

TSWV Incidence in Non-traditional Areas of North Carolina

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Overview

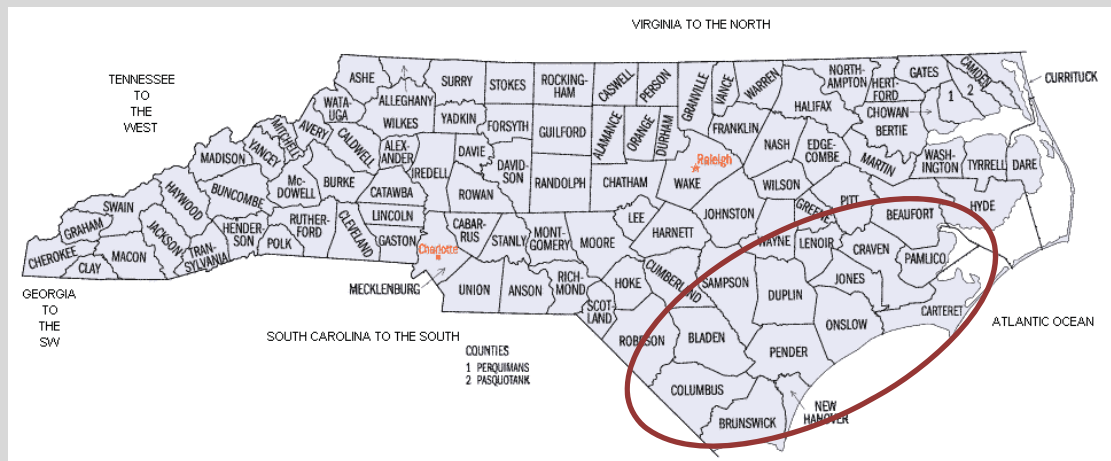
- Burley tobacco in Eastern North Carolina
- Research
 - Determine TSWV pressures on burley tobacco compared to flue-cured
 - Describe factors contributing to any differences in TSWV incidence in burley compared to flue-cured
- Conclusion

Types of Tobacco



Tomato Spotted Wilt Virus

- Family *Bunyaviridae* and genus *Tospovirus*
- NC in 1988
- Transmitted by 7 thrips species
 - *Frankliniella fusca*
 - *Frankliniella occidentalis*
- 900 plant species

