Management of Thrips and IYSV in Onions

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Thrips

Thrips are tiny slender insects, best seen with a hand lens or microscope.

Adults of most species have 2-pairs of wings that are fringed with long hairs.

Thrips species vary in color from pale yellow to light brown or black.

The immature stages have the same general body shape as adults but are usually lighter in color and wingless.

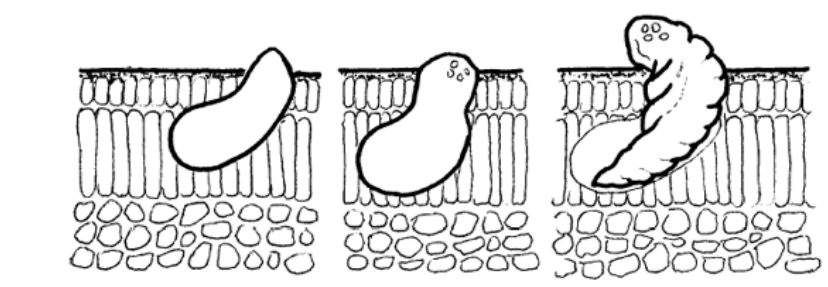
Only 1% of the 5,000 known thrips species are pests.

Some species are important vectors of plant viruses e.g. IYSV.

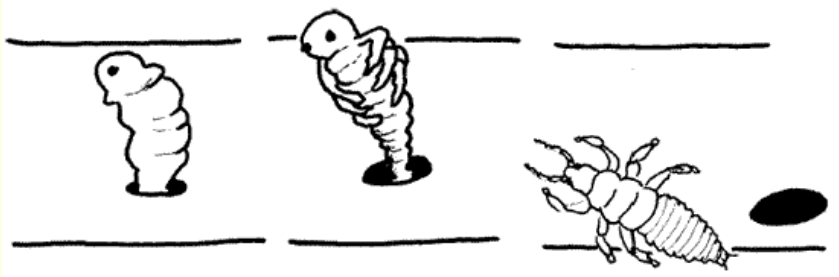
Thrips Life Cycle

Thrips pass through six developmental stages: an egg, two larval stages, a prepupal and pupal stage, and an adult. Generation time varies with temperature and the species but generally takes about a month. Most species insert eggs in to plant tissue and most species pupate in or no soil.

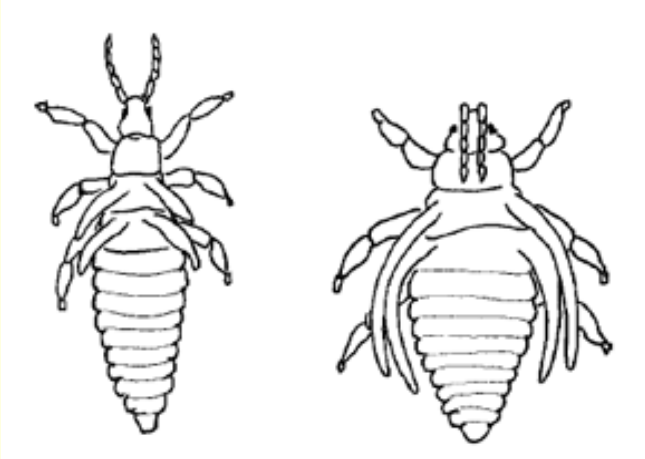
a) Hatching Eggs:



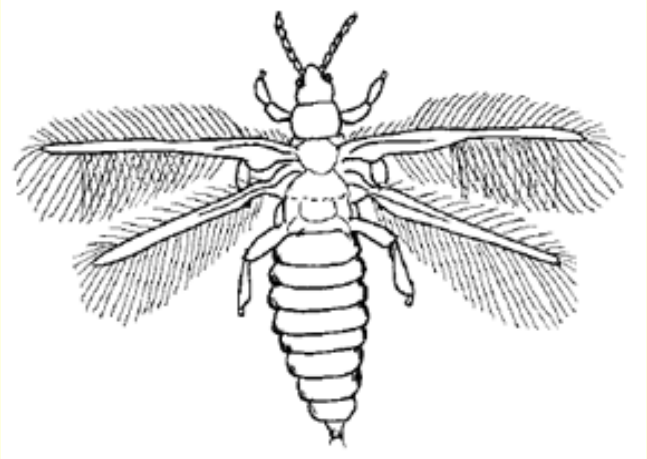
b) Emerging Larvae:



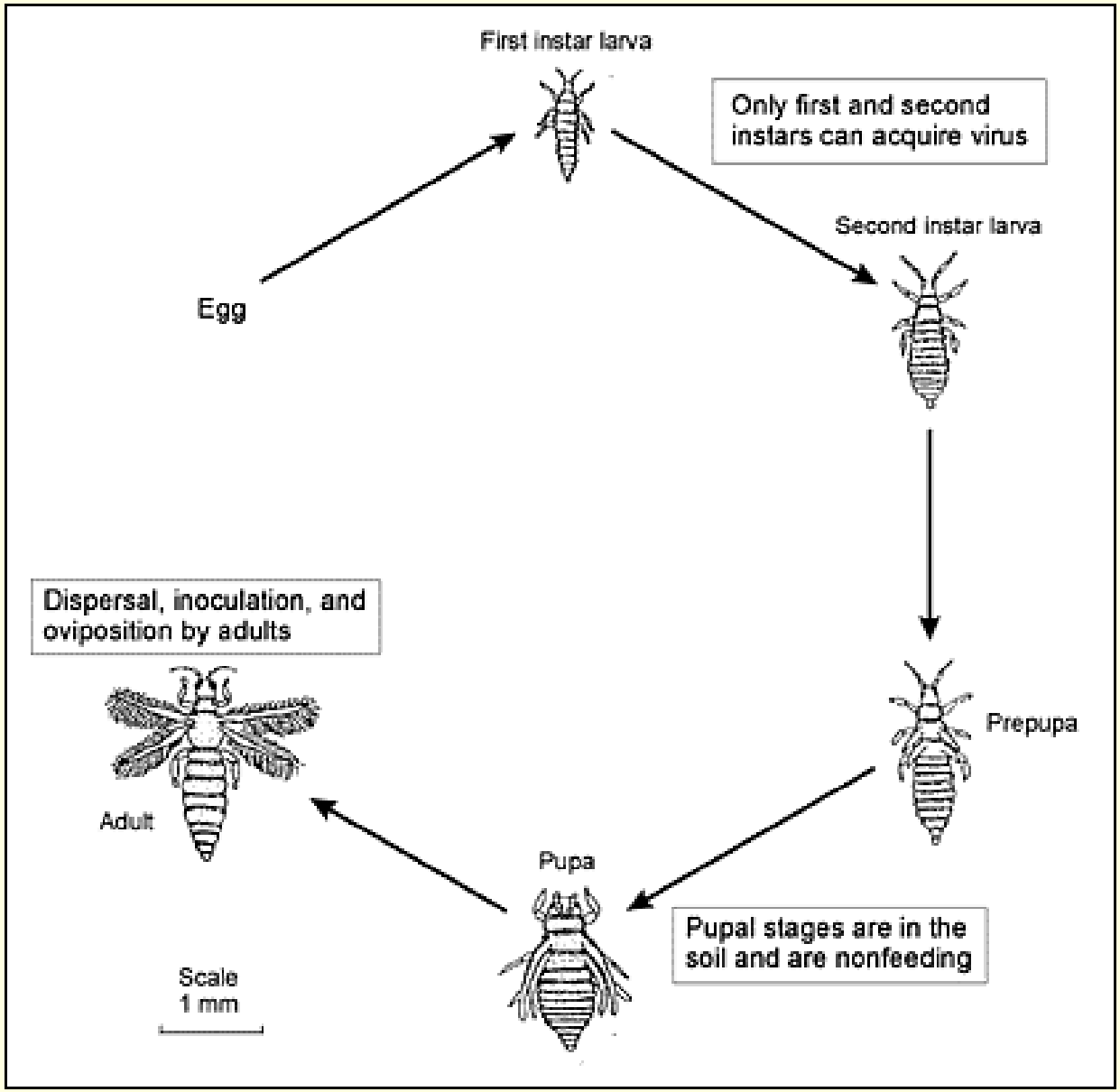
c) Prepupae & Pupae



d) Adults:



Thrips Life Cycle



Economically important thrips that threaten California Garlic and Onion Production include:

These two species are nearly impossible to distinguish without specimens properly mounted on microscope slides.

Onion thrips,
***Thrips tabaci* Lindeman**

Western flower thrips,
***Frankliniella occidentalis* (Pergande)**

Thrips cause direct feeding injury to garlic and onion crops

Thrips Damage to Garlic and Onions

- **Onion thrips and western flower thrips have extensive host ranges, including cereals and broadleaved crops.**

- **Onion thrips are more injurious to onions. Only onion thrips transmits *Iris yellow spot virus* (IYSV) IYSV may reduce yield of the larger bulb classes**

- **Onion thrips thrive in hot, dry conditions and are more damaging where these climatic conditions prevail for most of the production season.**

Onion field heavily infected with IYSV.

Photo by Grant J. Poole.

