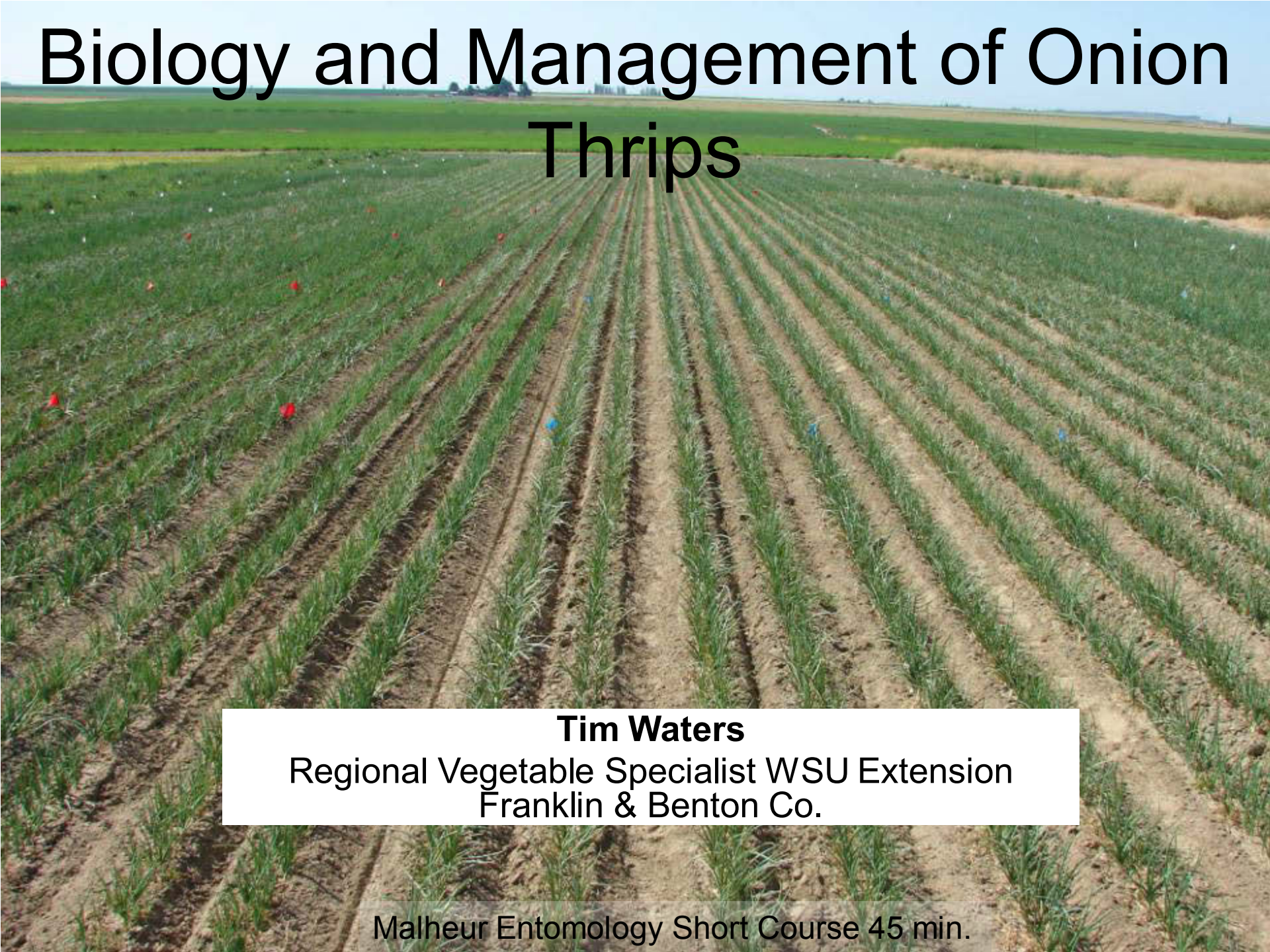
Biology and Management of Onion Thrips



Tim Waters
Regional Vegetable Specialist WSU Extension
Franklin & Benton Co.

Malheur Entomology Short Course 45 min.

Factors affecting thrips pressure

- Temperature
- Irrigation system
- Onion vigor
- Leaf color
- Plant structure
- Variety
- Nearby crops

- Thrips are the key pest of onions in the PNW.
- They reduce plant productivity
- Can Vector IYSV
- IYSV can cause lodging of seed scapes

Thrips Biology

- Sucking asymmetrical mouthparts (punch suck)
- Mobility- low and high
- Metamorphosis
- Damage from feeding, egg laying, virus transmission
- Can also feed on mite eggs, small arthropods and pollen
- Parthenogenesis
- Fecundity
- Thripssss

Parthenogenesis

- A reproduction type or process in which females are able to reproduce without mating.
- Mated females give birth to Males un-mated to females
- As a result, populations consist of females at a ratio of 1 male per 1000 females (Sakimura, 1932).

Onion Thrips Survival, Fecundity and Generation Times (Days) at Various Temperatures

	Days		
Factor	68^0 F	77^0 F	86^0 F
Survival	47	25	13
Eggs laid/ female	210	165	63
Generation time	48	30	17

Murai (2000)

Slide courtesy
B. Nault,

Onion Thrips Population Growth

	Number of Females		
Date	68^0 F		
July 1	1		
July 8			
July 15			
July 22			
July 29			
August 5			
August 12			
August 19	210		
August 26			
September 2			
Number generations	1		

Slide courtesy
B. Nault,
Cornell

Onion Thrips Population Growth

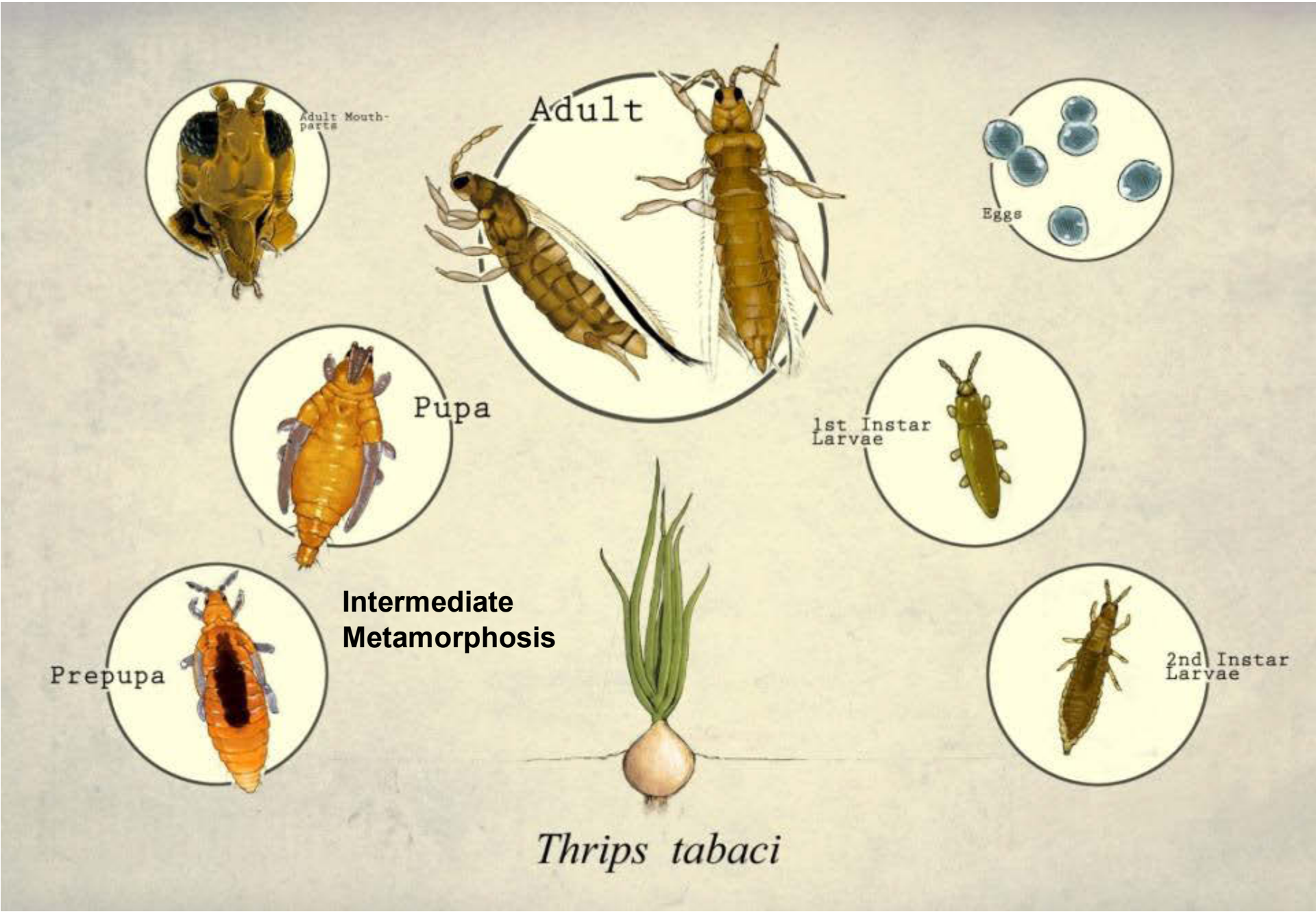
	Number of Females		
Date	68^0 F	77^0 F	
July 1	1	1	
July 8			
July 15			
July 22			
July 29		165	
August 5			
August 12			
August 19	210		
August 26			
September 2		27,225	
Number generations	1	2	

