Thrips Control Programs & Population Dynamics in Central SJV

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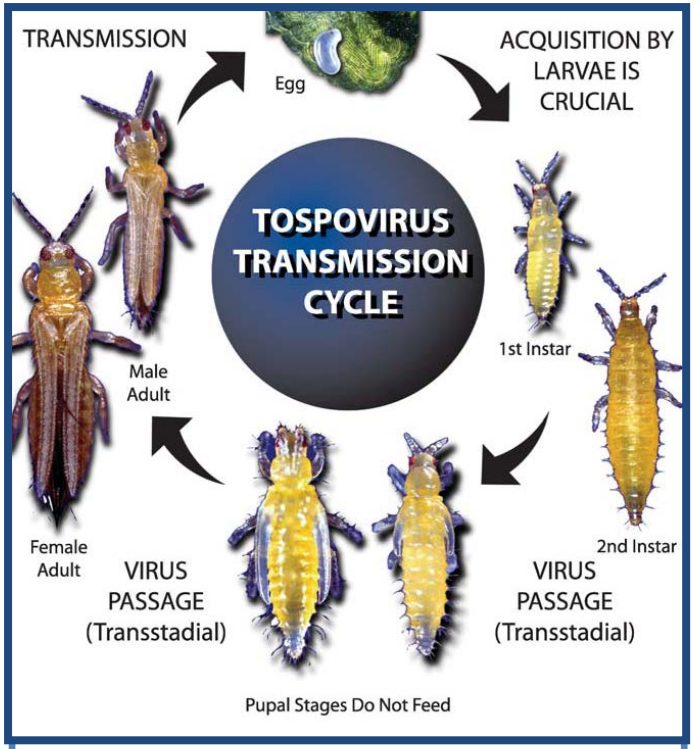
Thrips in onions in SJV

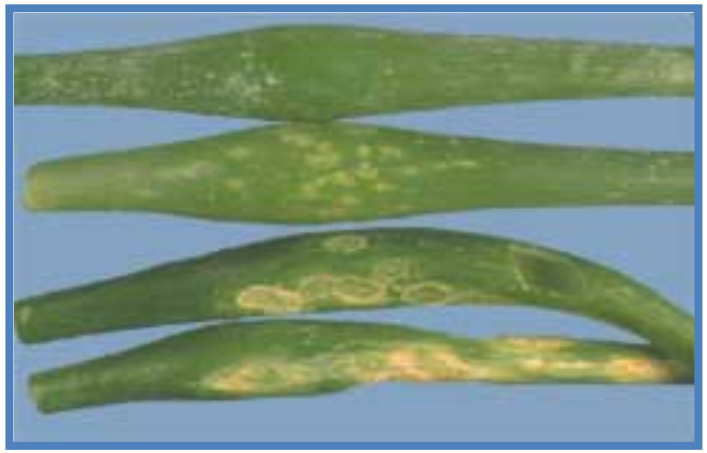
- Population densities typically increase slowly from mid-Feb to mid-Jun.
- Onions are grown on 22-26,000 acres in Fresno Co.
- *Iris yellow spot virus* is present, but typically at low levels.

Iris yellow spot virus

- Transmitted by Onion thrips (*Thrips tabaci*)
- Host Range: Iris, Jimsonweed, green onion, chives and bulb onion



A. E.Whitfield, D. E. Ullman, and T L. German. 2005. **TOSPOVIRUS-THRIPS INTERACTIONS.** Annu. Rev. Phytopathol. 2005. 43:459–89



Objectives

- Efficacy comparison for thrips control in onions
- Evaluate impact of insecticide programs on yield
- Document seasonal fluctuations in thrips spp.

