# Thrips Control Programs & Population Dynamics in Central SJV

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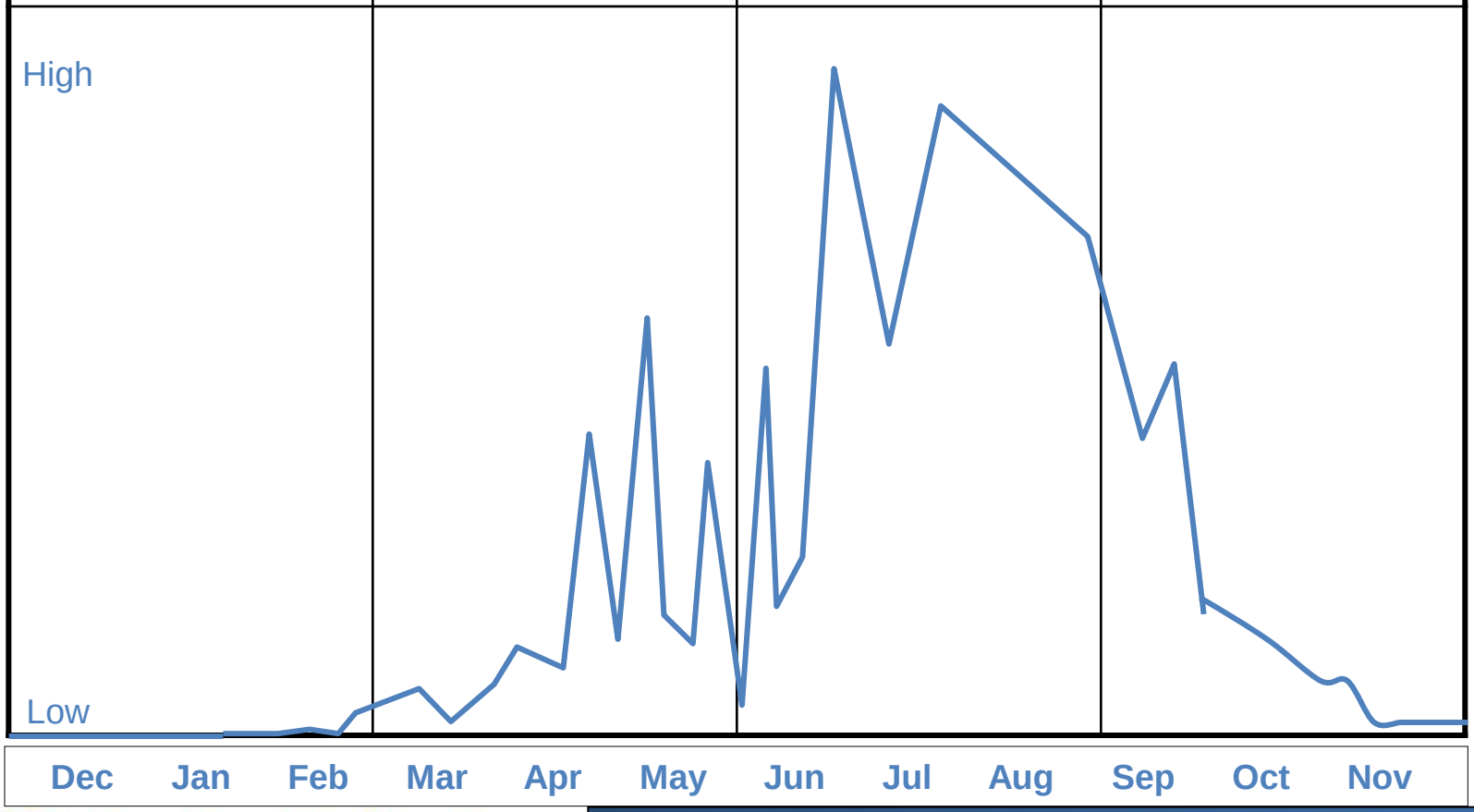
HEALTHY FOOD SYSTEMS • HEALTHY ENVIRONMENTS • HEALTHY COMMUNITIES • HEALTHY CALIFORNIANS

# 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* currently present at very low levels.

# Thrips Population Dynamics in the Central Valley of California

| **Winter:** Thrips overwinter at very low levels | **Spring:** Thrips populations increase | **Summer:** Peak populations | **Fall:** Populations decrease |
|---|---|---|---|




From R. Gilbertson at WSREC presentation 6 Dec 2011

# Short-Term Objectives, 2011

- Compare activity of registered and unregistered insecticides.
- Evaluate impact of insecticide programs on thrips populations and on yield
- Monitor species fluctuations.