Slide courtesy B. Nault, Cornell

Onion Thrips Population Growth

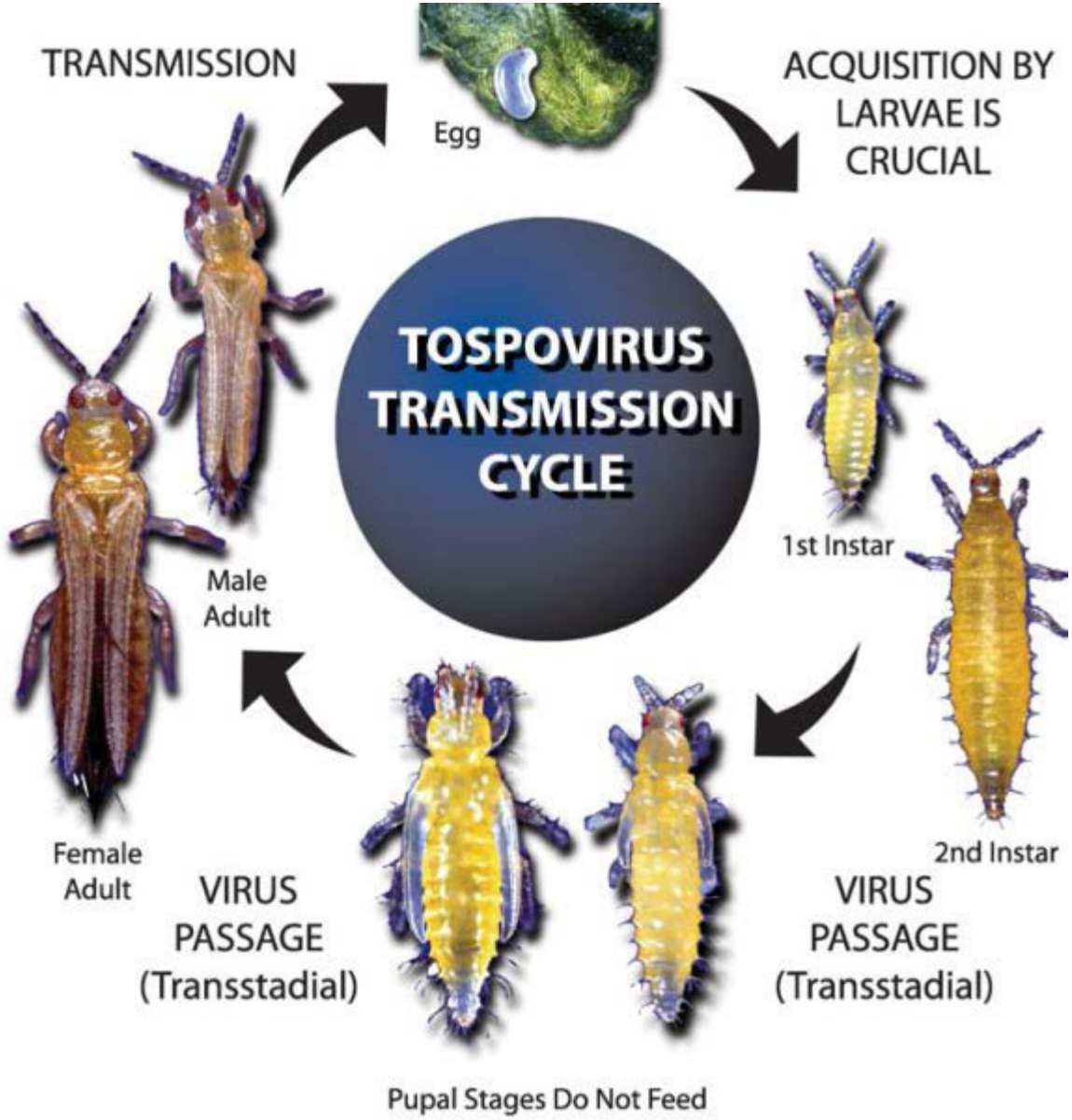
	Number of Females		
Date	68° F	77° F	86° F
July 1	1	1	1
July 8			
July 15			63
July 22			
July 29		165	3,969
August 5			
August 12			250,047
August 19	210		
August 26			15,752,961
September 2		27,225	
Number generations	1	2	4

Slide courtesy
B. Nault,



Intermediate Metamorphosis

D. Vermul



Whitfield et al., 2005. Annu. Rev. Phytopathol. 43:459–89

Bioassay of lamba-chyhalothrin(Pasco-western:2nd instar nymph of the1st genration rearing indoor)

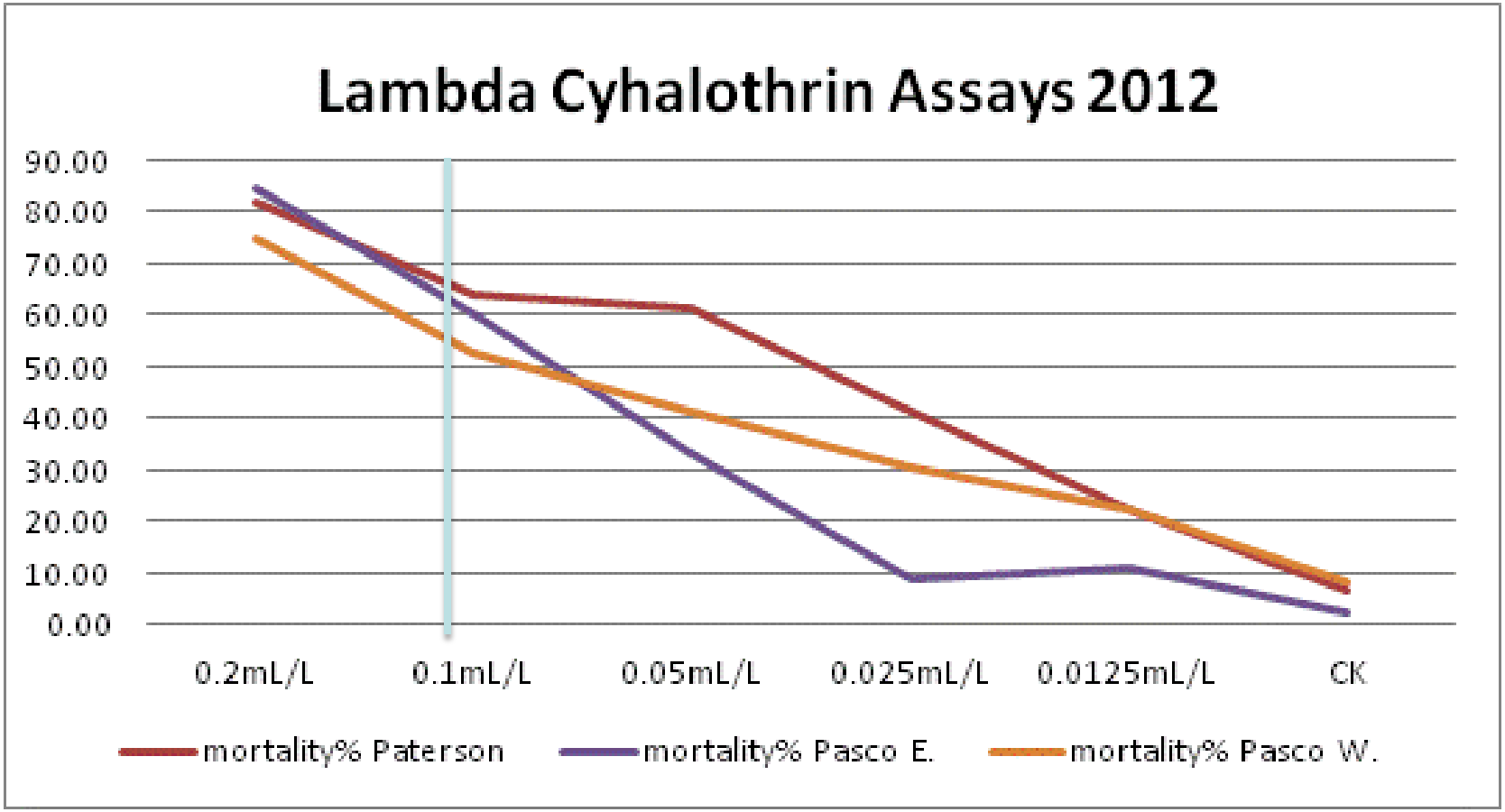
treatment	D	A		mortality %
0.2mL/L	27	9	0.7500	75.00
0.1mL/L	19	17	0.5278	52.78
0.05mL/L	14	20	0.4118	41.18
0.025mL/L	11	36	0.3056	30.56
0.0125mL/L	8	28	0.2222	22.22
CK	1	36	0.0833	8.33

Bioassay of lamba-chyhalothrin(Pasco-Eastern:field population)