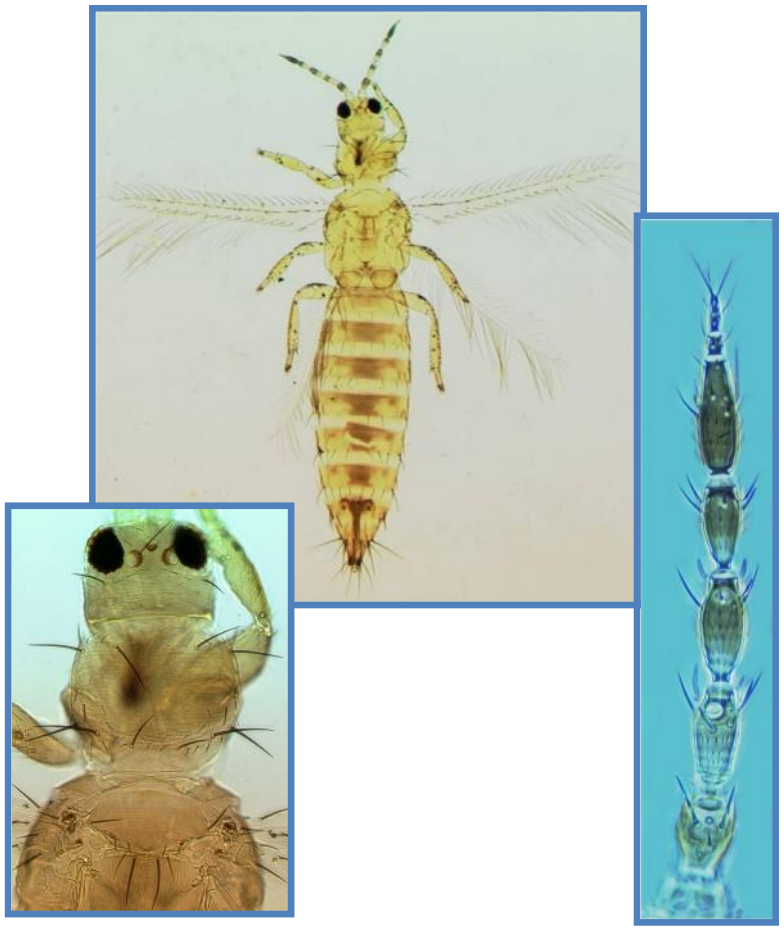
Methods

- University of California West Side Research and Extension Center, Fresno Co., CA
- First irrigation: 4 Feb 2011, 12 Jan 2012
- Olam processing onion variety
- Sprinkle irrigation/flood
- Applications began when 5-10 thrips/plant
- Efficacy applications were applied with CO^2-pressurized sprayer at 40 psi, 50 gpa
- Programs treatments were applied with a tractor mounted rig at 40 pai and 50 gpa
- Activator, non-ionic surfactant, 0.25% v/v was included with all treatments

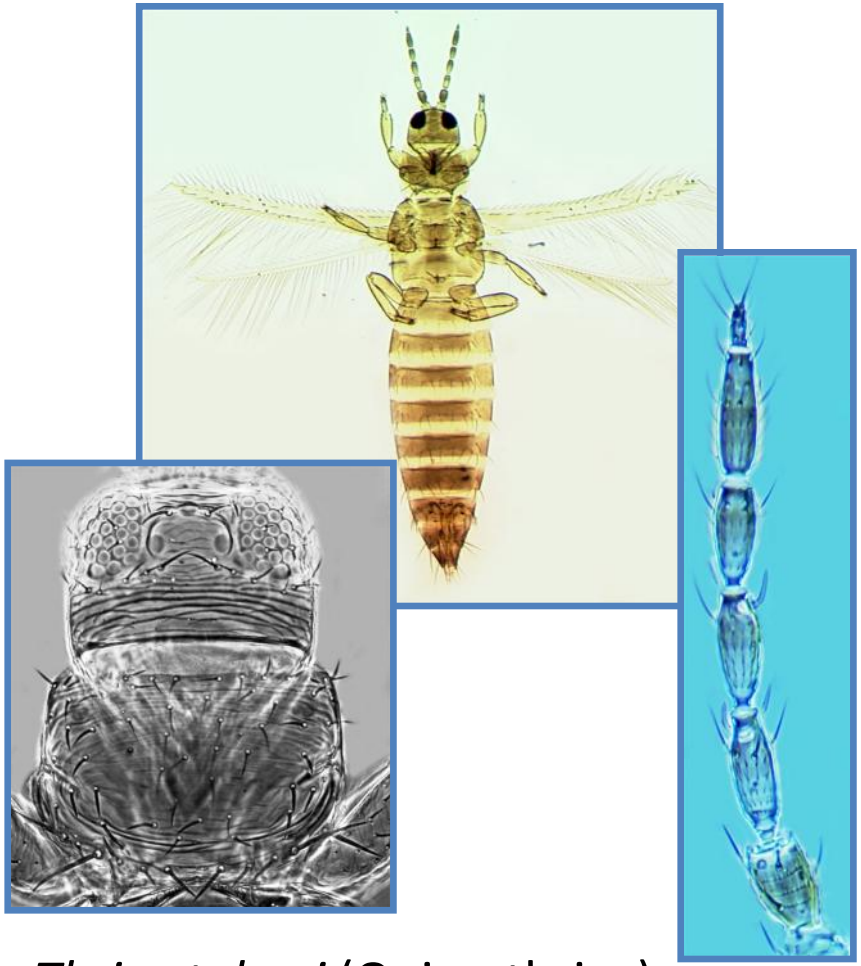
Thrips Data Collection

- Thrips counts
  - Three plants/plot cut and put into 1 to 2 gallon zip lock bag.
  - Samples were washed within the bag and poured into a 150 mesh screen. (repeated 3x)
  - From the top of the screen, 5 mls were poured into a vial and 15 ml EtOH was added.
  - A disecting-scope (17x) was used to count thrips.
- Thrips identification
  - Adult thrips (5-15/plot) are identified to species.
  - Compound microscope (40x)
  - Lucid Key: Hoddle MS, Mound LA, Paris DL. 2008. Thrips of California. CBIT Publishing, Queensland.

Thrips Identification



Frankliniella occidentalis
(Western flower thrips)