# Limitations of Thrips Control with Insecticides

- Thrips adults and immature stages generally prefer areas of the plant where they are sheltered.
- Thrips populations can increase very rapidly, 200-300 eggs/female.
- Insecticide resistance is a concern.

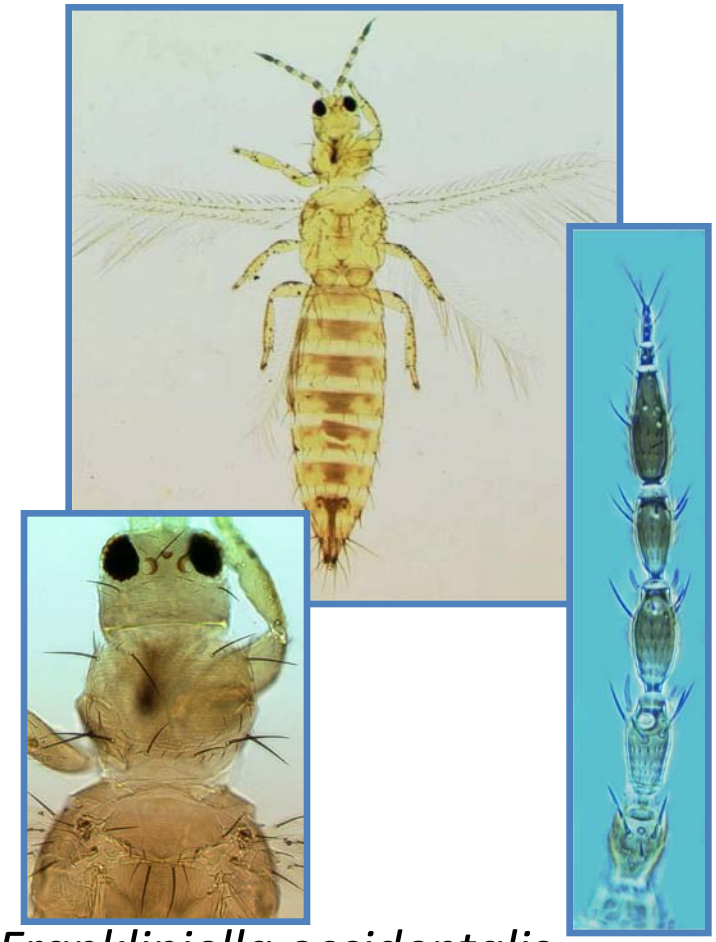
# Methods

- University of California West Side Research and Extension Center, Fresno Co., CA.
- Seeded and irrigated on 4 Feb 2011 with an Olam processing onion variety.
- Sprinkle irrigation/flood and standard irrigation, fertility and herbicide programs were used to grow the crop.
- Applications began when 5-10 thrips/plant were detected by field inspection.

