

2009 Studies on Thrips Control and Host Plant Resistance for Managing Tomato Spotted Wilt in Tomato and Pepper Tifton, GA (RAMP)



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Damage Caused by thrips vectored TSWV

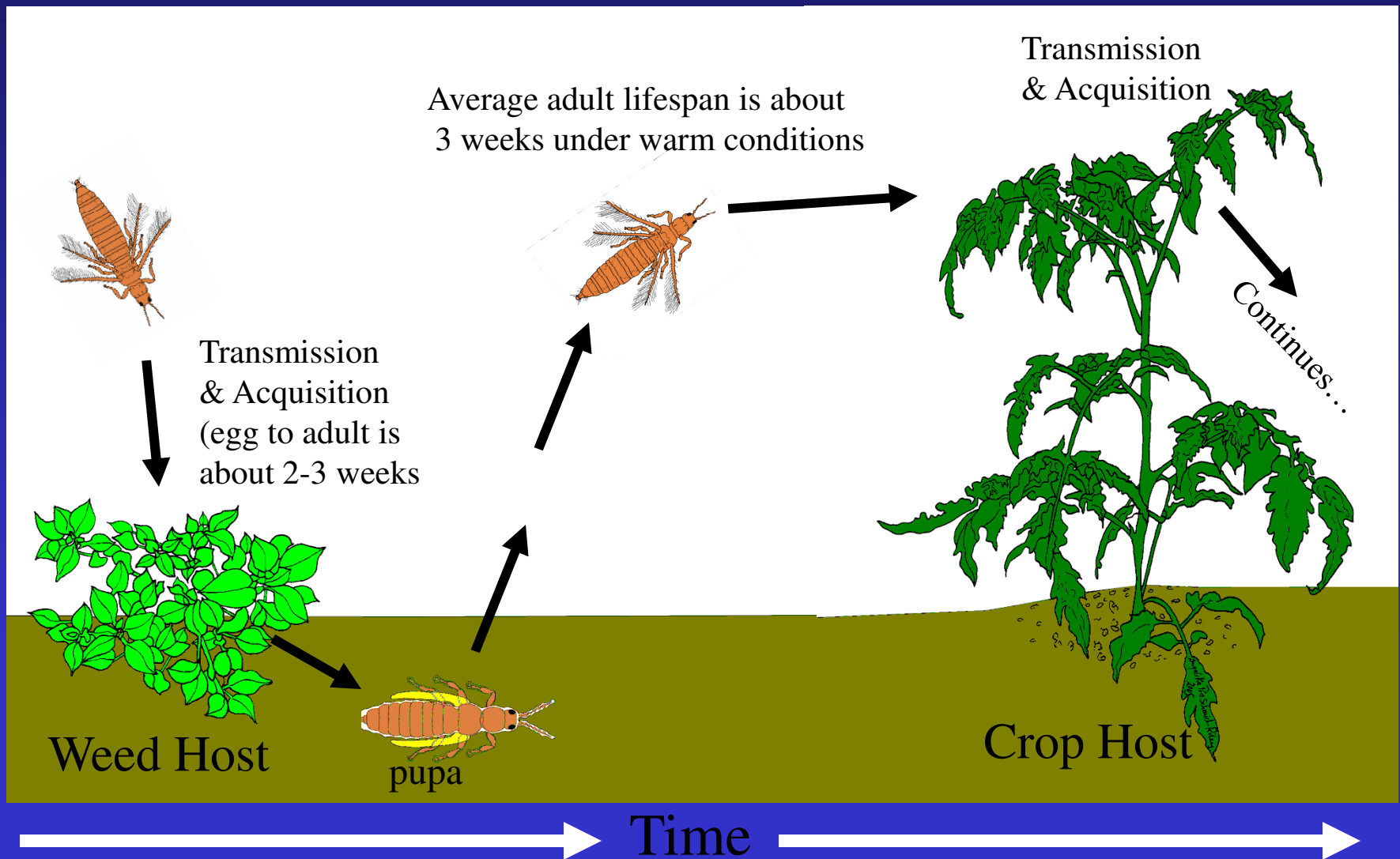


(R. Cullen/M. Gooch-IFAS)