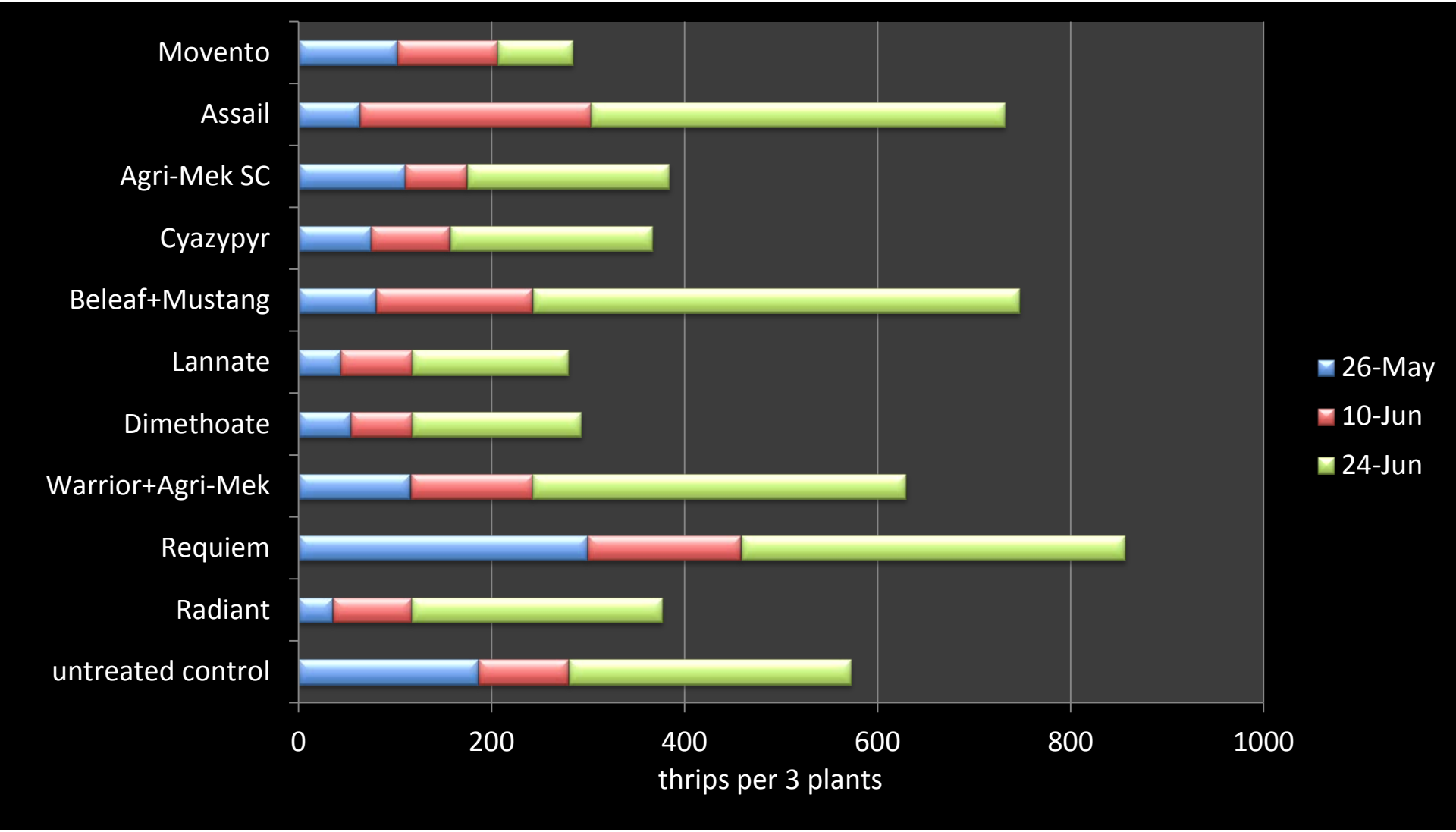
Thrips tabaci (Onion thrips)

Some materials tested may not be registered on tomatoes. All applicable labels should be read before writing a pesticide recommendation.

Group #	Chemical sub-group	Primary target site of action	Trade name	Active ingredient
1A	Carbamate	Acetylcholine esterase inhibitors	Lannate LV	methomyl
1B	Organophosphate		Dimethoate 4EL	dimethoate
3A	Pyrethroids	Sodium channel modulators	Mustang	Zeta-cypermethrin
			Warrior with Zeon	Lambda-cyhalothrin
4A	Neonicotinoids	Nicotinic acetylcholine receptor agonists	Admire, Assail, Platinum, Venom	Imidacloprid, acetamiprid, thiamethoxam, dinotefuron
5	Spinosyns	Nicotinic acetylcholine receptor allosteric activators	Radiant Entrust	spinetoram spinosad
6	Avermectins, Milbemycins	Chloride channel activators	Agri-Mek SC	abamectin
9C	Flonicamid	Selective homopteran feeding blockers	Beleaf	flonicamid
21	Pyrazole		Torac	tolfenpyrad
23	Tetronic and Tetramic acid derivatives	Inhibitors of acetyl CoA carboxylase.	Movento	spirotetramat
28	Diamide	Ryanodine receptor modulators	Cyazypyr	cyantraniliprole