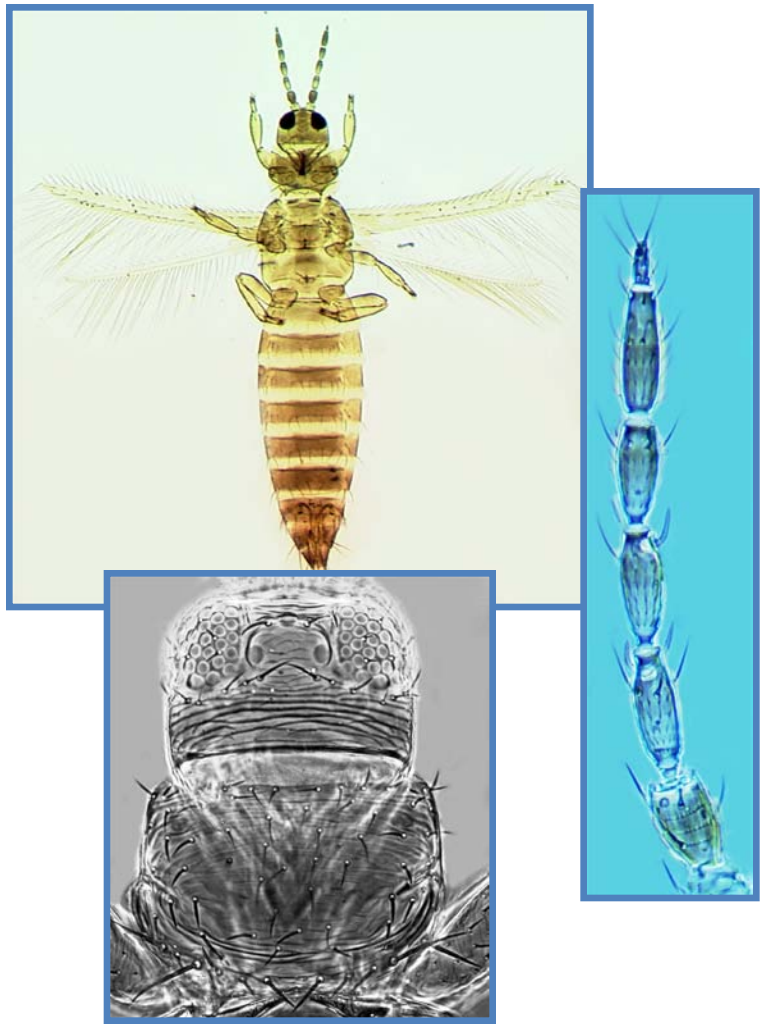
# Thrips Data Collection

- 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 (100x)
  - 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.

# Insecticide Comparison

1. Movento 240 SC 5 fl oz
2. Radiant 8 fl oz
3. Requiem  4 pt
4. Warrior with Zeon 1.92 fl oz + Agri-Mek SC 3.0 fl oz
5. Dimethoate 4EL 4 pt
6. Lannate LV 3 pt
7. Beleaf 50SG 2.8 oz + Mustang 4.3 oz
8. Cyazypyr (HGW86) 10SE @ 13.5 fl oz
9. Agri-Mek SC 3.0 fl oz
10. Assail 30SG 8.0 oz
11. Control

- Application dates :  13, 23 May, 7 and 17 Jun
- Applied with $CO_2$-pressurized sprayer 50 gpa applied to 50 ft X 40 in bed and 20 in of border row on either side.
- All treatments were applied with Activator 0.25%.

| 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 | Assail 30SG | acetamiprid |
| 5 | Spinosyns | Nicotinic acetylcholine receptor allosteric activators | Radiant | spinetoram |
| 6 | Avermectins, Milbemycins | Chloride channel activators | Agri-Mek SC | abamectin |
| 9C | Flonicamid | Selective homopteran feeding blockers | Beleaf | flonicamid |
| 23 | Tetronic and Tetramic acid derivatives | Inhibitors of acetyl CoA carboxylase. | Movento | spirotetramat |
| 28 | Diamide | Ryanodine receptor modulators Nerve and muscle action | Cyazypyr 10SE | cyantraniliprole |

From IRAC, 2011

# Efficacy

## 26 May (3 days after 2nd application)

| 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 |

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# Efficacy

## 26 May (3 days after 2nd application)

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

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*Aedothrips collaris, Ankothrips spp. and T. hawiiensis* were identified.

# Efficacy

## 26 May (3 days after 2nd application)

Treatments with higher T. tabaci %'s

| 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 |
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# Efficacy

## 26 May (3 days after 2nd application)

Treatments with lower T. tabaci %'s

| 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 |
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# 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 |

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# Efficacy

## 24 Jun (7 days after 4th application)

78% *T. tabaci*.
NS at P=0.05

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|---|---|---|---|---|---|
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| 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 |
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| 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 |

# Insecticide Program Comparison

| | Treatments (fp./acre) | | | | |
|---|---|---|---|---|---|
| | 13-May | 23-May | 30-May | 8-Jun | 21-Jun |
| 1 | Radiant 8.0 fl oz | Movento 5.0 fl oz | Assail 30 SG 8.0 oz | Lanate LV 3 pt | |
| 2 | Lanate LV 3 pt | Radiant 8.0 fl oz | Warrior 3.84 oz | Lanate LV 3 pt | |
| 3 | Movento 5.0 fl oz | Radiant 8.0 fl oz | Lanate LV 3 pt | | |
| 4 | HGW86 13.5 fl oz | Movento 5.0 fl oz | Assail 30 SG 8.0 oz | Lanate LV 3 pt | Radiant 8.0 fl oz |
| 5 | Untreated | | | | |

- Applied with PTO-driven FMC sprayer 50 gpa applied to 50 ft X 3 40” beds.
- All treatments were applied with Activator 0.25%.
- Harvested on 16 Sep (13.1 ft x a single 40” bed)