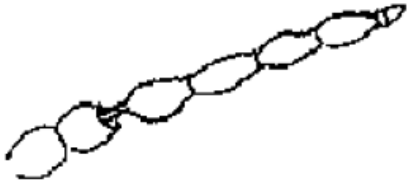
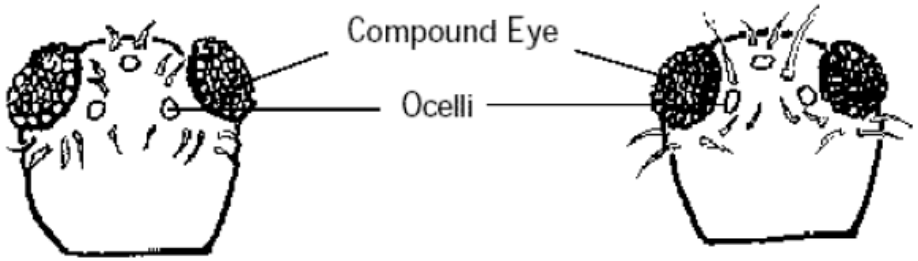
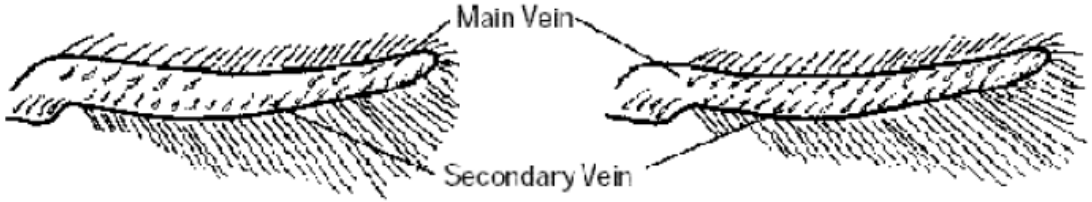
treatment	D	A	mortality%
0.2mL/L	38	7	84.44
0.1mL/L	27	18	60.00
0.05mL/L	15	30	33.33
0.025mL/L	4	41	8.89
0.0125mL/L	5	40	11.11
0.00625mL/L	2	43	4.44
CK	1	44	2.22

Bioassay of lamba-chyhalothrin(Paterson-R5: 2nd instar nymph of the1st genration rearing indoor)

treatment	D	A		mortality%
0.2mL/L	40	9	0.8163	81.63
0.1mL/L	30	17	0.6383	63.83
0.05mL/L	22	14	0.6111	61.11
0.025mL/L	14	20	0.4118	41.18
0.0125mL/L	8	28	0.2222	22.22
CK	3	41	0.0682	6.82



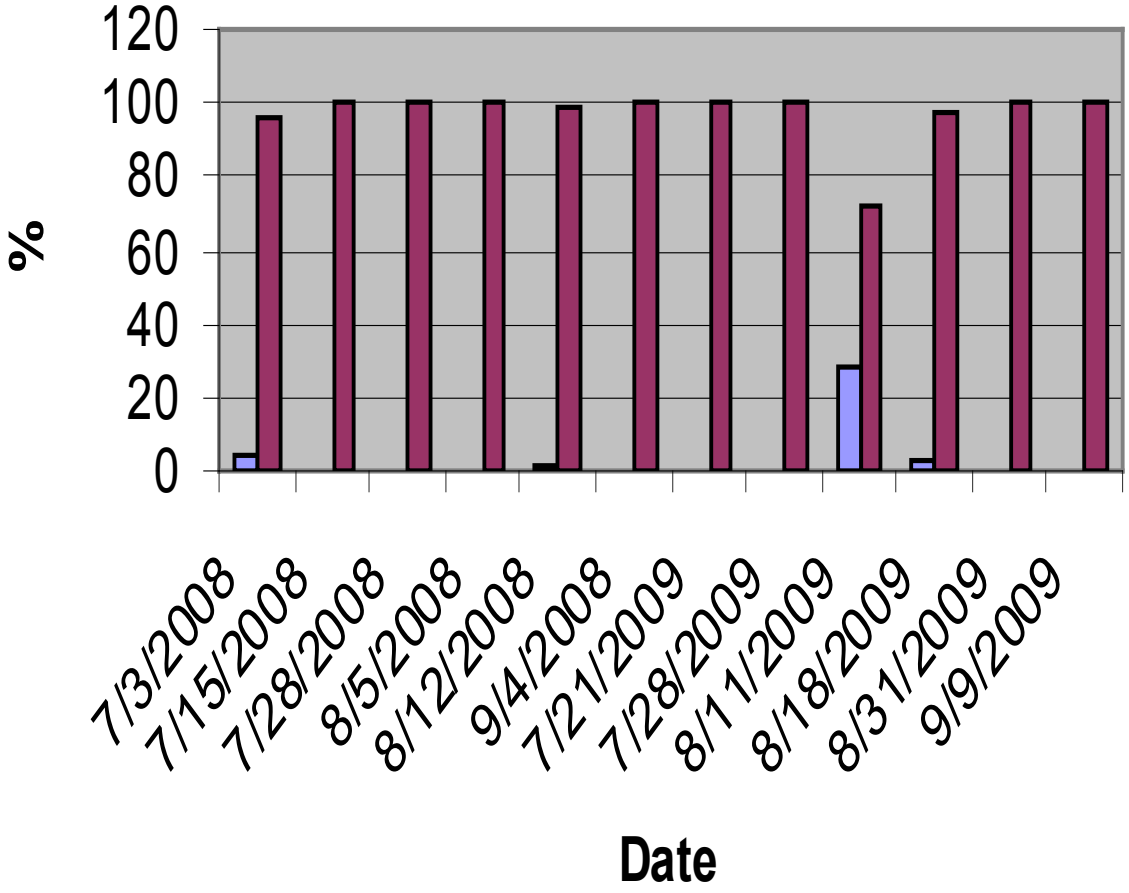
Wu and Walsh 2012. Pyrethroid resistance assays field collected populations. First laboratory generation 2nd instar nymphs (24 hr)

Thrips tabaci	*Frankliniella occidentalis*
BODY:	
Colour - yellow to dark-brown; if two-coloured, the thorax is lighter than the abdomen **Length** - 0.8 mm	**Colour** - light yellow to dark-brown, often darker yellow with irregular brown spots on thorax and abdomen **Length** - 1.2 mm
ANTENNA:	
 7 Segments	 8 Segments
HEAD:	
	
Setae ➢ two short hairs between the ocelli ➢ only short hairs behind the compound eye	➢ two long hairs between the ocelli ➢ one long and some short hairs behind the compound eye
FRONT WING:	
	
Main Vein ➢ 6 to 7 hairs at the base, 4 (sometimes 3 to 5) at the tip	➢ Covered with hairs over the whole length
Secondary Vein ➢ Covered with hairs over the whole length	➢ Covered with hairs over the whole length