From IRAC, 2012

2011 Efficacy Comparison



All materials applied on 13, 23 May, 7 and 17 Jun

2011 Efficacy

26 May (3 days after 2nd application)

Greater than 98% thrips were *T. tabaci* or *F. occidentalis.*

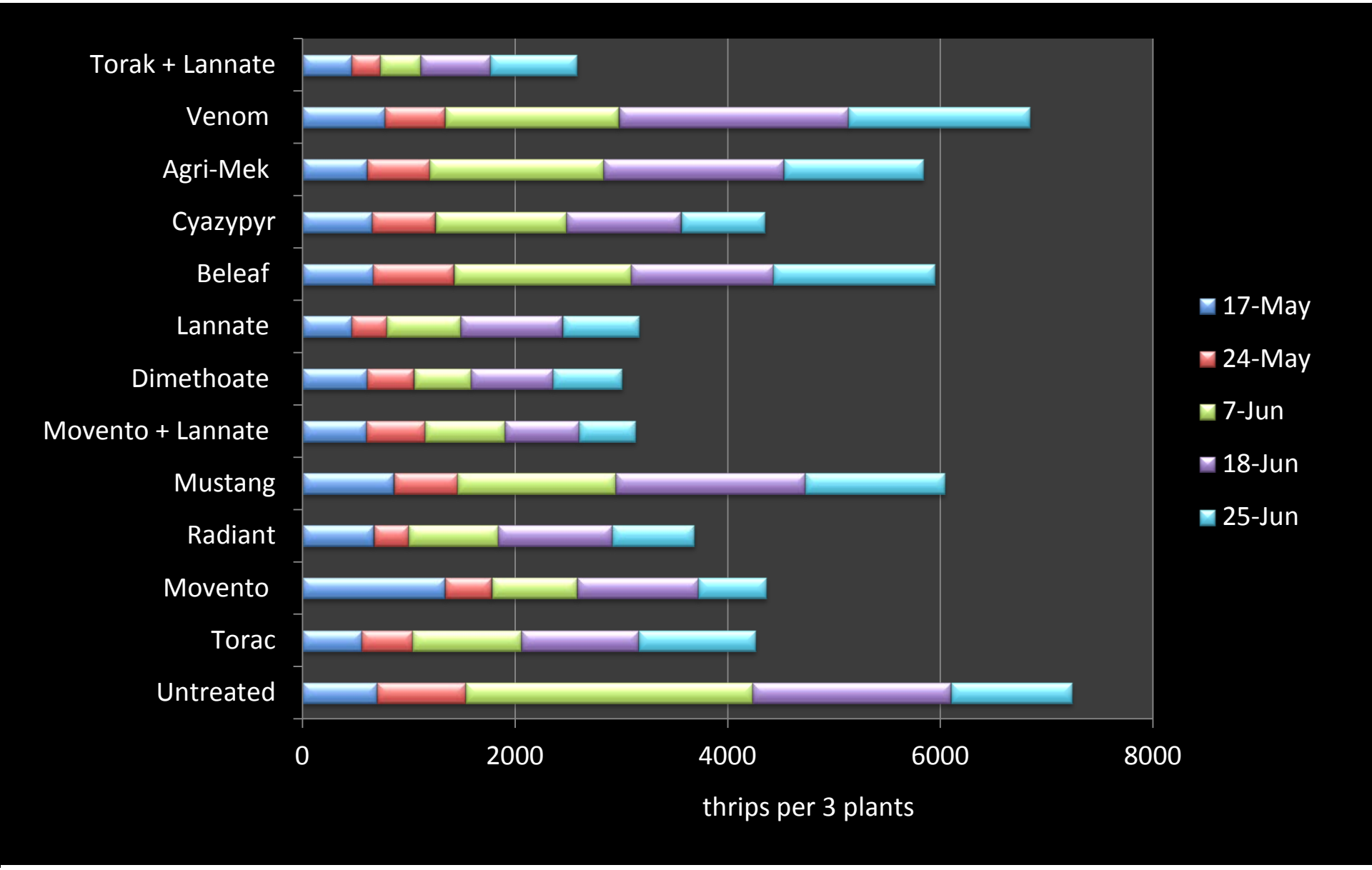
Treatments	Adults		Nymphs		*T. tabaci* (%)	
Radiant 8 fl oz	13.8	g	21.8	f	30.7	bcd
Dimethoate 4EL 4 pt	14.5	fg	39.3	def	17.6	d
Lannate LV 3 pt	17.8	efg	25.8	ef	54.5	ab
Warrior with Zeon 1.92 fl oz + Agri-Mek SC 3.0 fl oz	22.5	defg	93.0	bc	35.7	bcd
Assail SG 8 oz	23.8	cdefg	39.8	def	53.8	ab
Beleaf 50SG 2.8 oz + Mustang 4.3 oz	30.5	cdefg	49.8	cde	76.4	a
Cyazypyr 10SE 13.5 fl oz	32.5	cde	42.8	def	34.5	bcd
Agri-Mek SC 3.0 fl oz	43.0	bcd	67.5	cd	26.7	cd
Movento 240 SC 5 fl oz	44.8	abc	57.5	cd	44.4	bc
Control	59.3	ab	127.0	b	43.3	bc
Requiem 4 pt	71.5	a	227.8	a	15.5	d

2011 Efficacy

24 Jun (7 days after 4th application)

Treatments	Adults		Nymphs		*T. tabaci* (%)
Agri-Mek SC 3.0 fl oz	31.8	c	178.0	bcd	75.8
Movento 240 SC 5 fl oz	36.0	bc	42.5	e	83.3
Dimethoate 4EL 4 pt	38.5	bc	137.3	cd	67.9
Radiant 8 fl oz	42.5	bc	218.0	bcd	80.5
Lannate LV 3 pt	44.5	bc	117.3	de	72.2
Cyazypyr 10SE @ 13.5 fl oz	44.8	bc	165.8	cd	85.3
Assail 30SG 8.0 oz	65.5	ab	236.5	bcd	80.8
Warrior with Zeon 1.92 fl oz + Agri-Mek SC 3.0 fl oz	84.5	a	302.5	ab	72.4
Control	87.3	a	341.8	ab	72.7
Requiem 4 pt	88.5	a	310.0	abc	68.6
Beleaf 50SG 2.8 oz + Mustang 4.3 oz	89.3	a	415.5	a	85.6

2012 Efficacy Comparison



All materials were applied on 4,14,30 May and 12 Jun

2012 Efficacy: Species Differentiation

	24-May		7-Jun		18-Jun		T. tabaci (%)		
Treatments	Adults	Nymphs	Adults	Nymphs	Adults	Nymphs	24-May	7-Jun	25-Jun
Torac 24.0 fl oz + Lannate LV 3 pt	32	238	42	335	74	582	76	80	84
Dimethoate 4 pt	49	393	58	485	65	699	82	73	87
Lannate LV 3 pt	37	295	70	622	66	892	84	83	77
Movento 240 SC 5 oz + Lannate LV 3 pt	71	479	64	686	95	606	93	73	77
Movento 240 SC 5 oz	178	256	114	696	116	1025	93	80	77
Radiant 8 oz	54	275	101	743	91	981	87	93	80
Torac 24.0 fl oz	72	404	67	956	61	1039	91	86	84
Cyazypyr 10OD 13.5 fl oz	119	475	99	1134	89	987	77	80	73
Mustang 4.3 fl oz	170	433	167	1318	165	1616	90	100	80
Venom 70SG 3.0 oz	159	409	146	1488	168	1992	83	85	87
Agri-Mek SC 3.0 fl oz	102	487	99	1534	94	1602	90	83	77
Beleaf 50SG 2.8 oz	209	548	125	1549	79	1258	90	100	67
Untreated	228	607	191	2511	133	1731	83	80	73
LSD P=0.05	62.4	162.5	57.6	518.6	62.6	473.4	NS	NS	15.6
CV (%)	38.2	27.8	38.9	33.5	43.9	28.6	12.5	14.2	11.8