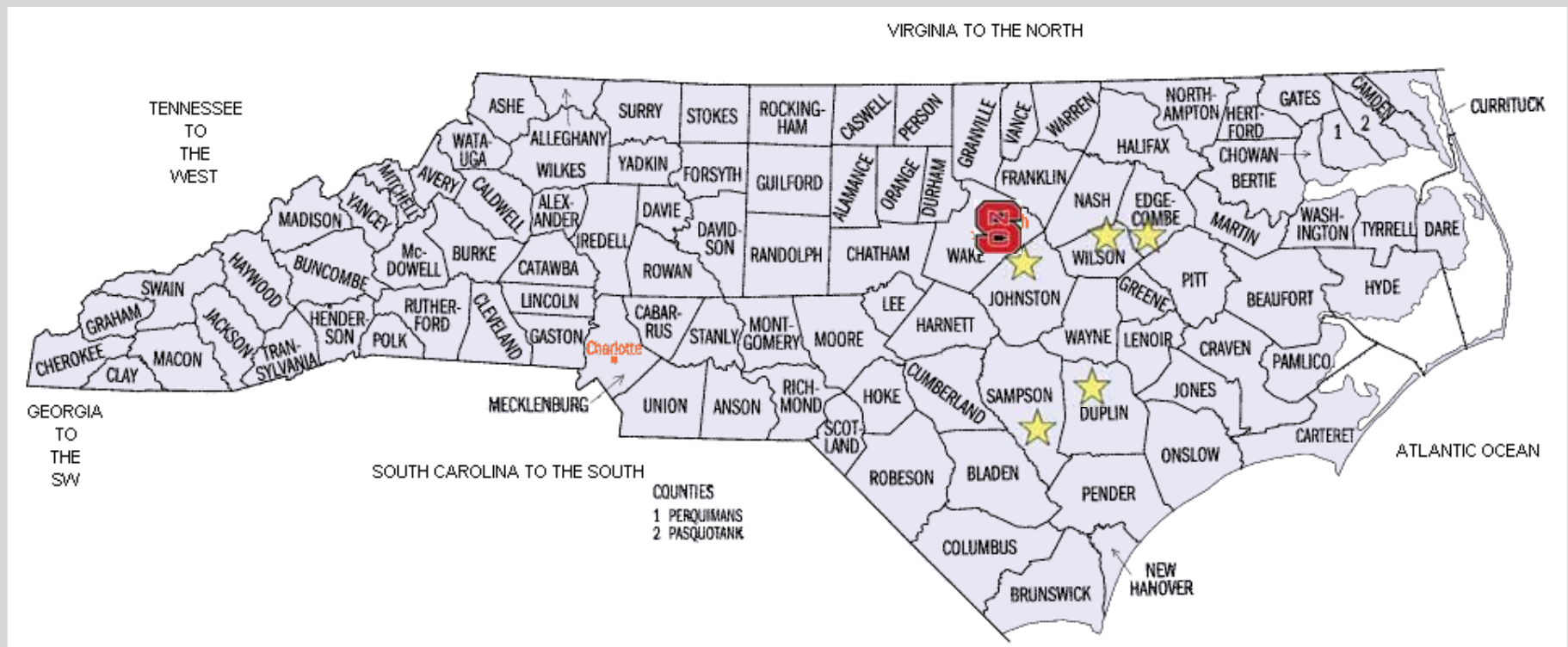


TSWV Symptoms



Commercial Surveys

- 2007, 2008, 2009



Commercial Surveys

- Contacted County Agents
- Surveyed apparent infection based on visual symptoms of TSWV
 - 2007: 4, 100 plant samples
 - 2008 and 2009: 4, 200 plant samples
- Tobacco variety, transplant date, insecticide use

Commercial Surveys

- 2007: 8 fields
 - 4 burley, 4 flue-cured
- 2008: 15 fields
 - 7 burley, 6 flue-cured, 2 Maryland
- 2009: 19 fields
 - 10 burley, 9 flue-cured

Year	County	Tobacco Type	TSWV Treatment	Transplant date	Mean % Incidence
2007	Duplin	Burley (KT204)	NONE	5/10	41.0
		Flue-cured (NC71)	AD, ACT	4/23	7.0
	Johnston	Burley	unknown	unknown	7.0
		Flue-cured	unknown	unknown	1.0
	Sampson	Burley	NONE	5/15	26.5
		Flue-cured	AD	4/21	11.8
	Wilson	Burley (KY204 & NC7)	PLT on KY204	5/10 & 4/12	11.6
		Flue-cured	unknown	unknown	2.8
	Duplin	Burley	AD, ACT	unknown	12.4
		Flue-cured	AD, ACT	unknown	3.9
2008	Edgecombe- old	Burley (NC7)	PLT	4/29 -5/3	3.4
		Flue-cured	unknown	unknown	1.5
		Maryland (M609)	PLT	4/29 -5/3	1.0
	Edgecombe- young	Burley (NC7)	PLT	~ 5/15	0.6
		Maryland (M609)	PLT	~ 5/15	0.5
	Johnston	Burley	unknown	unknown	0.9
		Flue-cured	unknown	unknown	0.9
	Sampson	Burley	AD	unknown	13.3
		Flue-cured	AD	unknown	4.0
	Wilson- Parkers BBQ	Burley	unknown	unknown	5.6
		Flue-cured	unknown	unknown	1.8
	Wilson- Contentnea	Burley	unknown	unknown	7.4
		Flue-cured	unknown	unknown	2.8

Year	County	Tobacco Type	TSWV Treatment	Transplant date	Mean % Incidence
2009	Duplin- Sandridge Rd	Burley (KT 204)	AD, ACT	4/23	19.1
		Flue-cured (K326)	AD, ACT	4/20	4.0
	Duplin	Burley (KT204)	AD	4/27	29.6
		Burley (KT204)	AD, ACT	4/27	27.3
		Flue-cured (NC71)	AD	4/20	4.1
	Johnston- C. Church Rd	Burley	unknown	unknown	6.0
		Flue-cured	unknown	unknown	1.5
	Johnston- Raleigh Rd	Burley	unknown	unknown	4.8
		Flue-cured	unknown	unknown	1.3
	Johnston- Langdon	Burley (KT204)	IMD	5/10	4.0
		Flue-cured	unknown	unknown	0.9
	Sampson	Burley	unknown	unknown	19.3
		Flue-cured	unknown	unknown	6.8
	Wilson	Burley (NC7)	PLT	5/5	9.4
		Flue-cured (CC27)	PLT	unknown	2.9
	Wilson- Water Tower	Burley (NC7)	PLT	unknown	12.4
		Flue-cured (CC27)	PLT	5/1	4.5
	Wilson- Wilco Rd	Burley (NC7)	AD	5/5	5.1
		Flue-cured (K326)	PLT	5/4	3.9