Taken from: BC Ministry of Agriculture and Lands


WFT 8 seg. Antennae

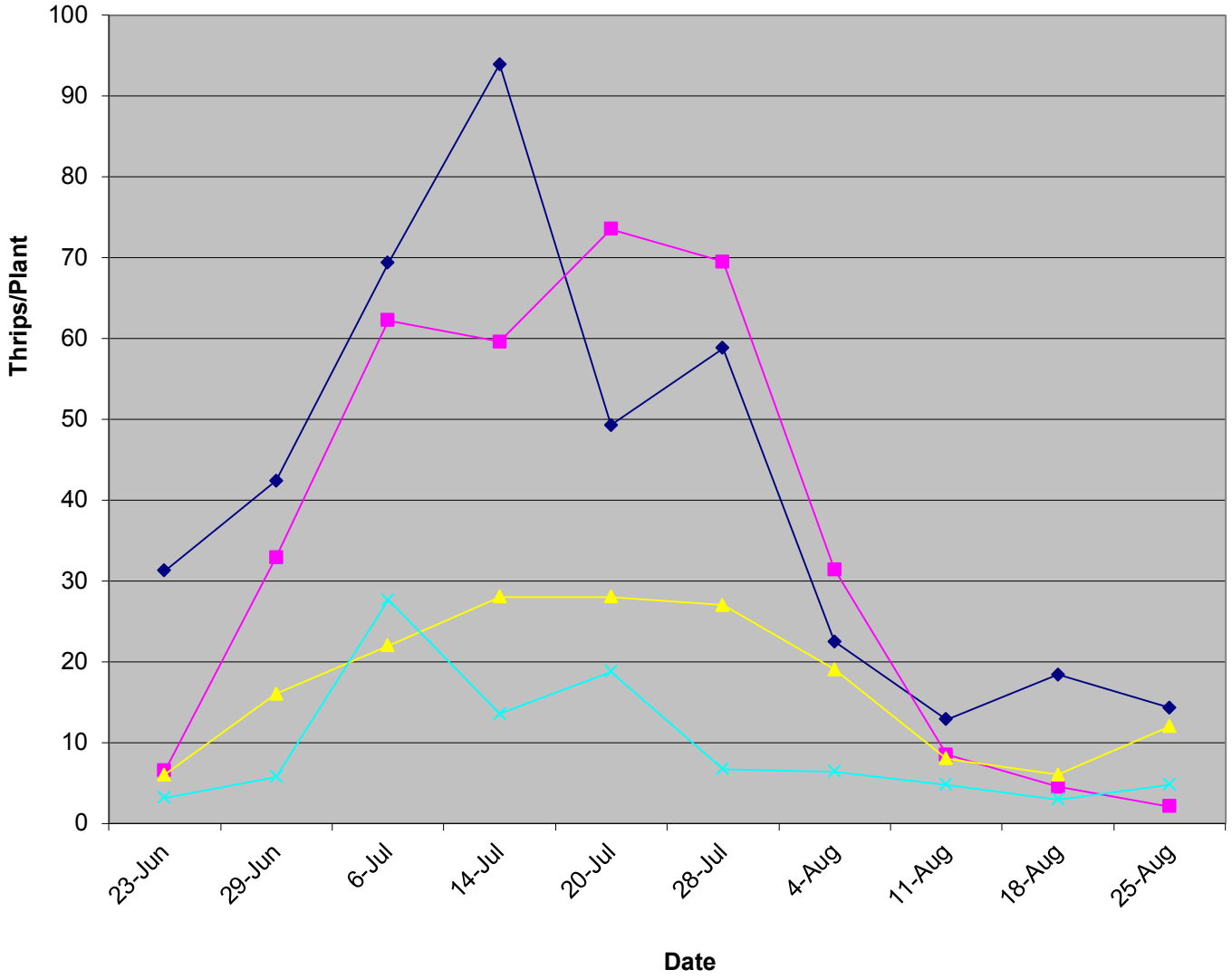
Thrips Population Onions Othello, WA



Methods

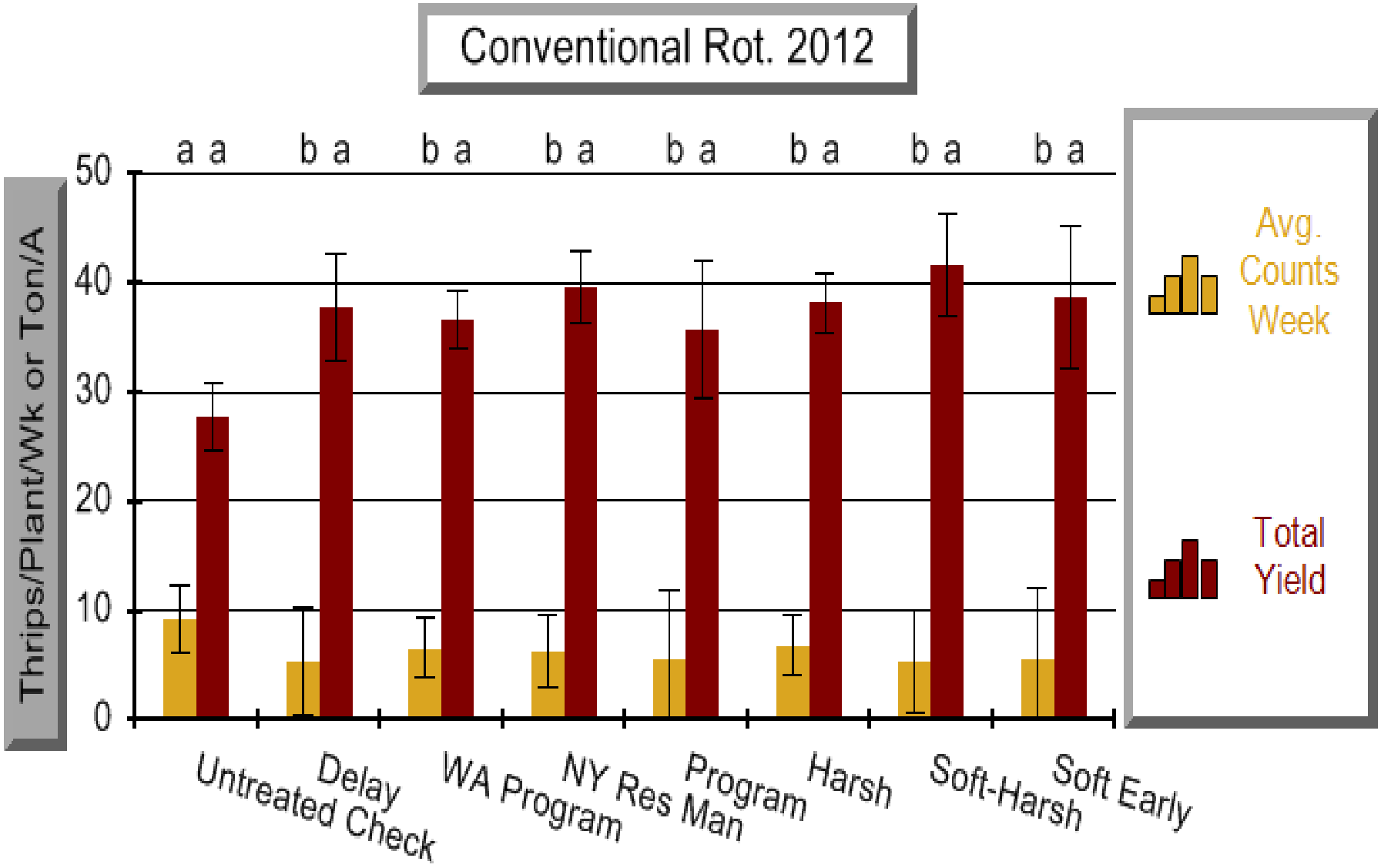
- Planted March 28, 2012 var. Sabroso
- Location: Pasco, WA
- 4 replications RCBD
- CO^2 Backpack sprayer
- 30 psi and 30 gallons water/A
- Plots reached treatment threshold on June 6^{th} (10 days earlier than 2009 and 2010)
- 10 plants counted per plot (7.5 x 30 feet)

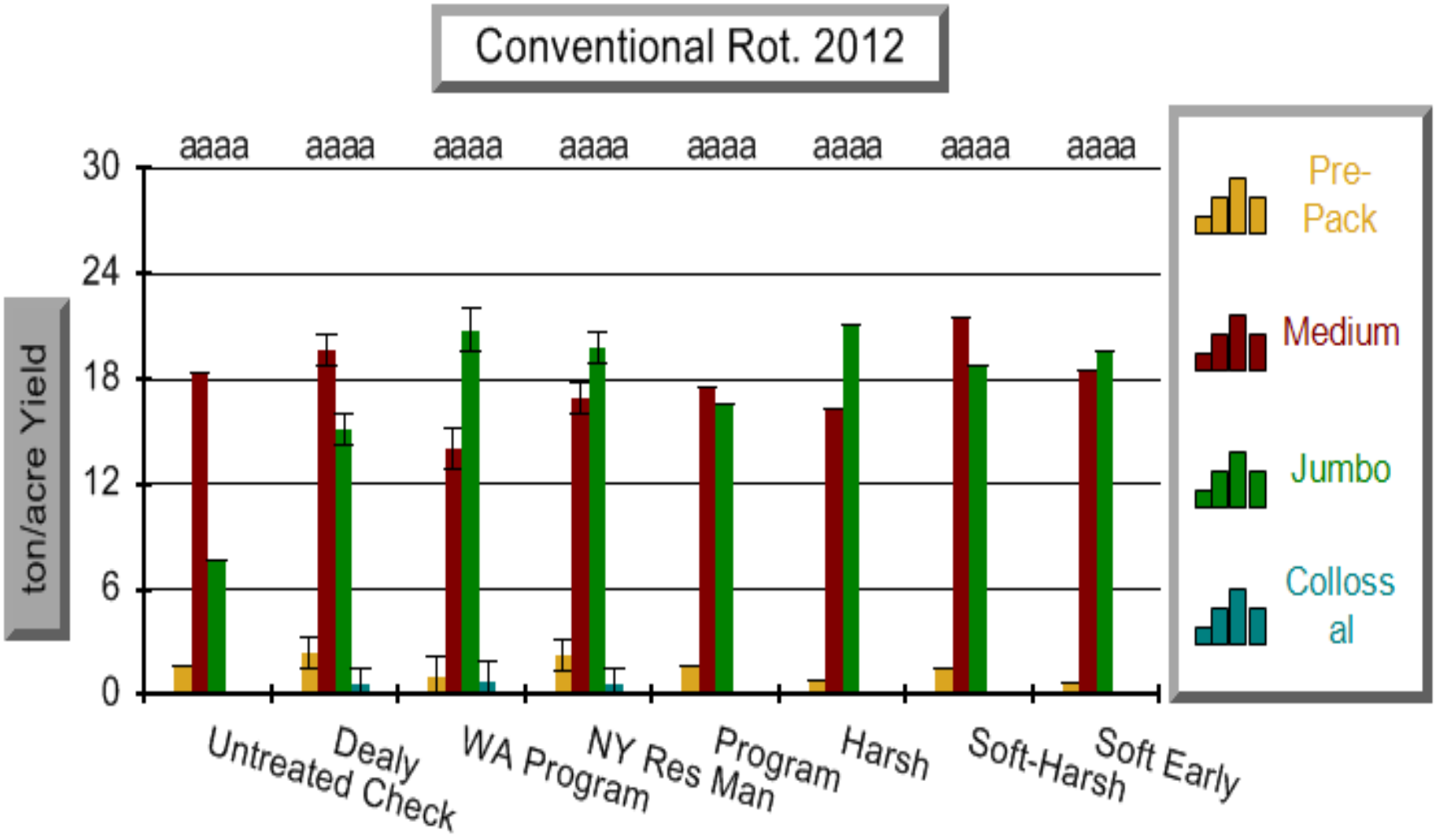
Thrips in UTC Plots



Sequential Applications

- What combination, and in what sequence do currently registered thrips control products work with one another?