Movento

Cyazypyr

Lannate

Movento+Lannate

Agri-Mek

Mustang

Venom

Dimethoate

Control

Radiant

18 Jun 2012

(6 days after 4th application)

Torac+Lannate

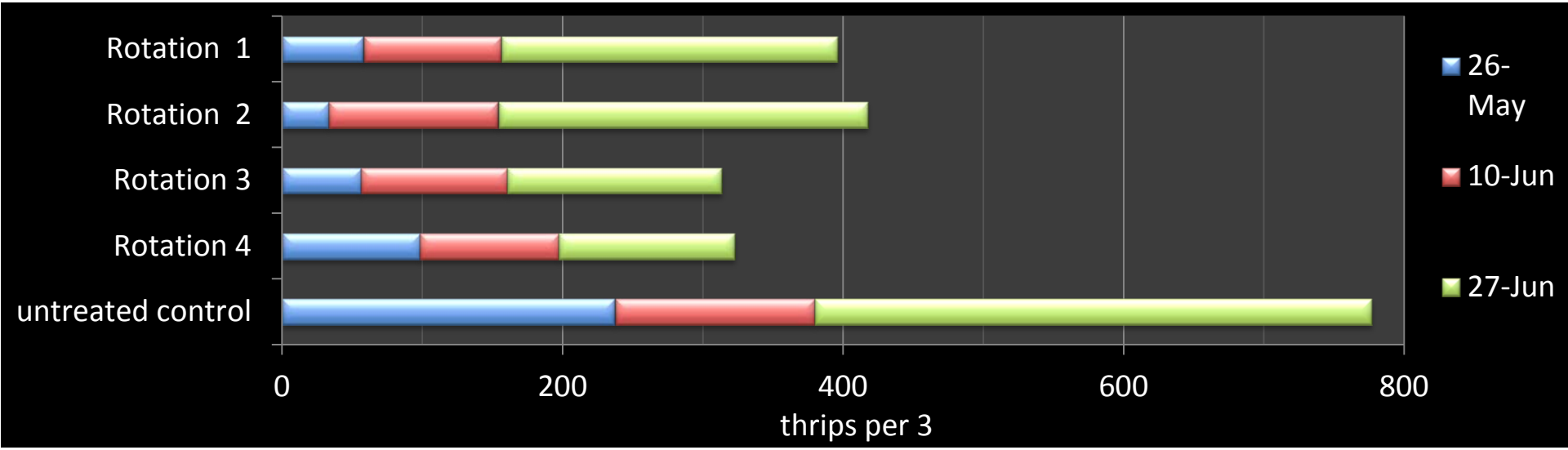
Torac

Beleaf

2012 Efficacy Comparison

Treatments	plant height (in) 14 Jun	thrips damage (0-10) 14-Jun	thrips damage (0-10) 28-Jun	Yield (T/A)
Torak 24.0 fl oz + Lannate LV 3 pt	28.4	0.4	1.4	
Movento 240 SC 5 oz + Lannate LV 3 pt	25.0	1.1	1.0	18.0
Dimethoate 4 pt	25.8	1.0	1.5	20.2
Lannate LV 3 pt	27.7	0.4	1.4	20.3
Radiant 8 oz	27.1	0.8	1.4	21.5
Cyazypyr 10OD 13.5 fl oz	25.0	1.9	2.5	20.4
Movento 240 SC 5 oz	23.8	2.5	4.3	
Torak 24.0 fl oz	25.8	1.0	2.4	
Beleaf 50SG 2.8 oz	23.1	5.8	6.5	
Agri-Mek SC 3.0 fl oz	25.3	1.0	2.3	
Mustang 4.3 fl oz	23.7	5.3	6.0	
Venom 70SG 3.0 oz	23.2	4.0	6.5	
untreated control	21.5	8.5	8.3	14.6
LSD P=0.05	**1.9**	**1.6**	**1.4**	**2.0**
CV (%)	**5.2**	**43.0**	**28.3**	**71.2**

2011 Insecticide Programs Evaluations



application dates, materials and rates

	13-May	23-May	30-May	8-Jun	21-Jun
Rotation 1	Radiant 8.0 fl oz	Movento 5.0 fl oz	Assail 30SG 8.0 oz	Lanate LV 3 pt	
Rotation 2	Lanate LV 3 pt	Radiant 8.0 fl oz	Warrior 3.84 oz	Lanate LV 3 pt	
Rotation 3	Movento 5.0 fl oz	Radiant 8.0 fl oz	Lanate LV 3 pt		
Rotation 4	Cyazypur13.5 fl oz	Movento 5.0 fl oz	Assail 30SG 8.0 oz	Lanate LV 3 pt	Radiant 8.0 fl oz
Untreated					