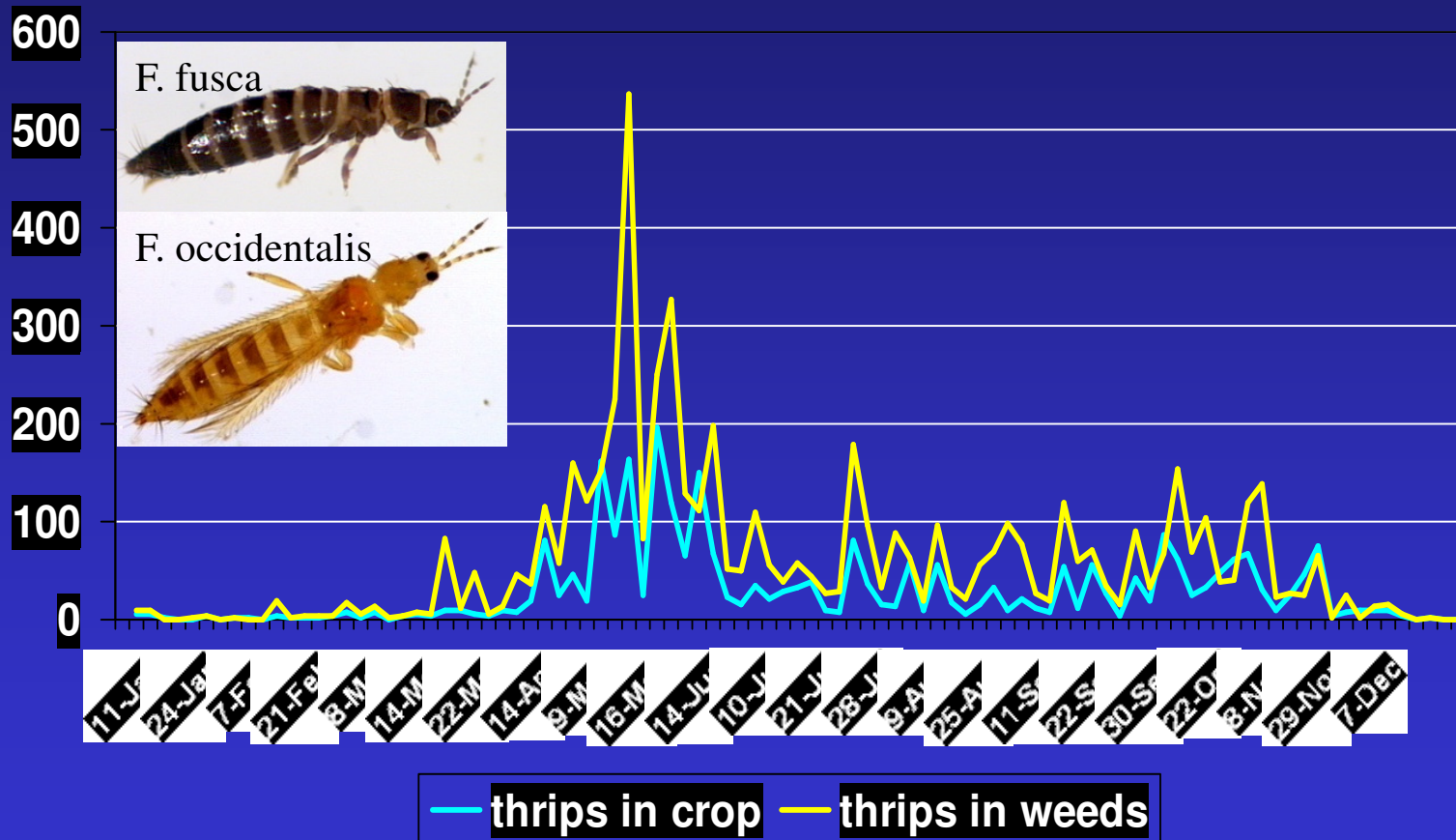


(R. Cullen/M. Gooch-IFAS)

Managing Thrips Vectors & Crop Response to Virus



Mean number of adult and immature thrips collected on sticky cards from 2004-08 in 4 counties in GA



Managing Thrips Vectors



- Currently used tactics: 1) insecticide, 2) mulch
- Imidacloprid (Admire Pro) used as a systemic (drench or drip injection up to 10.5 fl oz/a) [recall it reduces fusca not occidentalis!]
- Metallic-reflective plastic mulch

Georgia Research Projects - 2009

- **UV Mulch – Actigard Trial**
 - **Mulch: Black, Heat Stripe, UV Reflective**
 - **Actigard (4 different timing treatments)**
 - **At transplant, 10 days, 20 days 30 days**
- **Imidacloprid – Actigard Trial (black mulch)**
 - **Admire Pro at 10.5 oz/ac**
 - **Actigard (4 timings), HGW86 cyazypyr**
 - **At transplant, 10 days, 20 days 30 days**
- **Host Plant Resistance Trial:tomato and pepper**