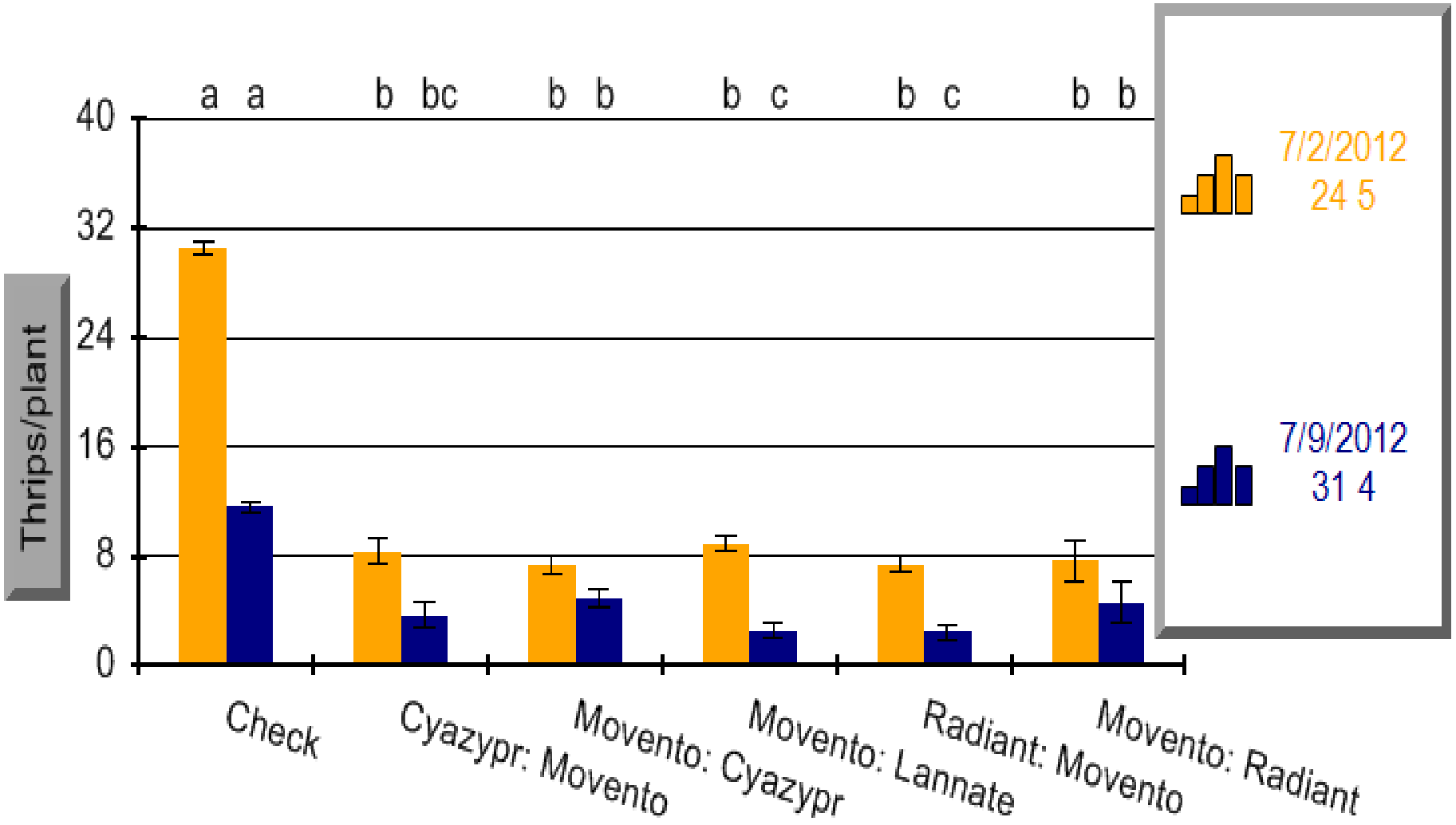

Conventional Rot. 2012
a a
b a
b a
b a
b a
b a
b a
b a
Thrips/Plant/Wk or Ton/A
50
40
30
20
10
0
Untreated Check
Delay
WA Program
NY Res Man
Program
Harsh
Soft-Harsh
Soft Early
Avg. Counts Week
Total Yield

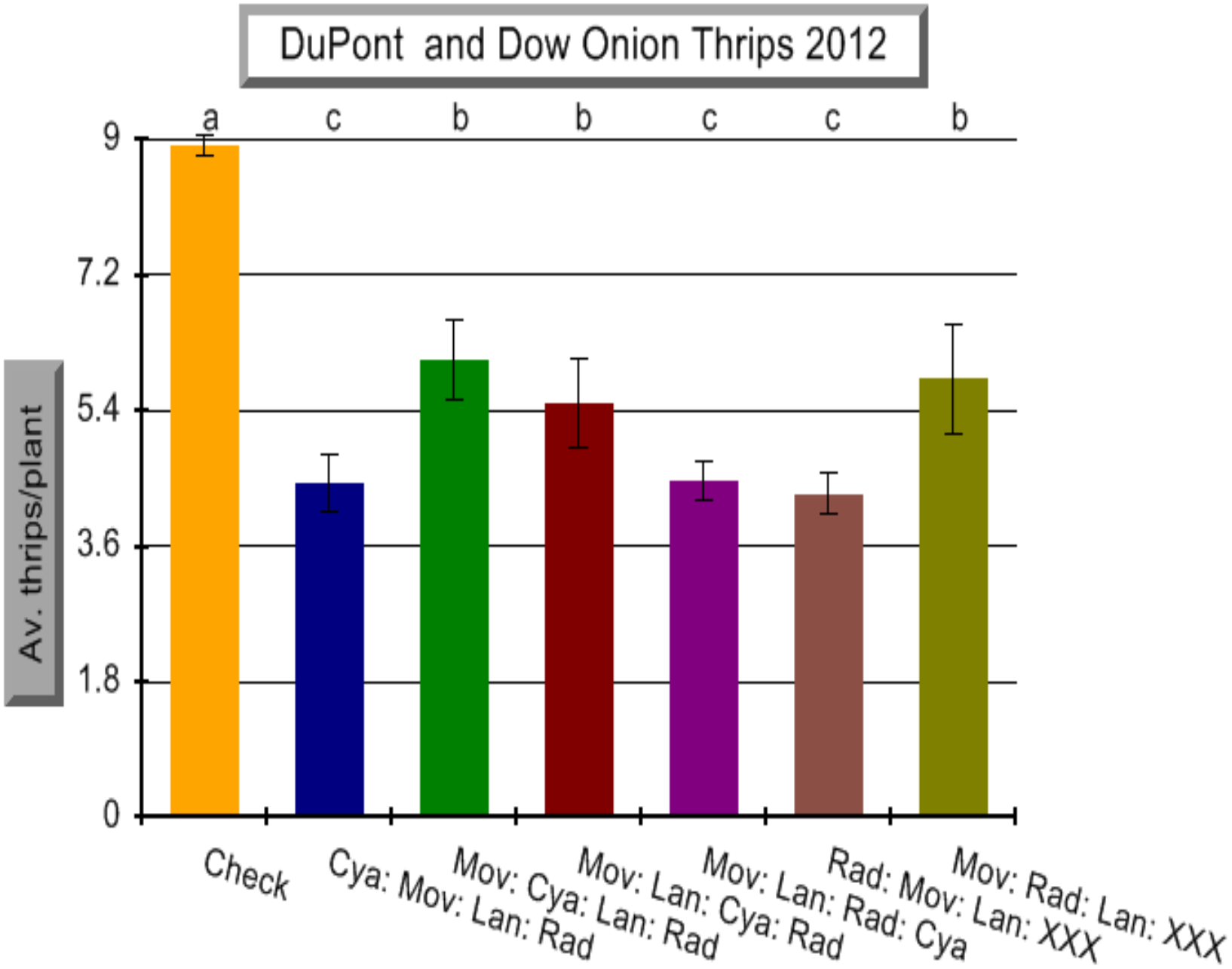

Conventional Rot. 2012
aaaa aaaa aaaa aaaa aaaa aaaa aaaa aaaa
30
24
18
12
6
0
ton/acre Yield
Pre-Pack
Medium
Jumbo
Colloss al
Untreated Check
Dealy
WA Program
NY Res Man
Program
Harsh
Soft-Harsh
Soft Early

Week	1	2	3	4	5	6	7	8	Cost/A $	yield tons/A	Net over Check $/A	Thrips/Week
Untreated Check									0	27.75	0.00	9.3 a
Delay		Radiant + Movento	Movento	Radiant	Agrimek		Lannate		275	37.83	2144.20	5.4 b
WA Program		Movento	Movento	AzaDirect + Radiant	AzaDirect + Radiant		Lannate	Lannate	303	36.59	1818.60	6.6 b
NY Res. Man.	Movento	Movento	Agrimek	Agrimek	Lannate	Lannate	Radiant	Radiant	356	39.60	2488.00	6.3 b
Program	AzaDirect + Radiant	Movento	Radiant	Agrimek		Lannate	Lannate		293	35.70	1615.00	5.6 b
Harsh	Lannate	Movento		Lannate	Agrimek	Radiant	Lannate		239	38.23	2276.20	6.8 b
Soft to Harsh	Movento	Movento	Radiant	Radiant	Agrimek	Lannate		Lannate	305	41.63	3026.20	5.5 b
Soft Early	Radiant + Movento	Movento		Radiant	Agrimek		Lannate		275	38.75	2365.00	5.7 b

Based on average retail product prices and onions selling at $240 per ton. ((Treatment yield-UTC Yield)*240)-Product cost/A.