Commercial Survey Conclusions

- Most field pairs significantly different when analyzed by county and year.
- Types significantly different when analyzed across fields by year
(2007 $P=.0007$, 2008 $P<.0001$, 2009 $P<.0001$)
- Burley had greatest TSWV incidence


TSWV Field Study

- 2008, 2009
- 8 treatments: tobacco type, transplant date, imidacloprid use
- Visual surveys weekly
 - Flagged infected plants in 2009

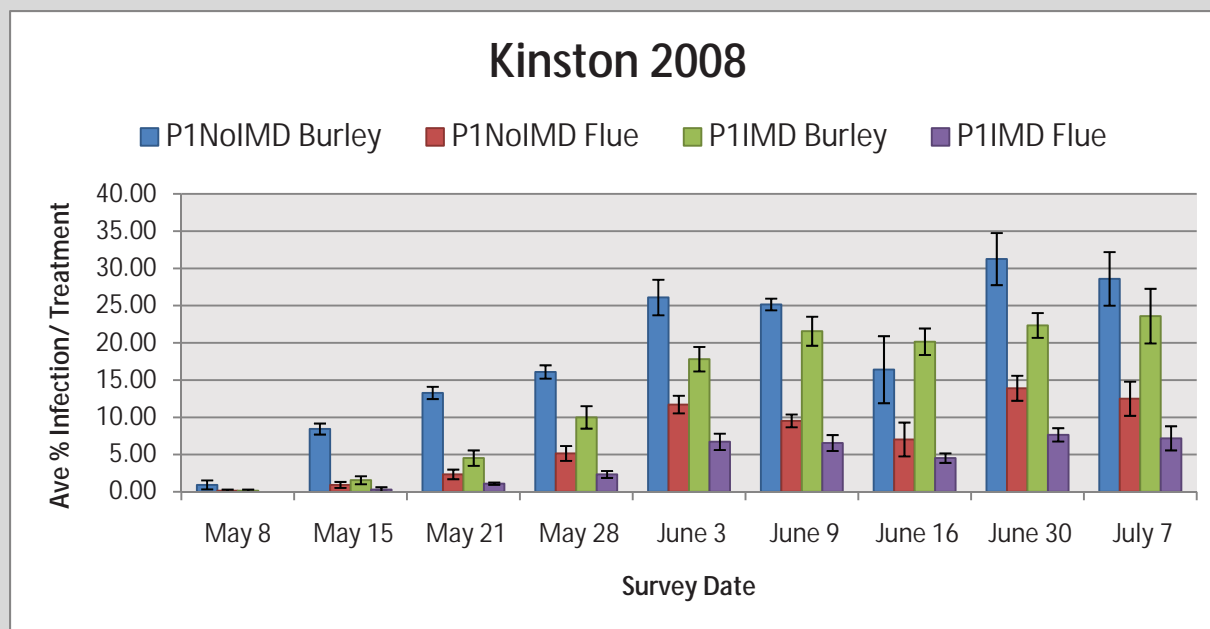


Field Design

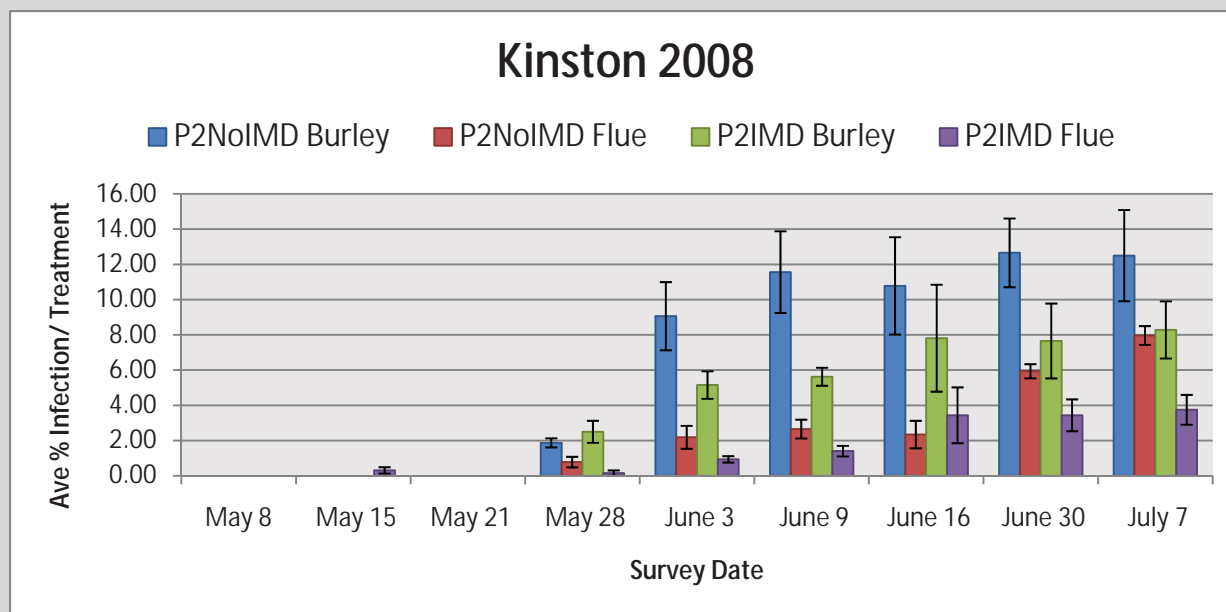
P2N	P2A	P1N	P1A
P2A	P1N	P2N	P1A
Alley			
P1N	P2A	P1A	P2N
P1N	P2N	P2A	P1A