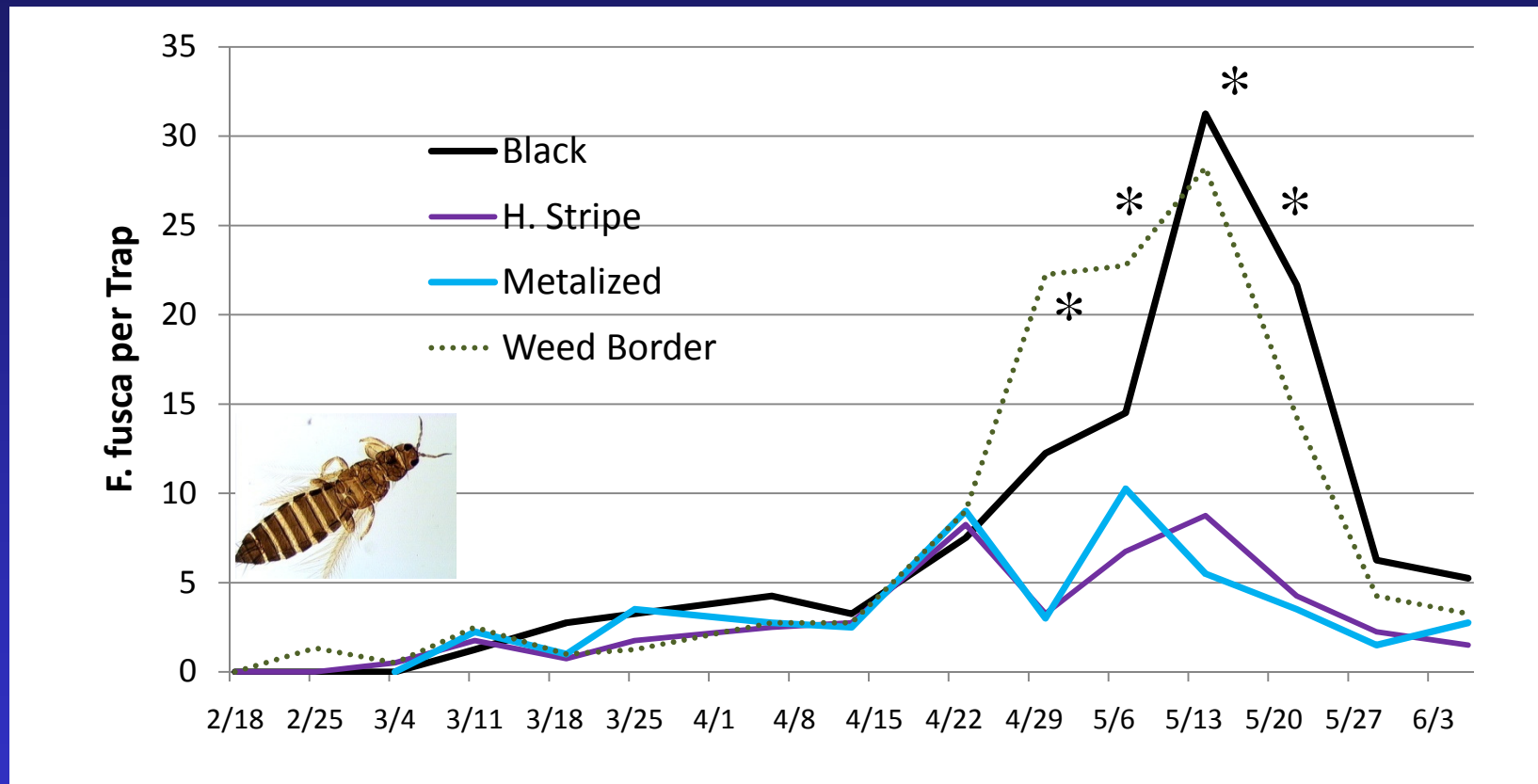
Georgia Demonstrations - 2009

- **Two locations, non-replicated**
- **4 row plots, 50-60 feet**
- **Plastic mulch**
 - **Black, Heat Stripe, UV Reflective**
- **Imidacloprid**
 - **Admire Pro at 10.5 oz/ac**
- **Actiguard**
 - **At planting, 10 days, 20 days, 30 days**

Data Collection

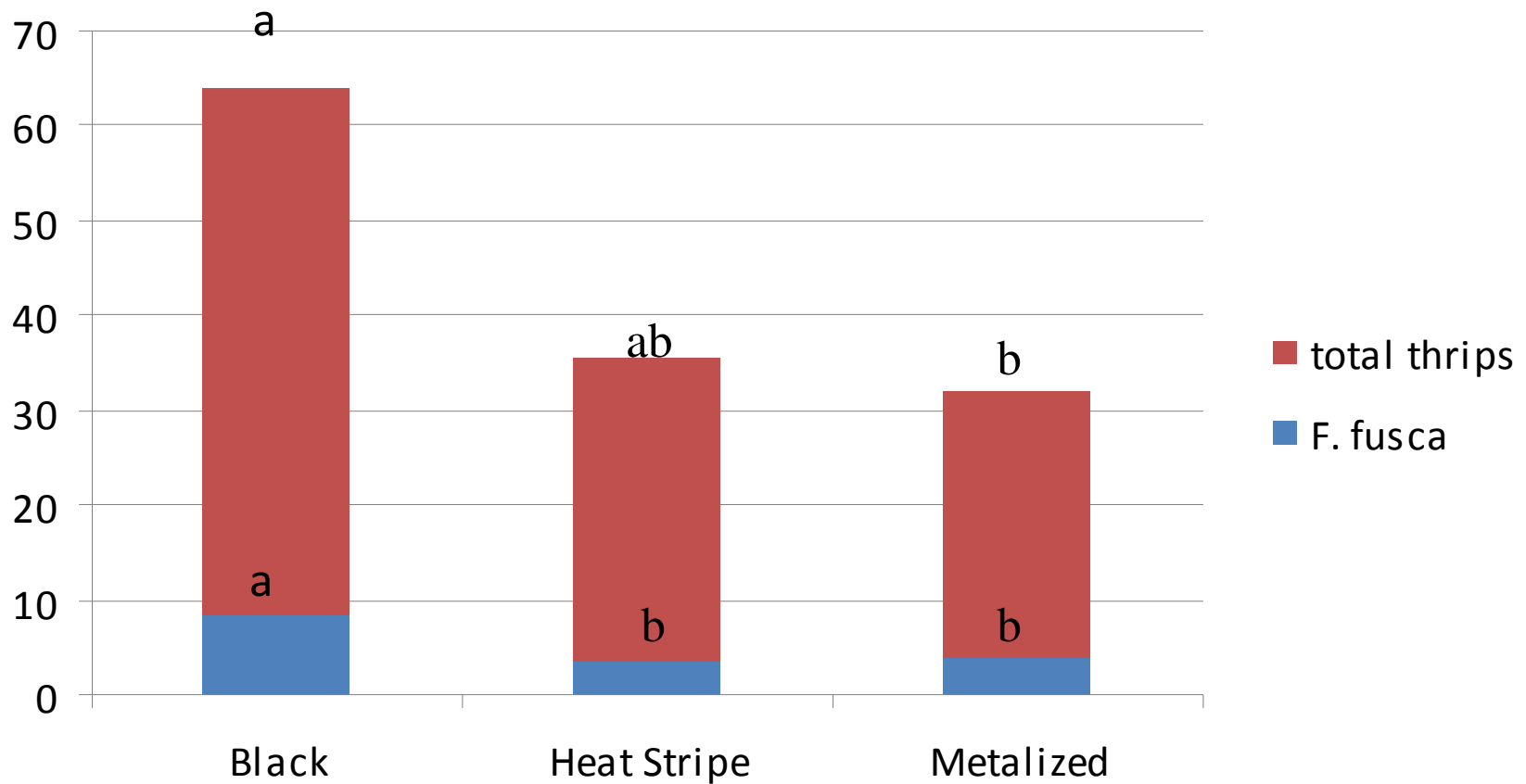
- **Thrips densities**
 - Yellow sticky traps
 - Beat samples, Bloom samples
- **TSWV pressure**
 - Petunias, replaced weekly
- **TSWV incidence and severity**
 - Weekly symptomatic plant counts (+/-)
- **Yields**