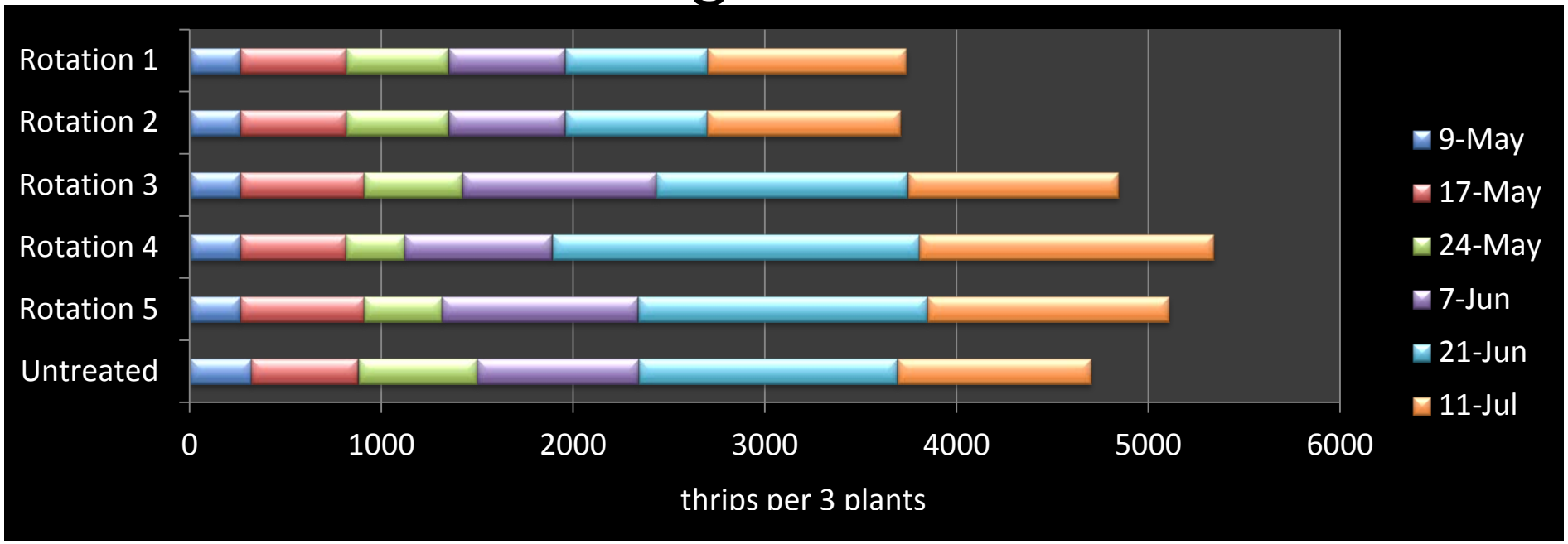
2011 Insecticide Programs
Thrips Populations

Treatments					26-May				27-Jun				Percentage of Onion Thrips	
13-May	23-May	30-May	8-Jun	21-Jun	Adults		Nymphs		Adults		Nymphs		26-May	27-Jun
Radiant 8.0 fl oz	Movento 5.0 fl oz	Assail 30SG 8.0 oz	Lanate LV 3 pt		36.5	b	21.3	c	30.3	a	209.3	ab	28.5	60.8
Lanate LV 3 pt	Radiant 8.0 fl oz	Warrior 3.84 oz	Lanate LV 3 pt		13.5	c	19.8	c	30.0	ab	233.8	ab	42.9	50.0
Movento 5.0 fl oz	Radiant 8.0 fl oz	Lanate LV 3 pt			14.0	c	42.5	bc	22.3	ab	130.3	b	41.7	53.0
Cyazypur 13.5 fl oz	Movento 5.0 fl oz	Assail 30SG 8.0 oz	Lanate LV 3 pt	Radiant 8.0 fl oz	42.3	ab	56.0	b	14.5	b	111.0	b	43.7	68.3
Untreated					67.8	a	169.5	a	27.0	ab	370.5	a	51.4	73.8

Insecticide Program Bulb Yields

					Yield (tons/acre)			
11-May	23-May	30-May	8-Jun	21-Jun	16 Sep (fresh wt.)		14 Oct (dry wt.)	
HGW86 13.5 fl oz	Movento 5.0 fl oz	Assail 30 SG 8.0 fl oz	Lanate LV 3 pt	Radiant 8.0 fl oz	20.79	a	15.11	a
Untreated					19.73	ab	14.23	ab
Movento 5.0 fl oz	Radiant 8.0 fl oz	Lanate LV 3 pt			19.13	ab	13.85	abc
Lanate LV 3 pt	Radiant 8.0 fl oz	Warrior 3.84 oz	Lanate LV 3 pt		17.84	b	12.59	bc
Radiant 8.0 fl oz	Movento 5.0 fl oz	Assail 30 SG 8.0 fl oz	Lanate LV 3 pt		17.42	b	12.28	c

2012 Insecticide Programs Evaluations



application dates, materials and rates

	3-May	11-May	18-May	25-May	1-Jun	8-Jun	15-Jun	22-Jun	29-Jun	6-Jul
Rotation 1	Movento 5 oz	Movento	Agrimek 3 fl oz	Agrimek	Radiant 8.0 fl oz	Radiant	Lannate LV 3 pt	Lannate	Dimeth 4pt	Dimeth
Rotation 2	Movento	Movento	Agrimek	Agrimek	Radiant	Radiant	Lannate	Lannate		
Rotation 3	Movento	skip	Agrimek	skip	Radiant					
Rotation 4	Movento	Movento	Radiant	Radiant						
Rotation 5	Movento	skip	Radiant							
Untreated										