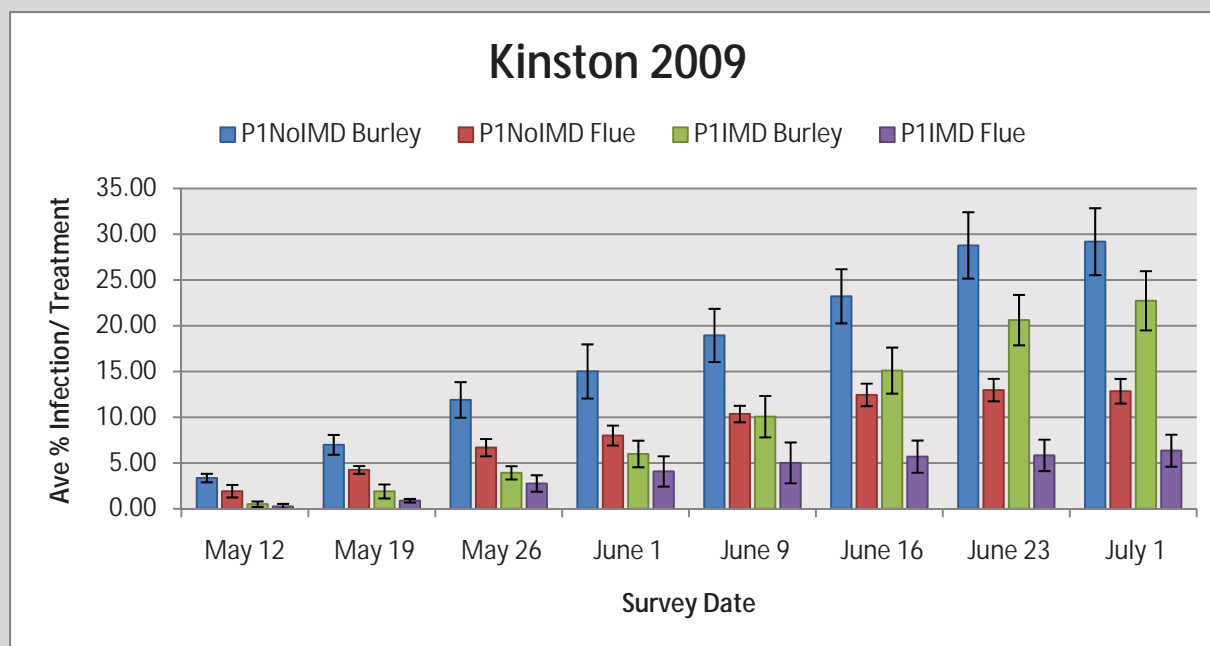


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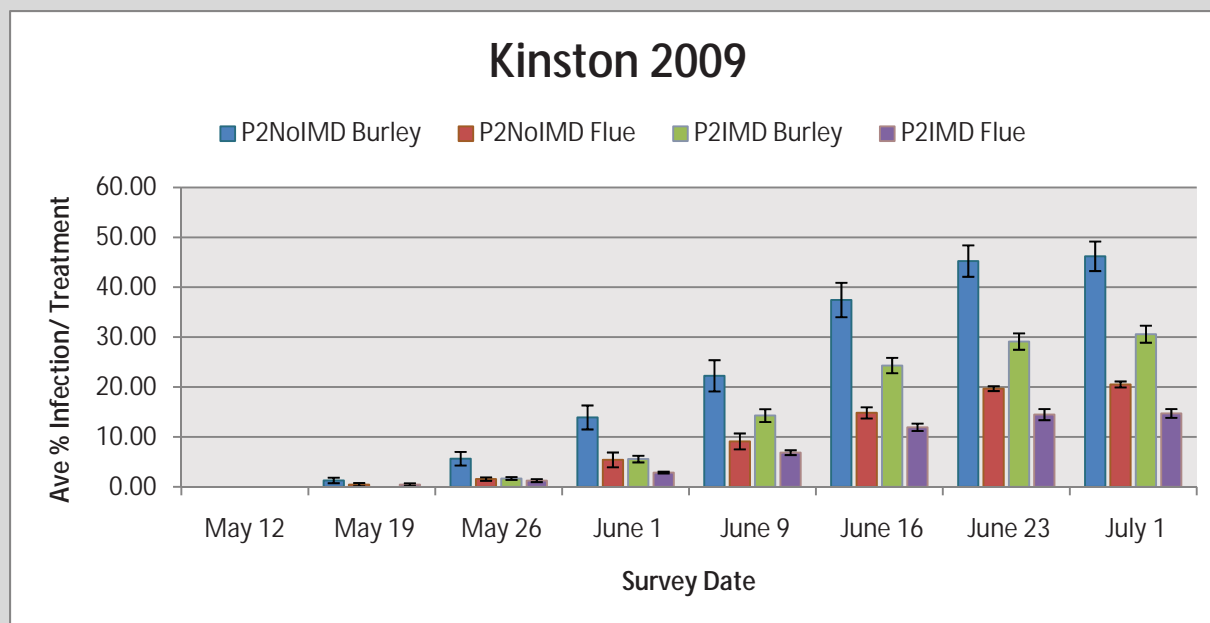


Tobacco type $P < .0001$, Planting date $P < .0001$, Imidacloprid $P < .0001$





Tobacco type $P < .0001$, Planting date $P < .0001$, Imidacloprid $P < .0001$



TSWV Field Study Conclusions

- Greater incidence of TSWV in burley
- Imidacloprid suppressed TSWV in both types
- Incidence was lower when planting dates avoided a major thrips flight
- Incidence was greater in 2009 than 2008