Metallic Mulch Reduces Thrips

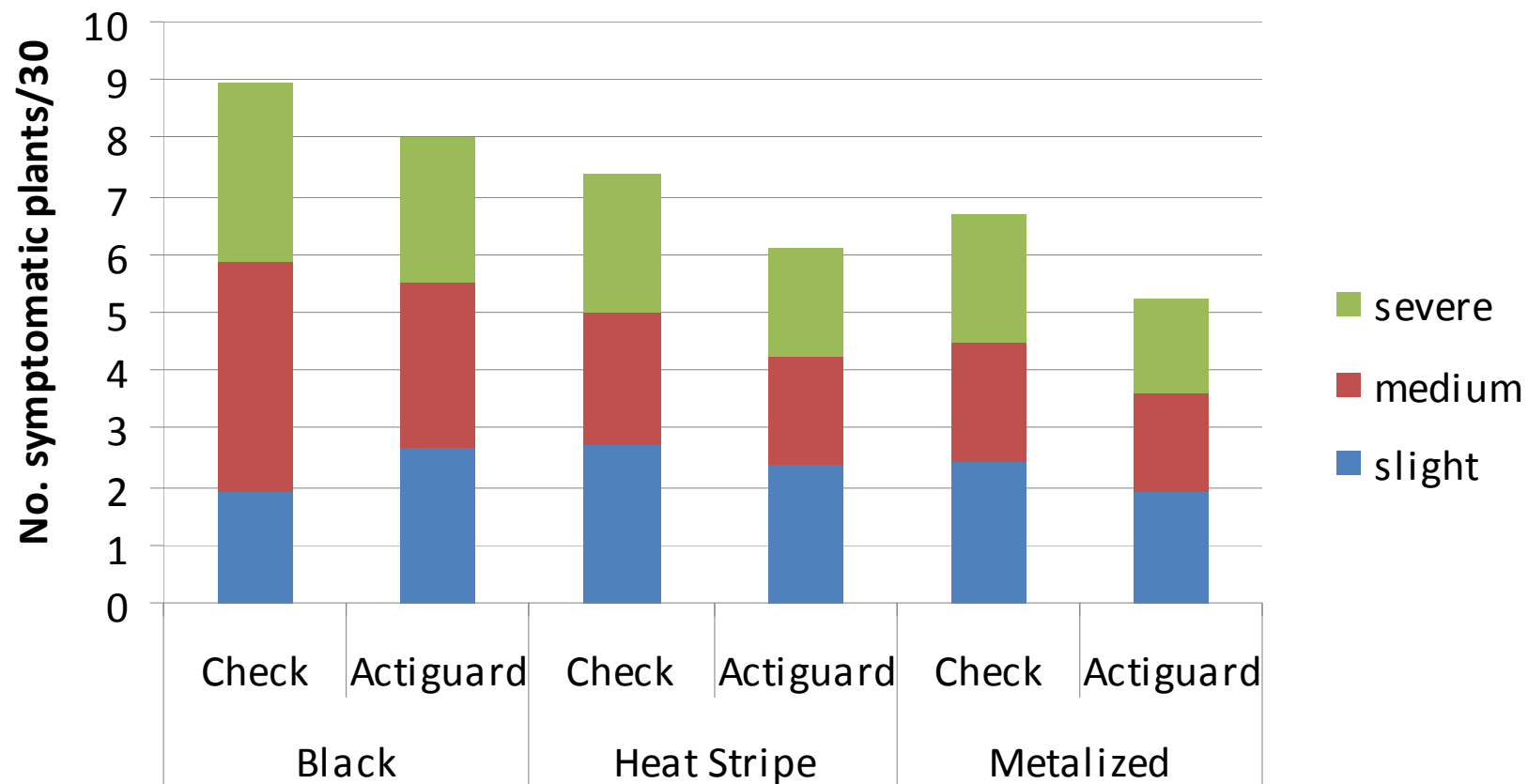


- 2009 tests at Tifton , Georgia demonstrated reduced thrips and especially *F. fusca* (Fig.) in metalized plastic reflective mulch compared to black plastic, but with delays in plant growth.