2012 Species Fluctuations in Insecticide Programs

	thrips counts				T. tabaci (%)	
	21-Jun		11-Jul			
	Adults	Nymphs	Adults	Nymphs	21-Jun	11-Jul
Rotation 1	66	674	114	928	90.0	83.3
Rotation 2			87	923		80.3
Rotation 3	81	1230	123	923	81.3	76.7
Rotation 4	100	1816	129	978	86.7	73.3
Rotation 5	108	1402	90	1408	100.0	61.5
untreated control	83	1268	94	1169	77.6	55.2
LSD 0.05	48	432	78	483	NS	NS
CV (%)	35	22	49	30	17.1	16.8

application dates, materials and rates

	3-May	11-May	18-May	25-May	1-Jun	8-Jun	15-Jun	22-Jun	29-Jun	6-Jul
Rotation 1	Movento 5 oz	Movento	Agrimek 3 fl oz	Agrimek	Radiant 8.0 fl oz	Radiant	Lannate LV 3 pt	Lannate	Dimeth 4pt	Dimeth
Rotation 2	Movento	Movento	Agrimek	Agrimek	Radiant	Radiant	Lannate	Lannate		
Rotation 3	Movento	skip	Agrimek	skip	Radiant					
Rotation 4	Movento	Movento	Radiant	Radiant						
Rotation 5	Movento	skip	Radiant							
untreated control										

2012 Insecticide Programs Evaluation

Foliar damage and reduced size was apparent in the untreated control

11 Jul 2012

Insecticide Programs Evaluation
11 Jul 2012

IYSV was present in the trial at a low level

2012 Insecticide Programs and Plant/Yield Damage

	damage		hieght	IYSV		Yield
	(0-10)		(in)	severity	incidence	(T/A)
	14-Jun	28-Jun	28-Jun	(0-10)	(%)	2-Oct
Rotation 1	3.1	2.0	23.3	1.5	2.0	20.1
Rotation 2	2.8	2.0	24.5	3.6	2.0	16.5
Rotation 3	3.5	4.3	22.8	3.7	4.3	16.5
Rotation 4	3.1	5.0	22.3	3.0	5.0	16.0
Rotation 5	4.3	5.5	19.8	2.9	5.5	14.4
untreated control	7.4	6.8	20.3	3.2	6.8	16.8
LSD 0.05	1.2	1.3	3.1	1.3	1.3	3.3
CV (%)	19.3	19.8	9.2	30.1	19.8	13.3