What's the underlying cause?

- 1) Greater susceptibility of burley plants
- 2) Greater attraction of thrips to burley plants

Greenhouse TSWV Study

- Trial 1
 - NC 7, SC 58, SC 58-modified
- Trial 2
 - NC 7, SC 58, SC 58-modified, TN 90
- Inoculation at 60, 75 & 95 days after sowing (DAS)

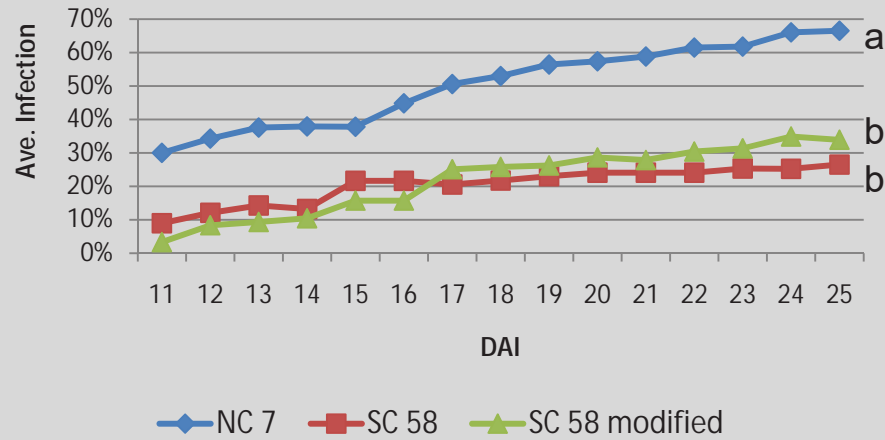


Greenhouse TSWV Study

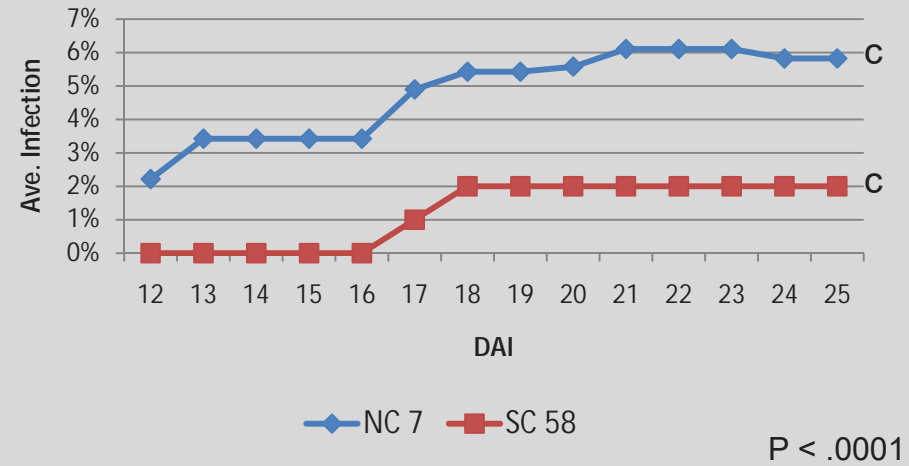
- Combine buffer, carborundum and leaf material
- Inoculation of 2 youngest unfurled leaves
- Monitored daily for 25 days