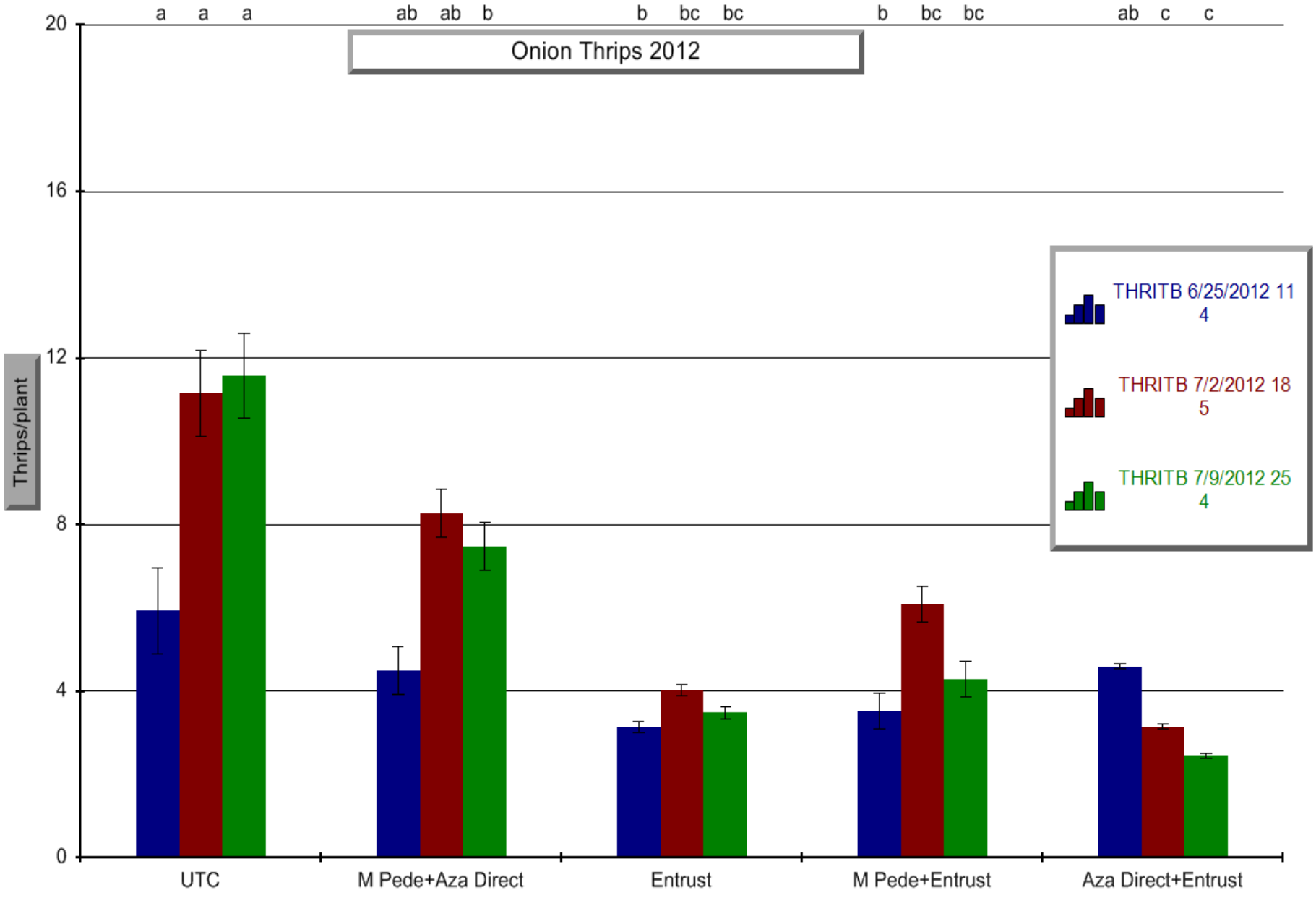
Dupont and Dow Onion Thrips 2012

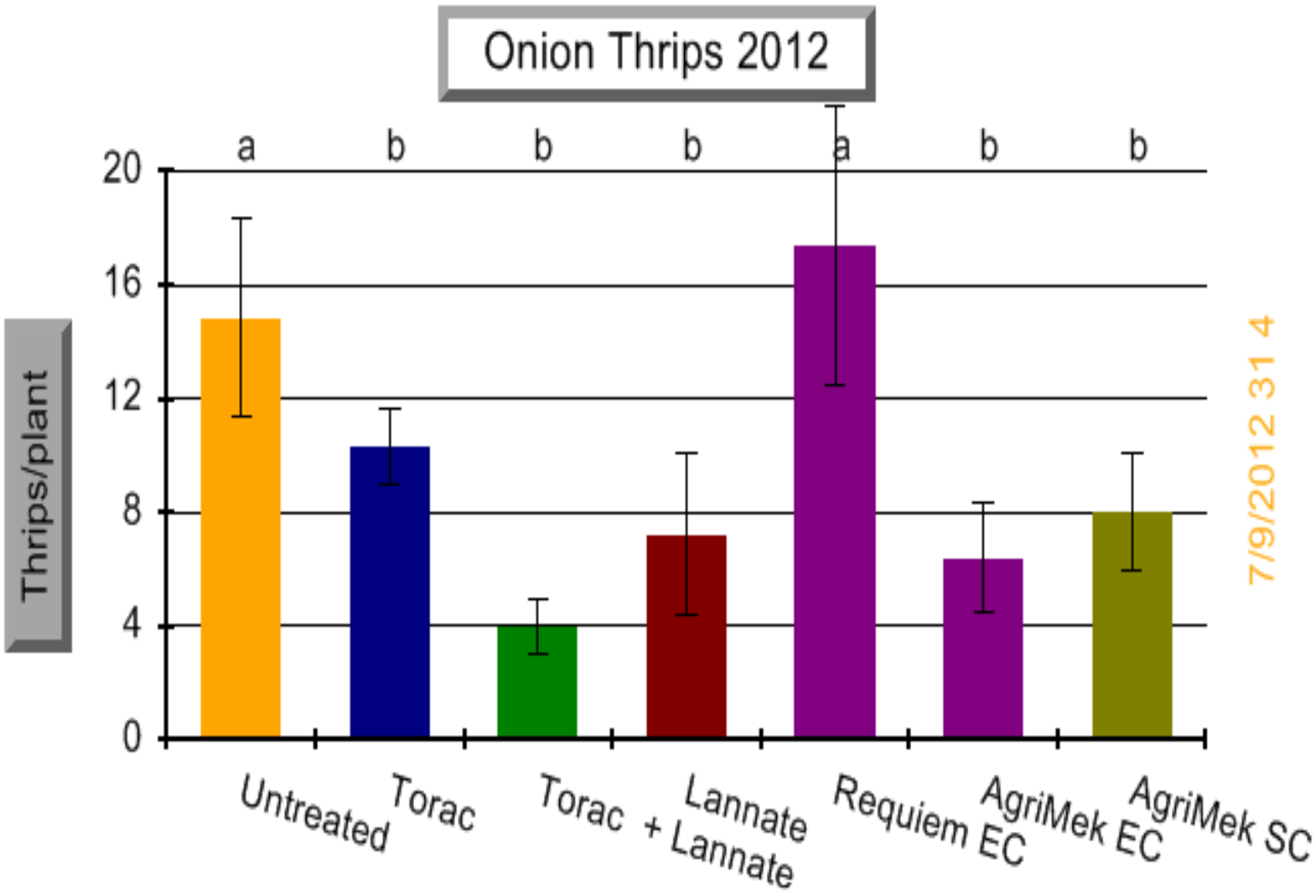



DuPont and Dow Onion Thrips 2012
a
c
b
b
c
c
b
9
7.2
5.4
3.6
1.8
0
Av. thrips/plant
Check
Cya: Mov: Lan: Rad
Mov: Cya: Lan: Rad
Mov: Lan: Cya: Rad
Mov: Lan: Rad: Cya
Rad: Mov: Lan: XXX
Mov: Rad: Lan: XXX