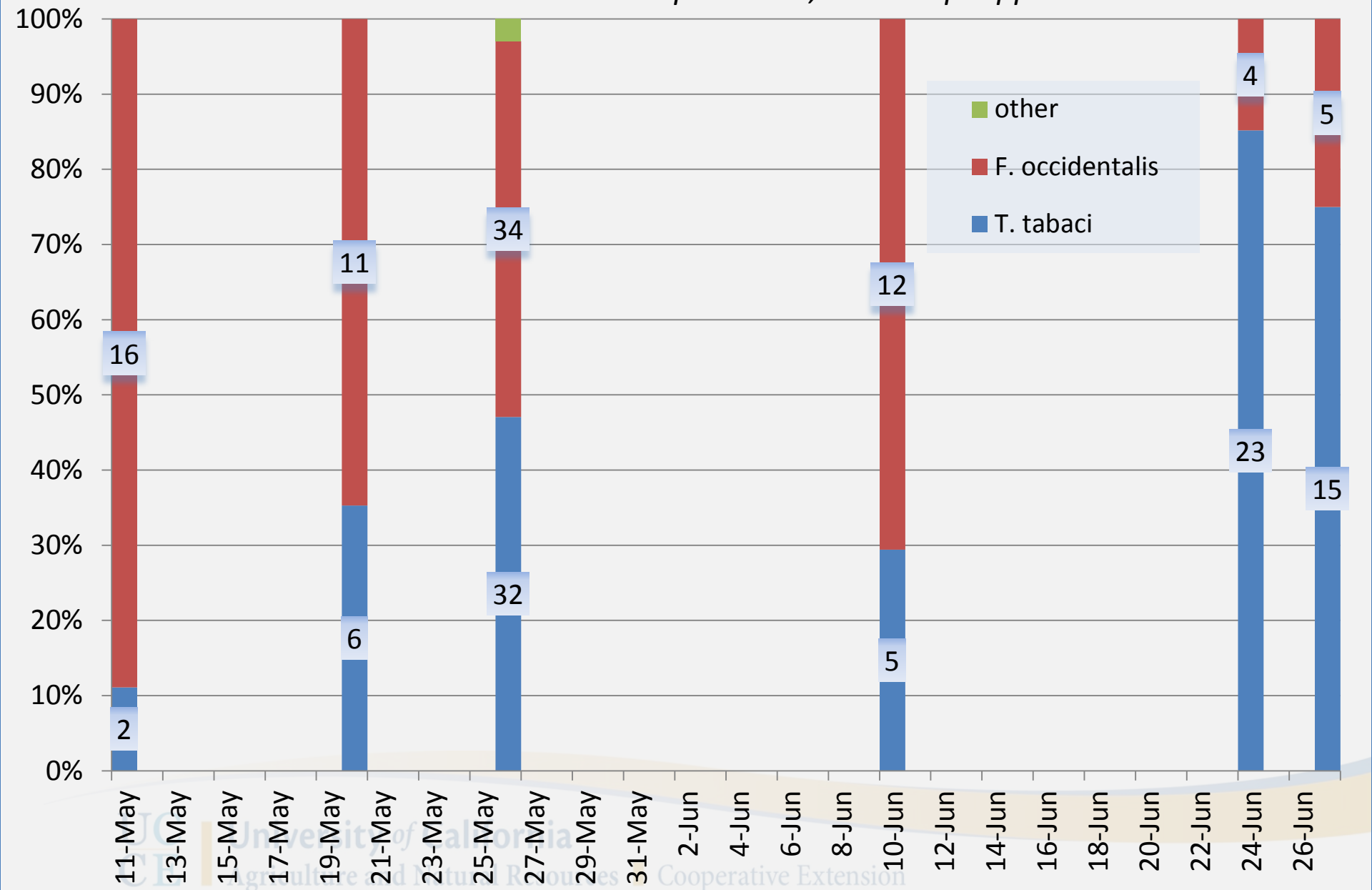
application dates, materials and rates

	3-May	11-May	18-May	25-May	1-Jun	8-Jun	15-Jun	22-Jun	29-Jun	6-Jul
Rotation 1	Movento 5 oz	Movento	Agrimek 3 fl oz	Agrimek	Radiant 8.0 fl oz	Radiant	Lannate LV 3 pt	Lannate	Dimeth 4pt	Dimeth
Rotation 2	Movento	Movento	Agrimek	Agrimek	Radiant	Radiant	Lannate	Lannate		
Rotation 3	Movento	skip	Agrimek	skip	Radiant					
Rotation 4	Movento	Movento	Radiant	Radiant						
Rotation 5	Movento	skip	Radiant							
untreated control										

Seasonal Thrips Species Relative Abundance, WSREC, 2011

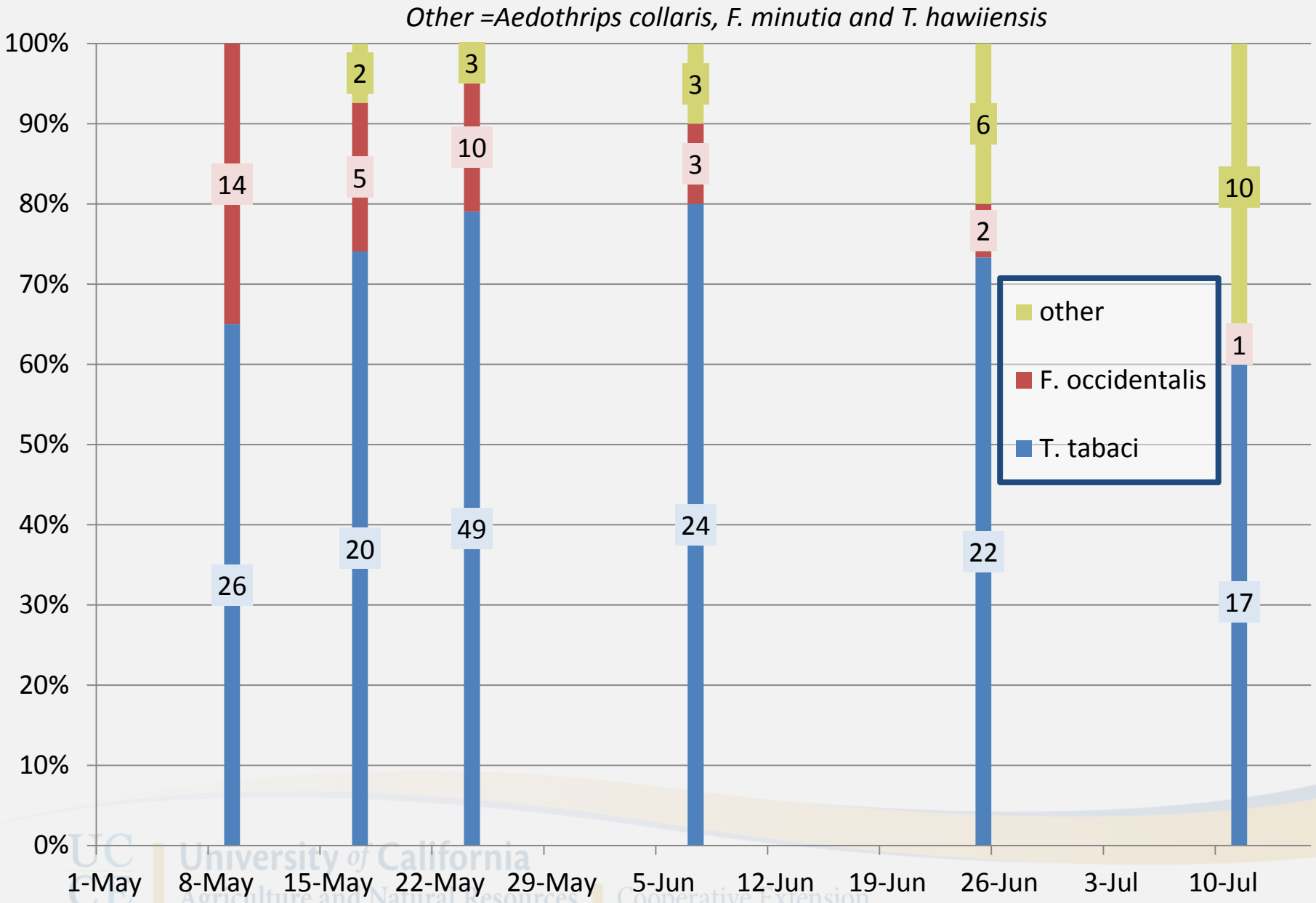
(from untreated areas)

Other =Aedothrips collaris, Ankothrips spp. and T. hawiiensis



Seasonal Thrips Species Relative Abundance, WSREC, 2012

(from untreated areas)



Summary

- Radiant, Cyazypur, dimethoate, Movento, Torac and Lannate reduced thrips levels in May and Jun evaluations.
- Under the higher thrips population densities in 2012, very intensive programs increased yields as compared to the untreated control.
- No consistent influence of chemical treatments on thrips species.
- *Thrips tabaci/F. occidentalis* ratio increased from early May to late Jun in WSREC trials.

Acknowledgements

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