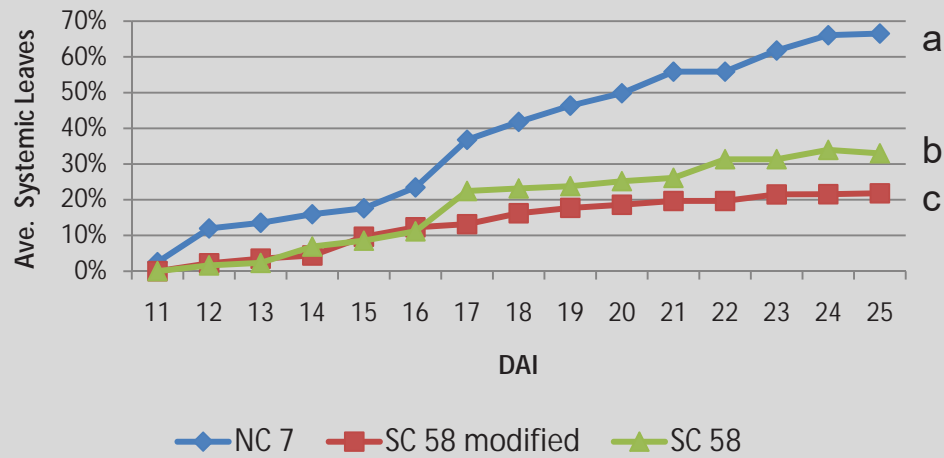
Trial 1 - 60 DAS



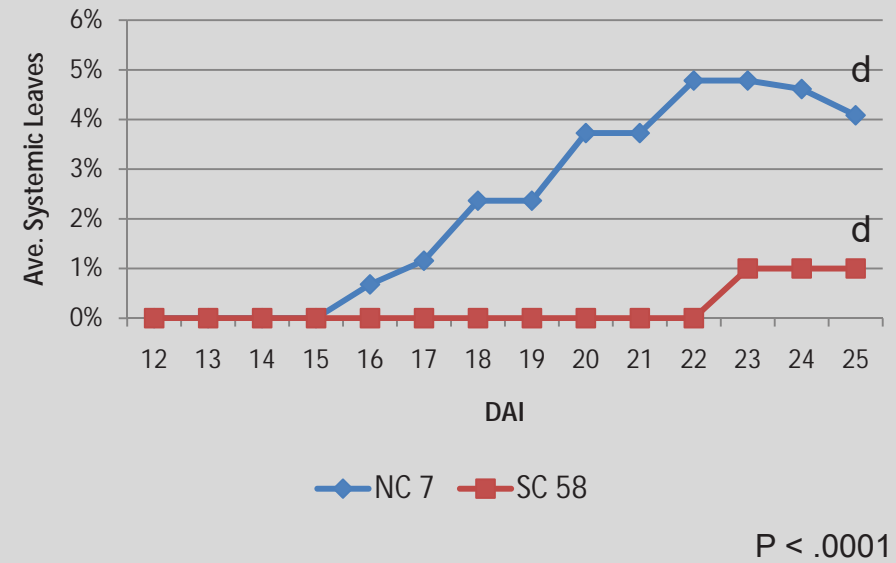
Trial 1 - 75 DAS



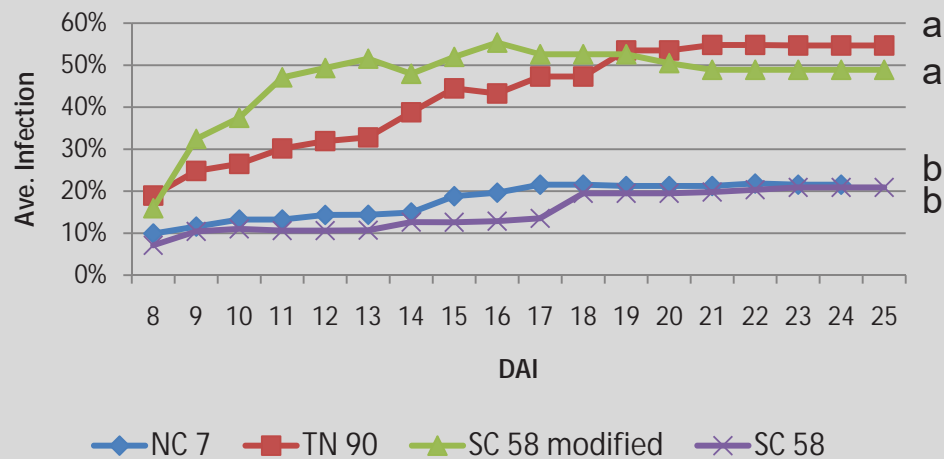
Trial 1 - 60 DAS



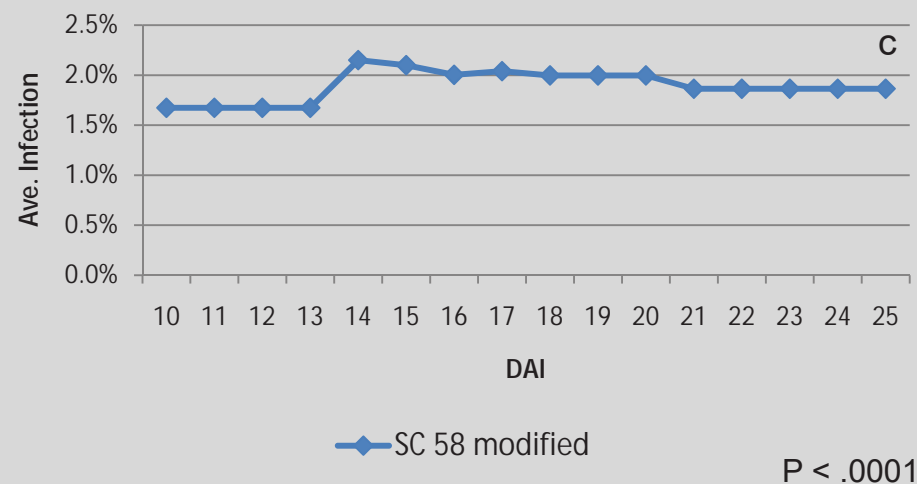
Trial 1 - 75 DAS



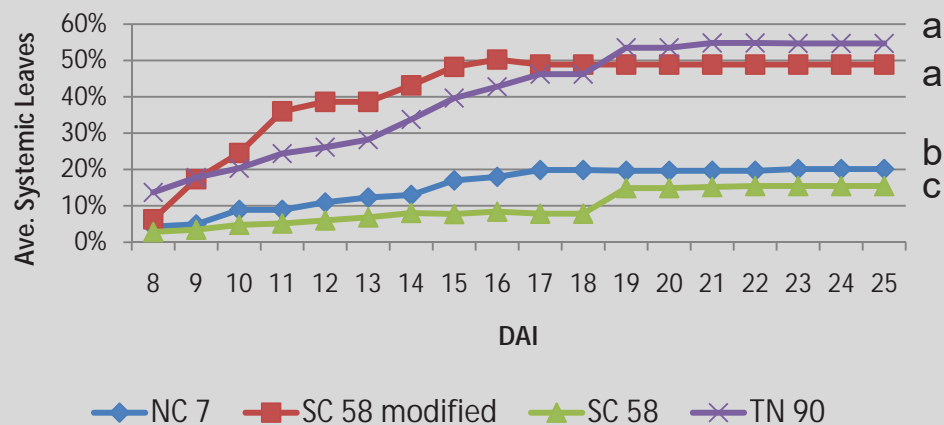
Trial 2 - 60 DAS



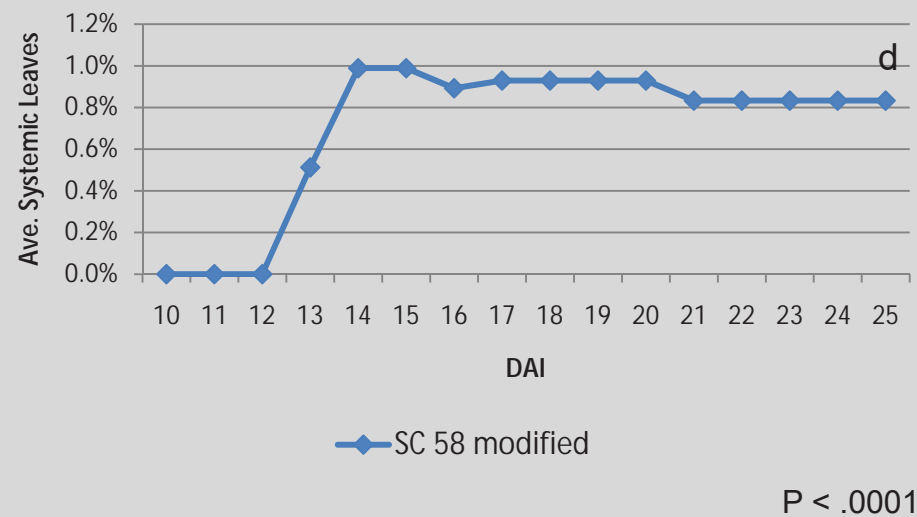
Trial 2 - 75 DAS



Trial 2 - 60 DAS



Trial 2 - 75 DAS



Greenhouse TSWV Study