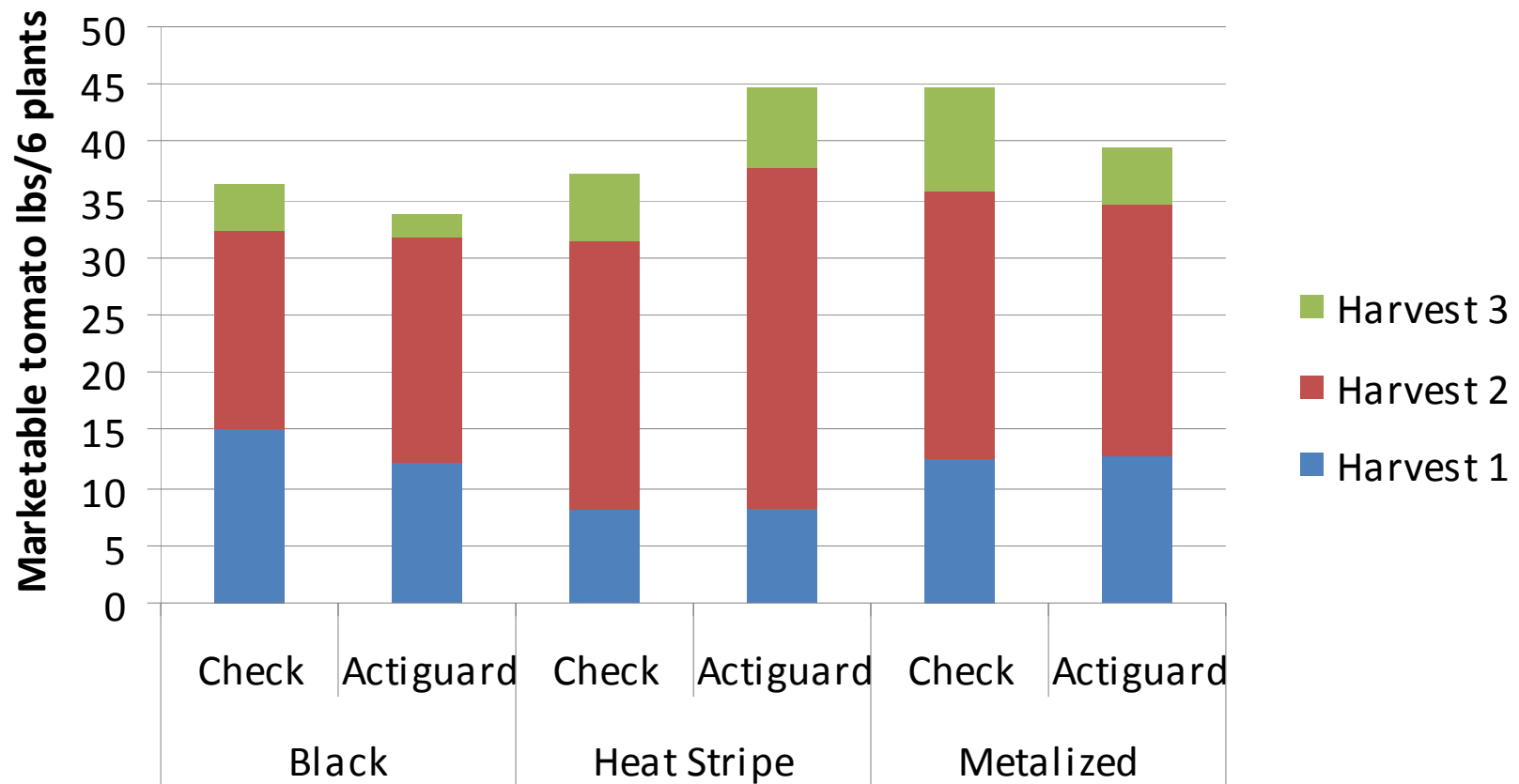
Metallic Mulch Reduces Thrips overall



Metallic Mulch and Actiguard Reduces TSWV Symptoms



Metallic Mulch and Some Actiguard Treatments Increased Tomato Yield



2009 Mulch Trial Results

(using FL 47 TSWV-susceptible tomato)

Treatment	% TSWV 5/29 before harvest	Marketable Yield Lbs /acre
Metalized mulch	31% b	32,907 a
Heat stripe mulch	28% b	32,820 a
Black plastic mulch	43% a	24,979 b

Means within columns followed by the same letter not significantly different (LSD, P<0.05)

