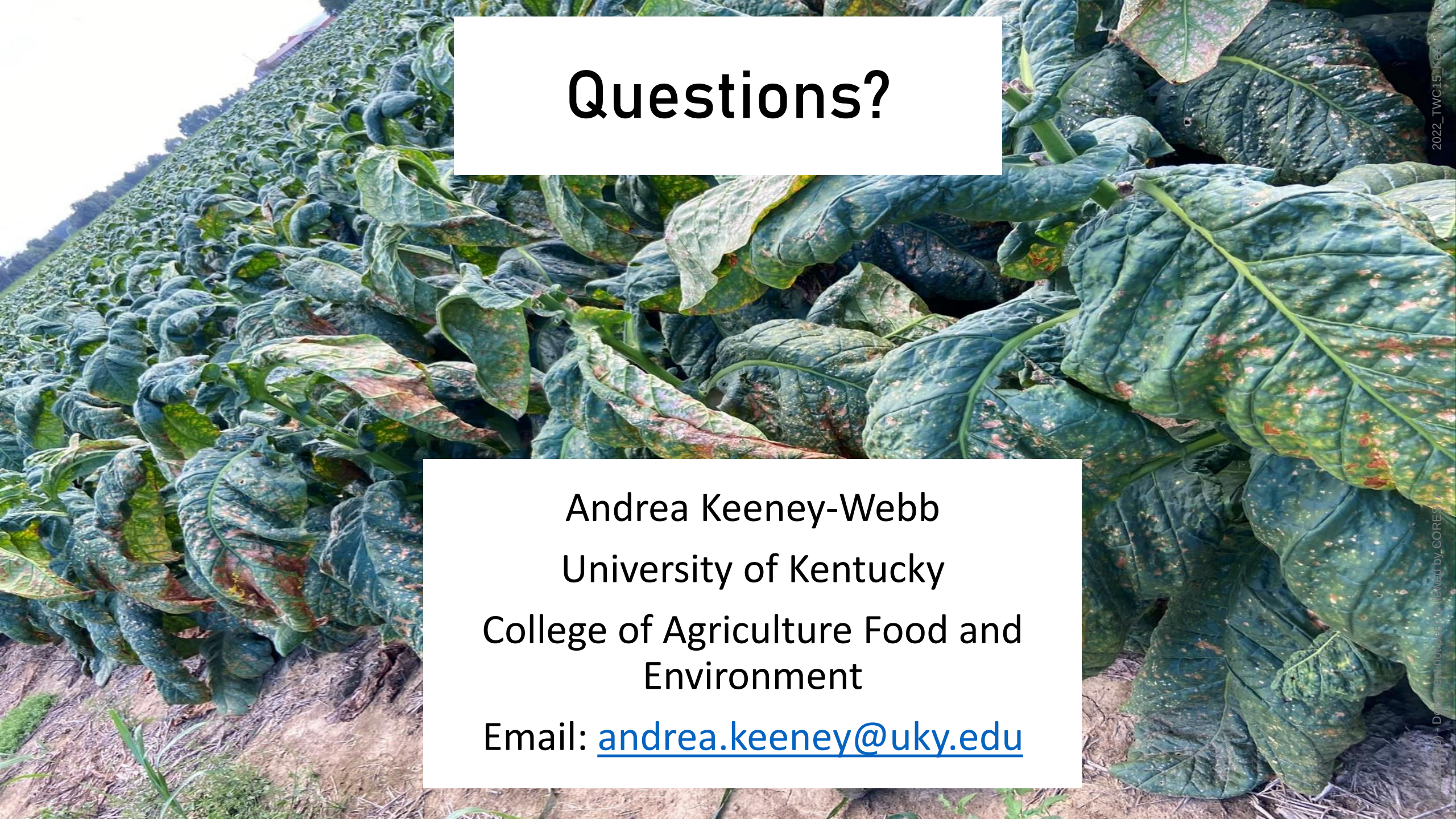

Questions?

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