# Insecticide Programs – Thrips Populations

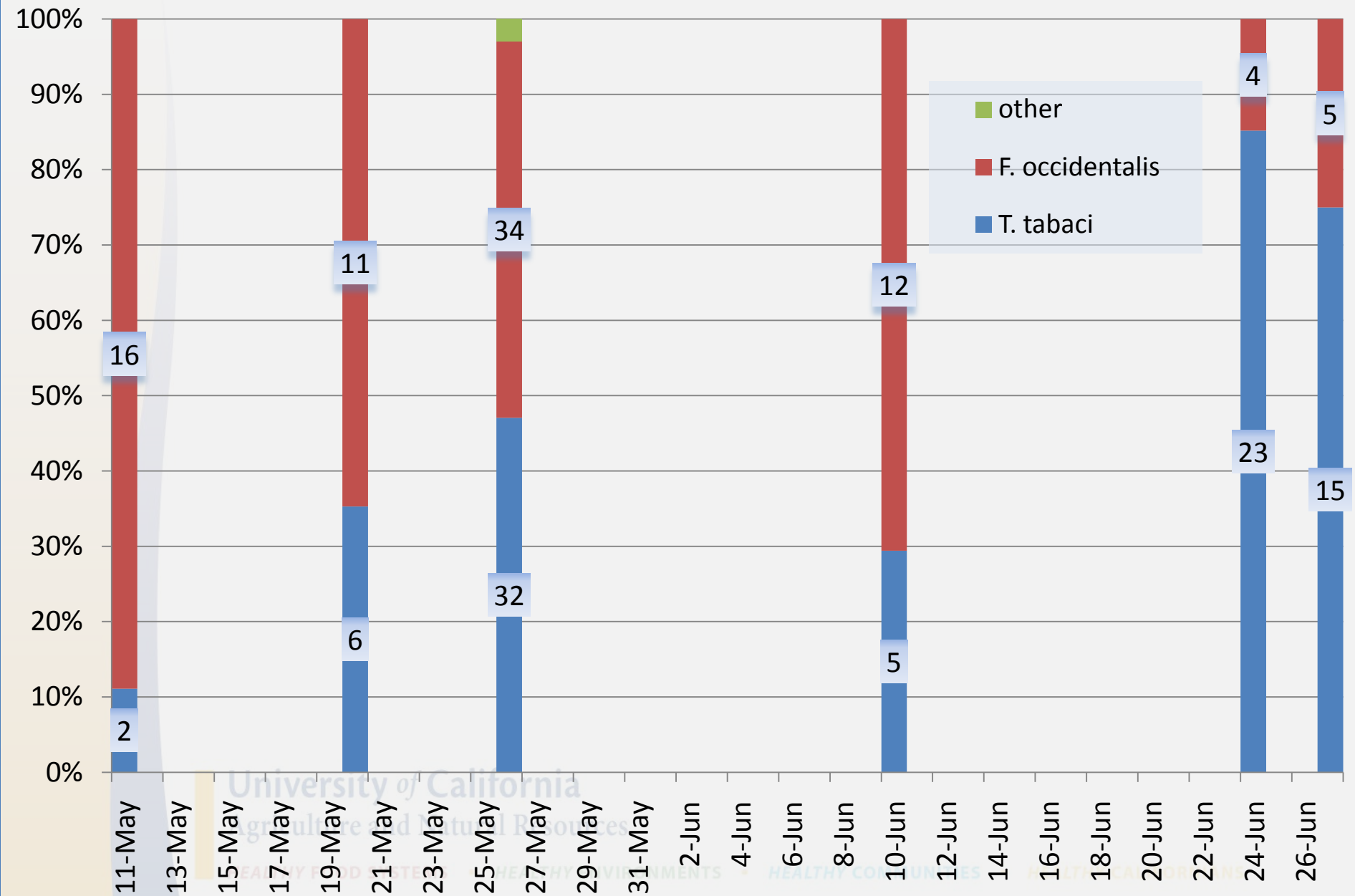
| Treatments | | | | | 26-May | | | | 27-Jun | | | | Percentage of Onion Thrips | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13-May | 23-May | 30-May | 8-Jun | 21-Jun | Adults | | Nymphs | | Adults | | Nymphs | | 26-May | 27-Jun |
| Radiant 8.0 fl oz | Movento 5.0 fl oz | Assail 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 |

# Seasonal Thrips Species Relative Abundance, WSREC, 2011

(from untreated areas)