Note there was ~**32%** increase in yield with mulch

2009 Actiguard Treatments Across Mulches (using FL 47 TSWV-susceptible tomato)

Subplot Actiguard Treatments	% TSWV at harvest	Marketable Yield (lb/a)
Transplant only	58% a	23,484 a
Transplant + 10 d*	49% ab	23,116 a
Transplant + 10, 20, 30 d	39% b	22,995 a
Untreated check	50% ab	18,594 a

Means followed by same letter not significantly different (LSD, P<0.05),

Note that the Actiguard at transplant provided ~30% increase in marketable yield

Abbrev. Results for Imidacloprid - Actiguard Trial 2009

Treatment	% TSWV 6/11	Marketable Yield
Imidacloprid 10.5 floz/a	56% b	20,179 a (marginal)
Untreated check	68% a	14,473 b

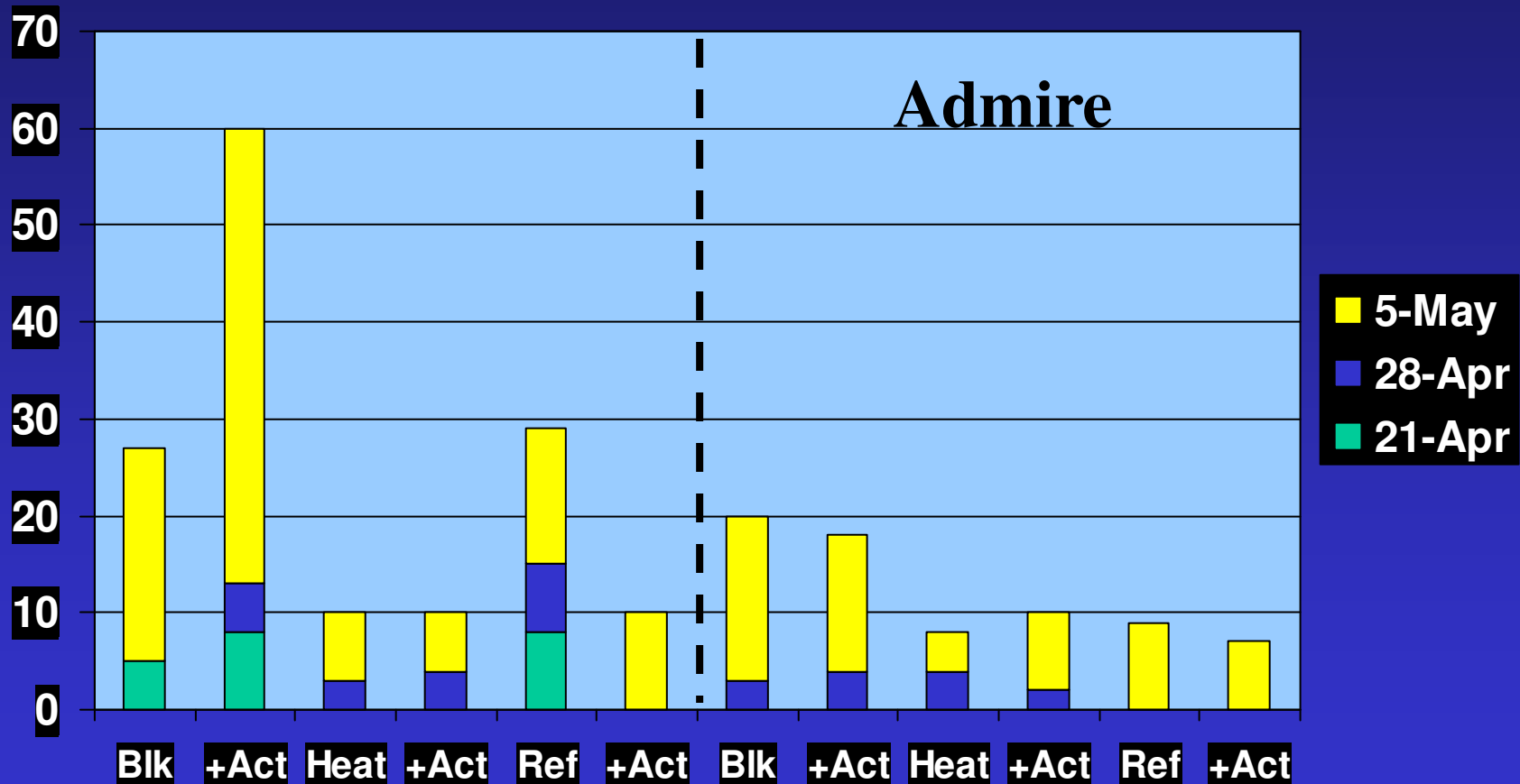
Treatments in untreated block (no imidacloprid)	% TSWV 6/11 at harvest	Marketable Yield Lbs /acre
Cyazypyr at Transplant only	68% a	19,610 a
Actiguard at Transplant only	68% a	16,048 a
Act. Transplant + 10 d*	68% a	16,743 a
Act. Transplant + 10, 20 d	68% a	15,579 a
Act. Transplant + 10, 20, 30 d	63% a	12,251 a
Untreated check	72% a	6,610 a

Means within columns followed by the same letter not significantly different (LSD, P<0.05)