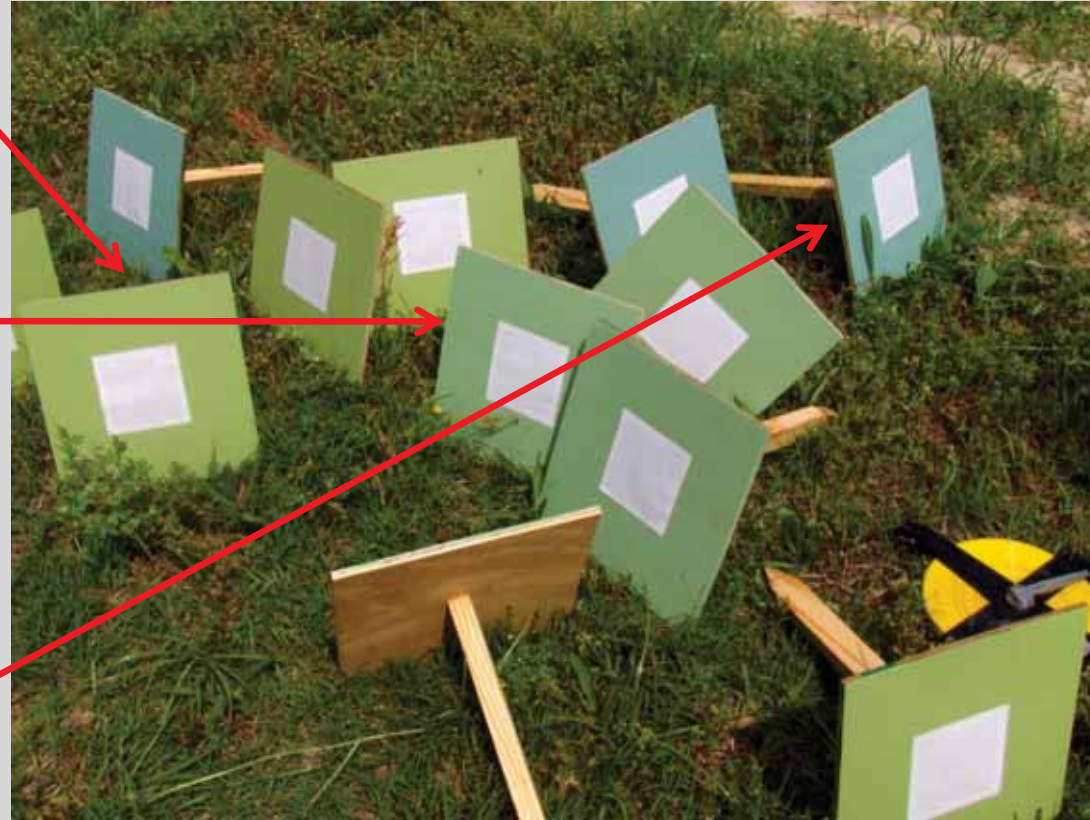
- ELISA (enzyme-linked immunosorbent assay)
 - 4 plants from each treatment (40 plants total)
 - 3 positive controls
 - 3 negative controls

Plants not exhibiting
symptoms were virus
free.

Greenhouse TSWV Conclusions

- Burley tobacco varieties had generally higher incidence than flue-cured tobacco variety
- High incidence = high systemic leaves
- Greenhouse temperatures may have caused variation between trials

Adhesive Trap Study



Adhesive Trap Study

- Significant difference noted for Trial 1 (P = .0350)
- Need more data

Mean Thrips /Trap/Week			
	Burley	Flue-cured	Maryland
Trial 1	19.72 a	17.32 ab	10.10 b
Trial 2	4.07	3.21	3.60

Conclusions...

- TSWV incidence is higher in burley tobacco
 - Mostly likely due to variety susceptibility
 - Could be some color attraction



Special Thanks To...

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