Weekly applications

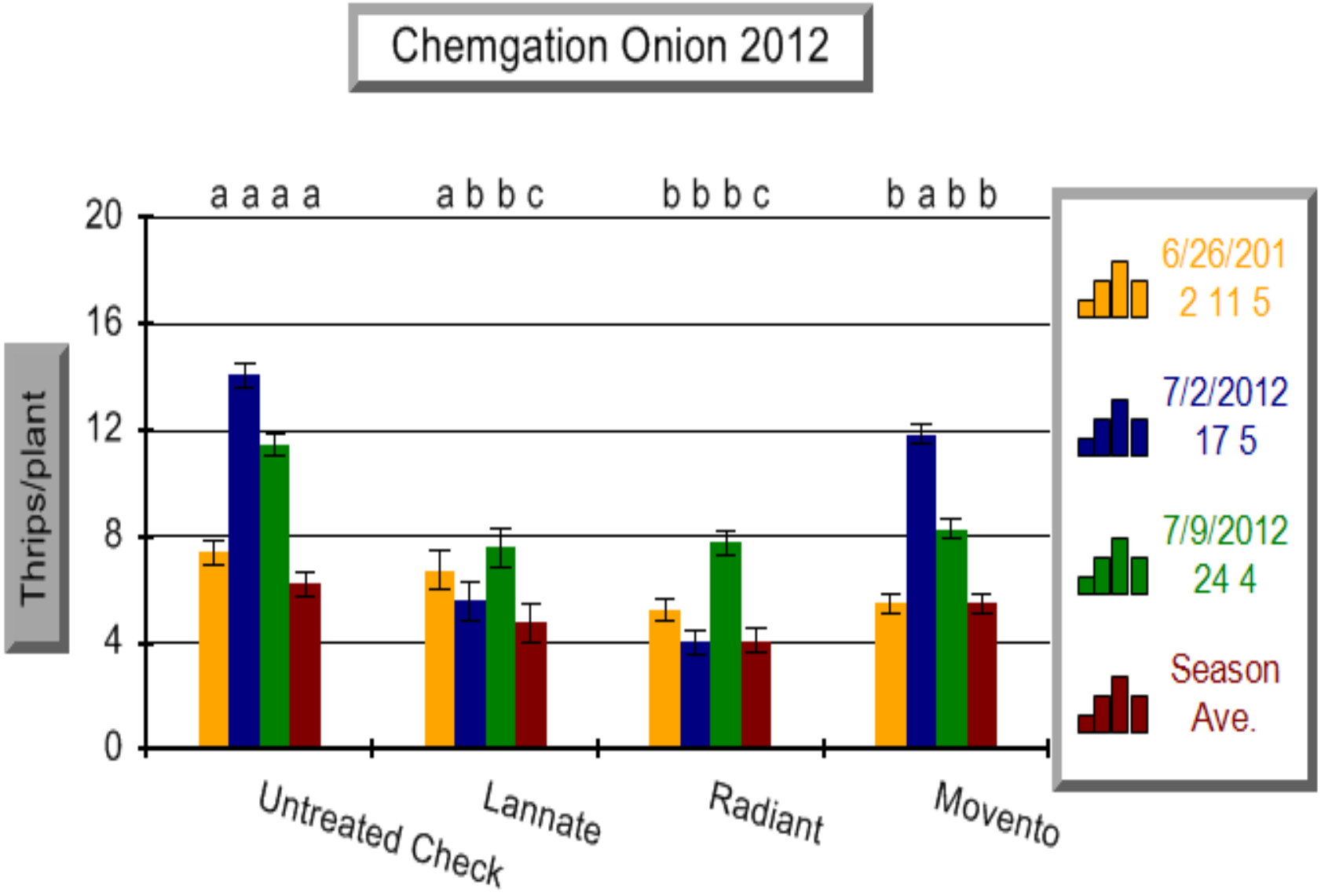
- Which products are most effective at controlling thrips?

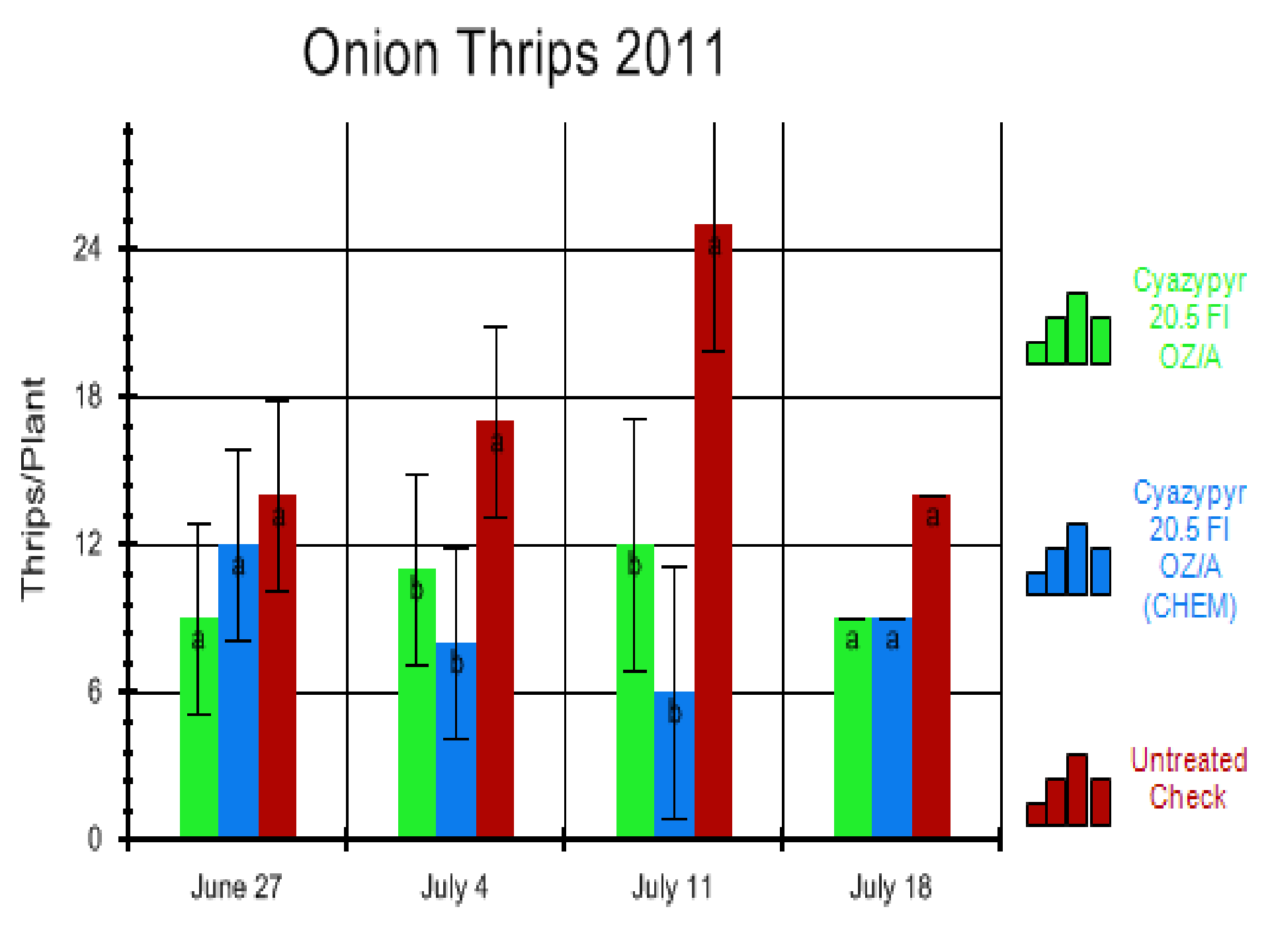

a a a
ab ab b
b bc bc
b bc bc
ab c c
Onion Thrips 2012
20
16
12
8
4
0
Thrips/plant
THRITB 6/25/2012 11 4
THRITB 7/2/2012 18 5
THRITB 7/9/2012 25 4
UTC
M Pede+Aza Direct
Entrust
M Pede+Entrust
Aza Direct+Entrust


Onion Thrips 2012
Thrips/plant
20
16
12
8
4
0
a
b
b
b
a
b
b
Untreated
Torac
Torac + Lannate
Lannate
Requiem EC
AgriMek EC
AgriMek SC
7/9/2012 31 4

Chemigation Simulation

- Applies 0.1” of water per pass
- Water applied in equal volume to all treatments including UTC


Chemgation Onion 2012
a a a a
a b b c
b b b c
b a b b
20
16
12
8
4
0
Thrips/plant
Untreated Check
Lannate
Radiant
Movento
6/26/201
2 11 5
7/2/2012
17 5
7/9/2012
24 4
Season
Ave.