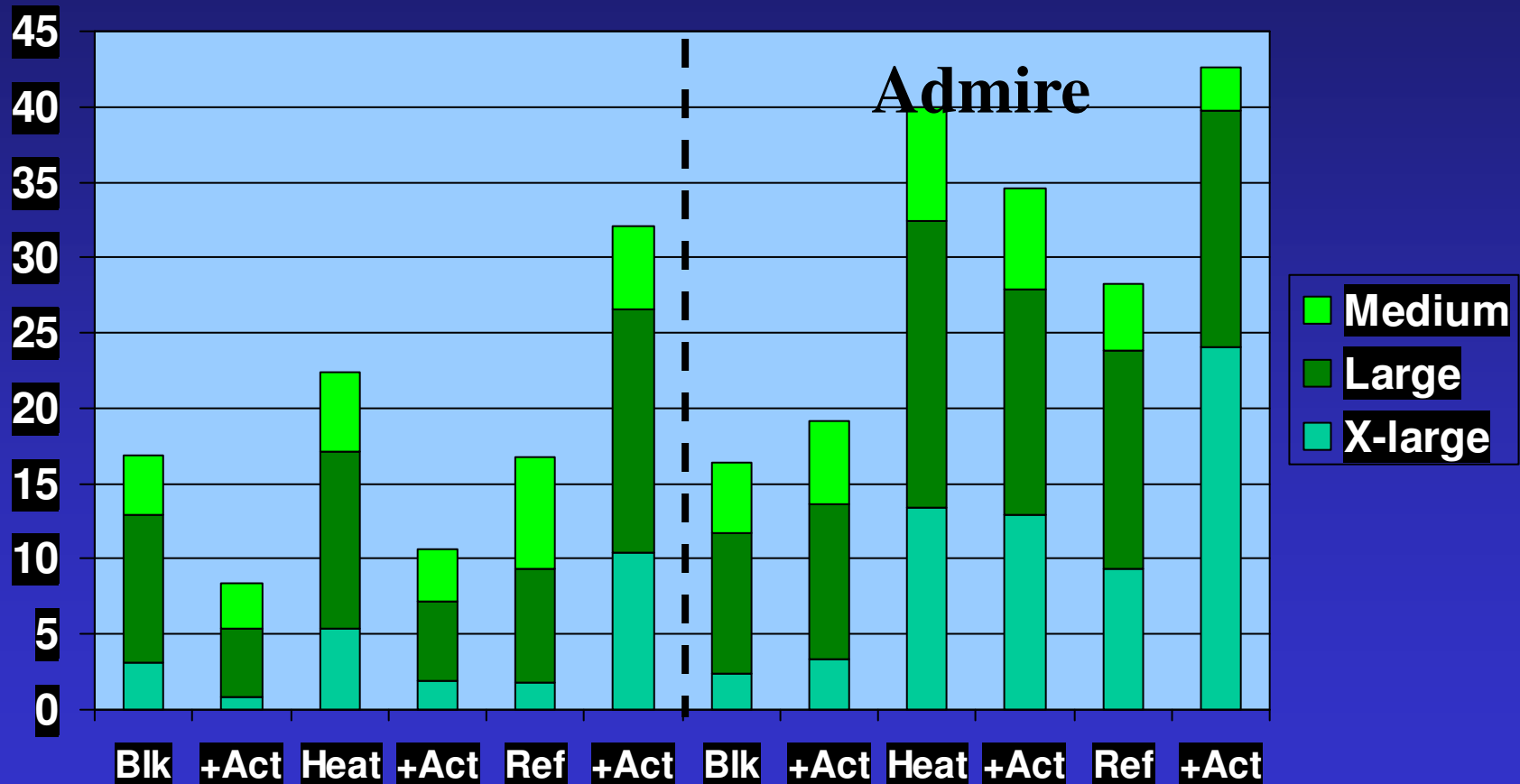
Note there was ~40% increase with imidacloprid overall treatments

Vidalia Onion Farm – Spring, 2009

thrips per beat sample



Total kilograms marketable yield Vidalia Onion Farm – Spring, 2009



Summary on Managing Thrips Vectors

1. Different thrips species react differently to insecticide. Specifically, imidacloprid reduces tobacco thrips feeding, but can stimulate western flower thrips feeding. Cyazypyr bears more testing for thrips control.
2. Reflective mulch is effective against thrips, but mulch can cool soil temperatures 2°C (Diaz et al. 2007) and slow plant growth.

Crop response...



Host Plant Resistance Trials:


- **30 lines of tomato** (1. Mountain Glory [TSW-R], 2. Fletcher [TSW-R], 3. BHN 602 [BHN (Siegers) TSW-R], 4. Amelia [Harris Moran (Clifton) TSW-R], 5. Crista [Harris Moran (Clifton) TSW-R], 6. Bella Rosa [Sakata (Siegers) TSW-R], 7. Quincy [Seminis TSW-R], 8. Talladega [Syngenta TSW-R], 9. FL 47 [Seminis (Siegers) S], 10. Red Defender [Harris Moran TSW-R], 11. Top Gun [Twilley TSW-R], 12. Redline [Syngenta TSW-R], 13. Finishline [Syngenta TSW-R], 14. Tygress [Seminis S (TYLC-R)], 15. SecuriTY 28 [Harris Moran S (TYLC-R)], 16. Inbar [Hazera TSW-R (TYLC-R)], 17. Shanty [Hazera TSW-R (TYLC-R)], 18. Tycoon [Hazera TSW-R], 19. BHN 444 [(Siegers) TSW-R], 20. BHN 640 [(Siegers) TSW-R], 21. Carson [Hazera TSW-R], 22. Tribeca line 1 [UF TSW-R], 23. 8685 line 2 [UF TSW-R], 24. 8688 line 3 [UF TSW-R], 25. 5808 line 4 [UF TSW-R], 26. 8686 line 5 [UF TSW-R], 27. 8684 line 6 [UF TSW-R], 28. 8683 line 7 [UF TSW-R], 29. XTM 5230, 30. 8687 line 9 [UF TSW-R])
- **10 lines of pepper** (1. Stiletto [Syngenta R], 2. Heritage [Harris Moran R], 3. Magico [Harris Moran R], 4. Excursion II [Abbott & Cobb S], 5. Monarch [Hazera R], 6. Plato [Seminis R], 7. Aristotle [Seminis S], 8. Declaration [Harris Moran R], 9. Allegiance [Harris Moran S], 10. HMX 7633 [Harris Moran R], 11. Sargon [Harris Moran])

2009 HPR Tomato Trial Abbrev. Results

Cultivar	At harvest % Symptomatic	%Irreg. 	Marketable Yield (lb/a)
Tycoon	0% e	0% a	64,235 a
BHN444	2% e	0% a	53,522 ab
Quincy	3% e	0% a	50,860 a-c
XTM 5230	0% e	0% a	49,013 b-c
BHN 640	0% e	1% a	48,142 b-d
Inbar	2% e	0% a	47,940 b-e
FL 47	95% a	4% a	5,397 k

Means followed by same letter not significantly different (LSD, P<0.05),
Note up to **12-fold** increase in yield over FL47 !


2009 HPR Tomato Trial Abbrev. Results

Cultivar	At harvest % Symptomatic	%Irreg. 	Marketable Yield (lb/a)
Shanty (roma*)	0% e	0% a	47,392 b-f
UF line 5808	5% de	0% a	45,173 b-g
Amelia	7% de	3% a	44,657 b-h
UF line 8683	3% e	0% a	44,076 b-h
Mountain Glory	5% de	0% a	43,786 b-h
Fletcher	0% e	0% a	43,504 b-h
FL 47	95% a	4% a	5,395 k

Means followed by same letter not significantly different (LSD, P<0.05)

* Other TSWV resistant roma types include BHN 685, Picus, Hedvig, Galilea, Sheena 31, Lia

2009 HPR Tomato Trial Abbrev. Results

Cultivar	At harvest % Symptomatic	%Irreg. 	Marketable Yield (lb/a)
Bella Rosa	7% de	0% a	43,399 b-h
Red Defender	3% e	0% a	41,213 b-h
Carson	0% e	0% a	40,737 b-h
UF line 8688	0% e	0% a	40,479 b-h
UF Tribeca 8363	3% e	0% a	40,091 b-h
UF line 8685	3% e	2% a	39,777 b-h
FL 47	95% a	4% a	5,395 k

Means followed by same letter not significantly different (LSD, P<0.05),

2009 HPR Pepper Trial Abbrev. Results

Cultivar	At harvest % Symptomatic	%Irreg. Fruit	Marketable Yield (lb/a)
Magico	1% c	0% a	21,344 a
Declaration	1% c	0% a	20,038 ab
Excursion II (s)	10% ab	0% a	17,424 abc
Heritage	0% c	0% a	15,827 bc
Aristotle (s)	6% b	0% a	15,391 c
Allegiance (s)	15% a	0% a	13,939 cd
Stiletto	0% c	0% a	7,260 e

Means followed by same letter not significantly different (LSD, P<0.05),

Summary Managing Crop Response

1. Host plant resistance provided the greatest reduction in TSWV and greatest increase in yield in tomato and will clearly continue to be the main tactic for managing risk from thrips-vectored TSWV.
2. Host plant resistance in pepper is effective, but may not be the biggest factor if the TSWV pressure is low.
3. Systemic acquired resistance (SAR) materials such as Actiguard have some yield benefits, but is variable.

Summary of Benefits and Relative Costs in Tomato

TSWV Management Tactic and cost/acre	2009 estimated % increase in marketable yield	% increase per \$ spent
TSW-resistant lines cost ~\$130 more in tomato	800-1200%	6-9%
Imidacloprid treatment ~\$30 more per acre	40%	1.3%
Metallic reflective mulch ~\$125 more per acre	30-70%	0.2-0.6%
Actiguard treatment ~\$75 more per acre	30%	0.4%

Conclusion

- 2009-2012 Risk Avoidance and Mitigation Program (RAMP) project was successful in 2009 and will continue to re-evaluate tactics (especially resistant tomato/pepper lines) across SE region and develop and validate risk prediction.
- Regional outreach through field days, regional meetings and the web site www.tswv.org
- **Acknowledgements: G. Kennedy, J. Walgenbach, J. Moyer, F. Louws, C. Gunter, M. Abney at NCSU; A. Sparks, D. Langston, R. Gitaitis, G. Fonsah at UGA; P. Smith at Clemson; and S. Olson, J. Scott at UF and W. T. Kelley of Harris Moran Seed Company**