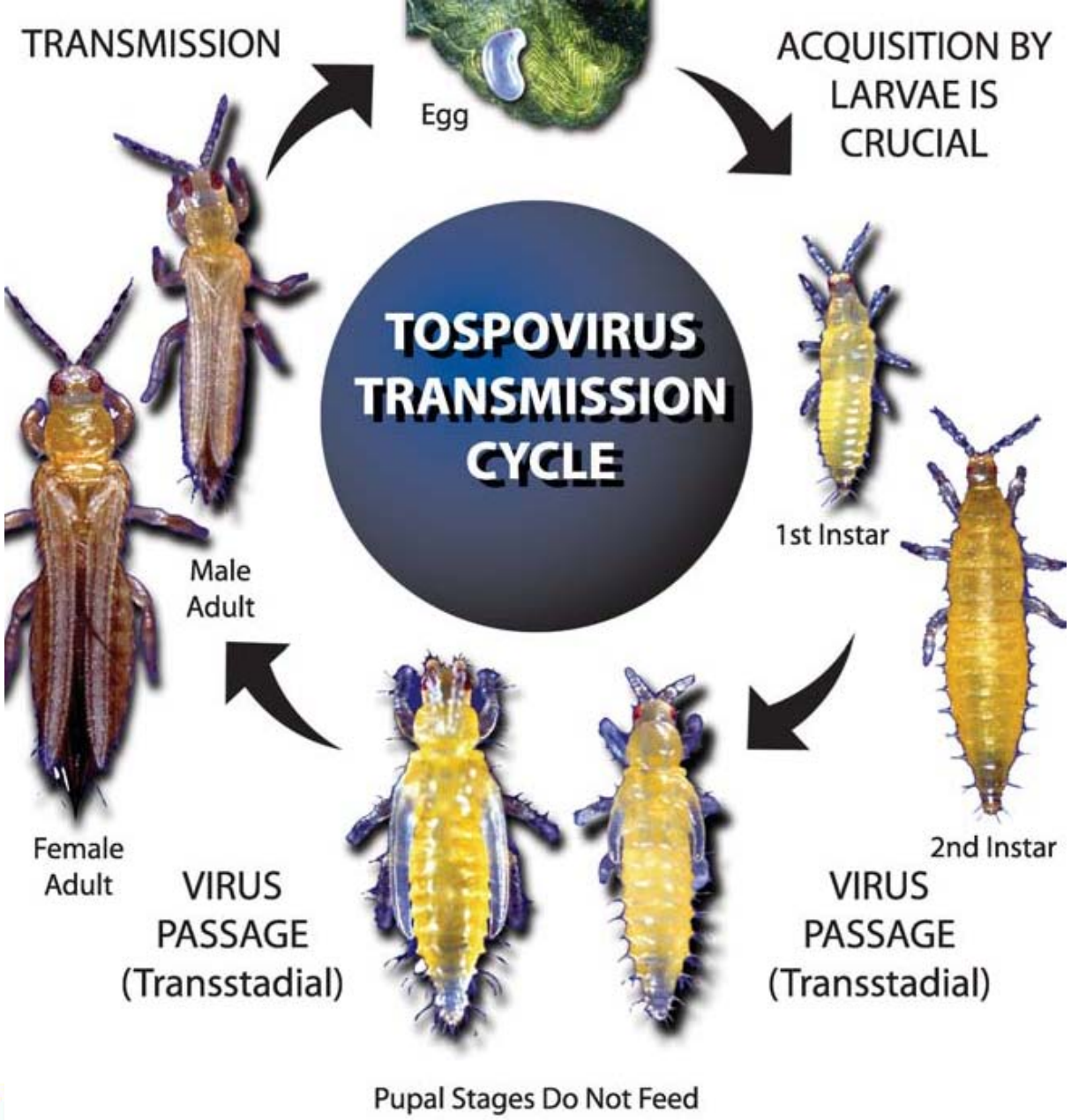


# Summary of 1st Season of Trials

- Radiant, Cyazypur, dimethoate and Lannate reduced thrips levels in May and Jun evaluations.
- Insecticide programs resulted in subtle thrips population density reductions, but no yield improvements.
- Differences in species within chemical treatments was demonstrated on one of 4 dates evaluated.
- *Thrips tabaci/F. occidentalis* ratio seemed to increase from early May to late Jun in WSREC trials.

# Acknowledgements


- California Garlic and Onion Research Advisory Board
- OLAM
- UC West Side Research and Extension Center
- Devon Rodriguez:  UCCE, Fresno
- Jon Wroble: UCCE, Fresno




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