Onion Thrips 2011
Thrips/Plant
0
6
12
18
24
June 27
July 4
July 11
July 18
a
a
a
b
b
a
b
b
a
a
a
Cyazypyr 20.5 FI OZ/A
Cyazypyr 20.5 FI OZ/A (CHEM)
Untreated Check

Gallonage and Pressure

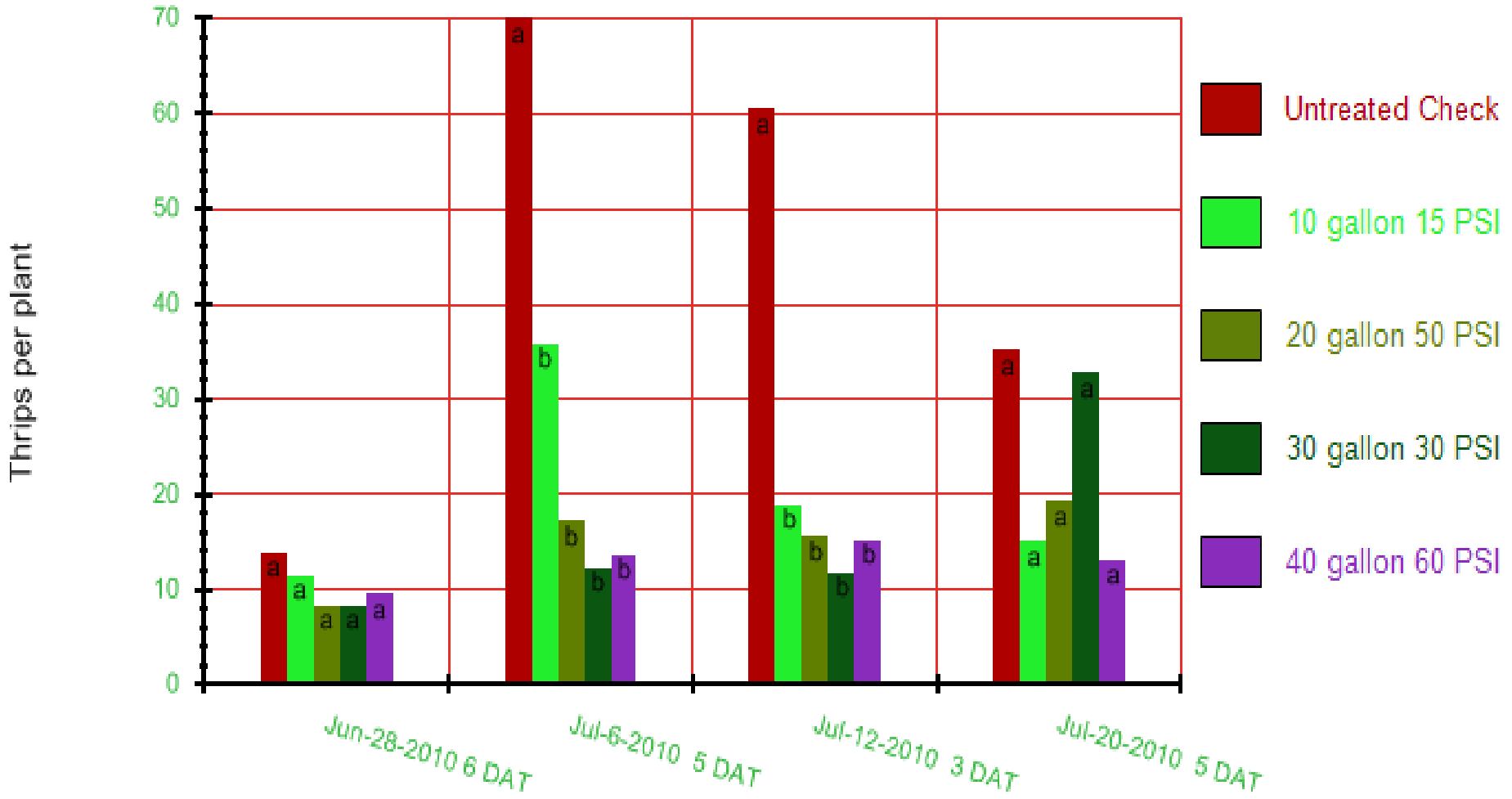
- Does application Gallonage and pressure affect thrips efficacy?
- Previous studies suggests it does
- How does the pressure and gallonage affect the products ability to contact thrips in onion plants?

Gallonage and Pressure

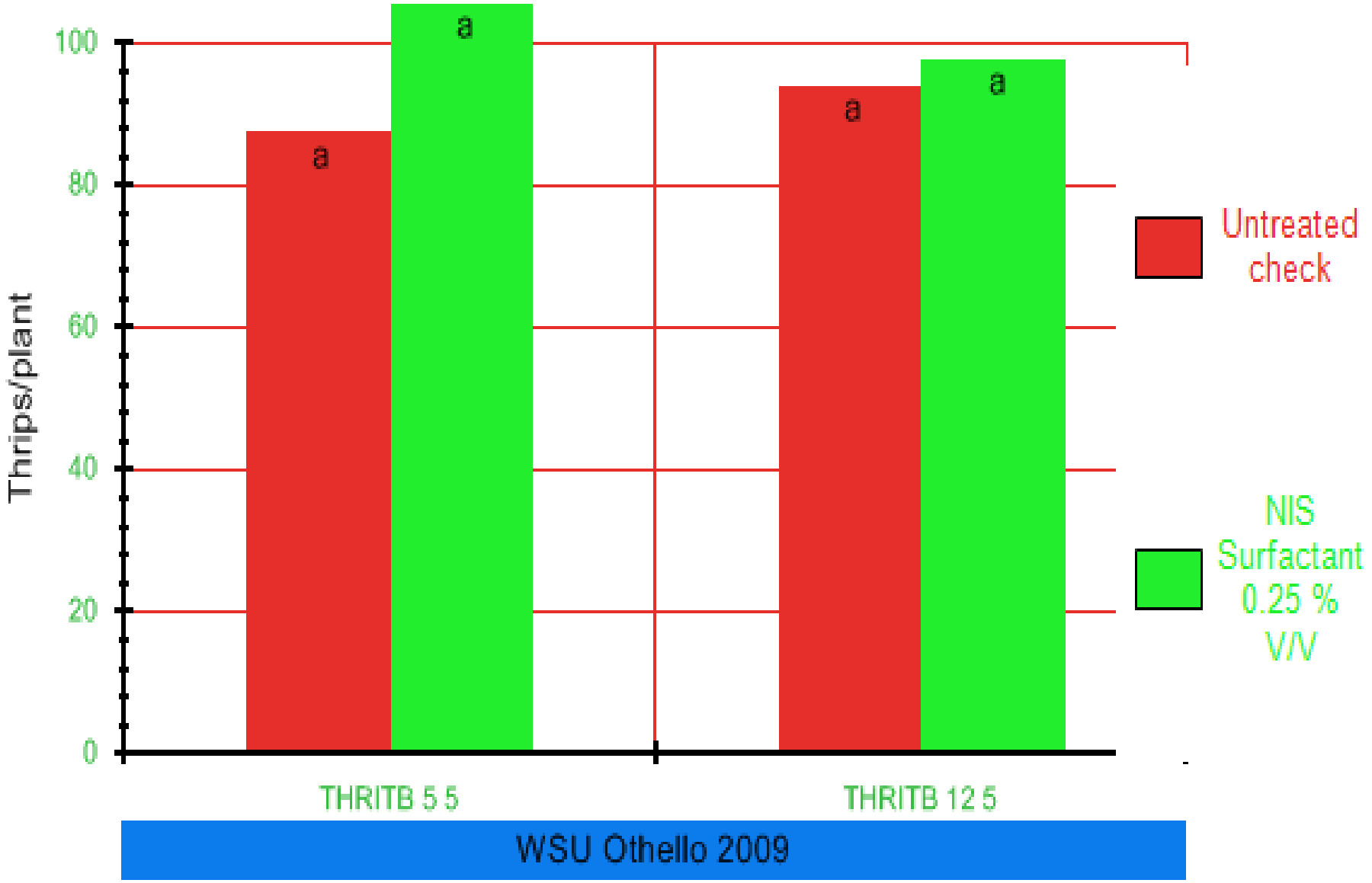
- Tested
  - 10 Gallons @ 15 PSI
  - 20 Gallons @ 50 PSI
  - 30 Gallons @ 30 PSI
  - 40 Gallons @ 60 PSI

  - AzaDirect+Radiant (Weekly)

Gallonage Onion Thrips 2010



Surfactant vs. UTC



Things to consider

- Rotate Chemistries w/Different modes of Action
- Leave spray tracks in field
- Use good surfactants
- Scout fields often, attack before they spike
- Plant varieties that are less susceptible
- Buffer spray solution when recommended by label

Take Home

- Radiant- Good early and late season choice
- Lannate- Best used later in season. Chem.
- Movento-Good early season choice, slow acting, doesn't control WFT well
- AgriMek-Late season choice
- Pyrethroids-not effective in most areas
- Soon to be-
  - Tolfenpyrad (Torac)-good activity, late season choice
  - Cyazypyr (Benevia)-good activity, late season, chem.

Acknowledgments

Funding

- Carr Farms
- Cascade Specialties
- Easterday Farms
- Grigg Farms
- Mercer Canyons
- McCain Foods USA
- River Point Farms
- Roloff Farms
- Sunheaven Farms
- Agraquest
- Syngenta
- DuPont
- Nichino
- Gowan Co.
- Dow Agrosciences
- WSCPR

Technical assistance and In-Kind Support

- Greg Jackson, Two Rivers
- Nunhems USA
- Bob Middlestat, Clearwater Supply

Disclaimer

- Not all compounds tested are currently registered for use on Onions in Washington State.
- Do not use unregistered compounds
- Consult your local Extension office and read and follow label directions.
- Oregon and Washington labels (PICOL):

  http://cru66.cahe.wsu.edu/LabelTolerance.html

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