- **Thrips are most damaging when they feed during the early bulbing stage of plant development. High populations of thrips reduce both yield and storage quality of onions.**

- **Adults and nymphs cause damage. When foliage is severely damaged, the entire field takes on a silvery appearance.**

Thrips Management in Onions

- Identification is the 1st step to pest management
- Biology of the pest: life cycle, behavior, hosts, damage potential, is it a disease vector?
- Economic injury level & treatment threshold
- Control options:
  - Biological
  - Host plant resistance
  - Cultural practices
  - Chemical control

Thrips Identification Is Key To Management

- The first important step in any pest management program is the accurate identification of the pest.
- ID is important for biological control because natural enemies are often specific to just one pest or group of pests.
- Some entomophagous thrips are predators of other pests including phytophagous thrips.
- Some species of thrips are very resistant to insecticides e.g. Western flower thrips.

Thrips Identification

Onion thrips
(*Thrips tabaci*)

Western flower thrips has a row of hairs along both the upper and lower margin of the prothorax (first segment behind the head). Onion thrips has hairs on the lower, but not upper margin. This characteristic is visible with a 10X hand lens (and good eyes), but is easily seen with a good dissecting microscope

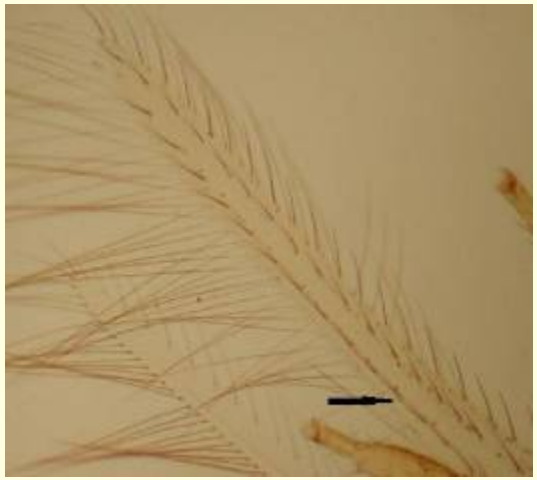
Western flower thrips
(*Frankliniella occidentalis*)

Developed by
Bob Hammon,
Colorado State University, Agricultural Experiment Station,
Western Colorado Research Center @ Fruita

Thrips Identification

Focus on the rows of setae (hairs) along the center of the rib of the forewing. Western flower thrips have two continuous rows of setae, while there is a gap in at least one row of setae in onion thrips. A dissecting microscope is necessary to see this characteristic

Onion thrips
(*Thrips tabaci*)



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Thrips Identification

Onion thrips
(*Thrips tabaci*)

The terminal antennal segment of onion thrips is not as sharply pointed as that of Western flower thrips. This characteristic is best observed when the two species are observed side by side. A dissecting microscope is necessary to see the characteristic in enough detail to be useful.

Western flower thrips
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Biological Control of Thrips

- Many predators attack thrips, unfortunately they rarely keep thrips populations below economic injury levels.
- **Minute pirate bugs *Orius spp*.** and other (Anthocoridae) many thrips species and other pests
- **Predatory mite;** many species, e.g. *Neoseiulus californicus* (McGregor)
- **Parasitic wasps;** many species in several families
- **Green lacewings *Chrysopa* and *Chrysoperla spp.* (Chrysopidae)** many thrips species and other pests
- **Entomopathogens** e.g. *Beauveria bassiana*
- Some predacious thrips species include:
  - **banded-wing thrips**
  - **black hunter thrips**
  - ***Franklinothrips* or vespiform thrips**
  - **sixspotted thrips**

HOST PLANT RESISTANCE

- Some varieties or types of onions more susceptible to thrips feeding injury or injury from IYSV.
- If possible, plant varieties that are more tolerant thrips injury and/or IYS disease.
- Dehydrator or processing onion varieties appear to be much more susceptible than fresh market onion or sweet onion varieties.

Cultural Controls for Thrips & IYSV

- Sprinkler irrigation can suppress thrips population levels.
- Don’t plant upwind from crops that harbor thrips e.g. small grain crops.
- Use thrips-free IYSV-free transplants; if possible choose thrip tolerant varieties.
- IYS disease symptoms may be more severe with plant stress (i.e. moisture, temperature extremes, salinity, soil compaction, pink root, etc.)
- Use clean culture; quickly remove plant residues from harvested crops before thrips migrate to later plantings.
- Straw or yellow mulch has shown some suppression of thrips and IYSV
- Onion growers and PCA’s need to familiarize themselves with the symptoms of IYS disease
- Bury all cull piles that may contain bulbs with IYSV
- Remove volunteer onions ASAP
- Weed control?

CHEMICAL CONTROL

- Insecticides are the most effective management tool for thrips control in onions and garlic
- Insecticide treatments that control thrips larvae help to manage IYSV buildup and spread within a field
- Treatment thresholds vary by:
  - Crop (garlic or onion) and crop type (shallots, fresh market, dehydrator, seed)
  - Presence of a disease such as IYSV

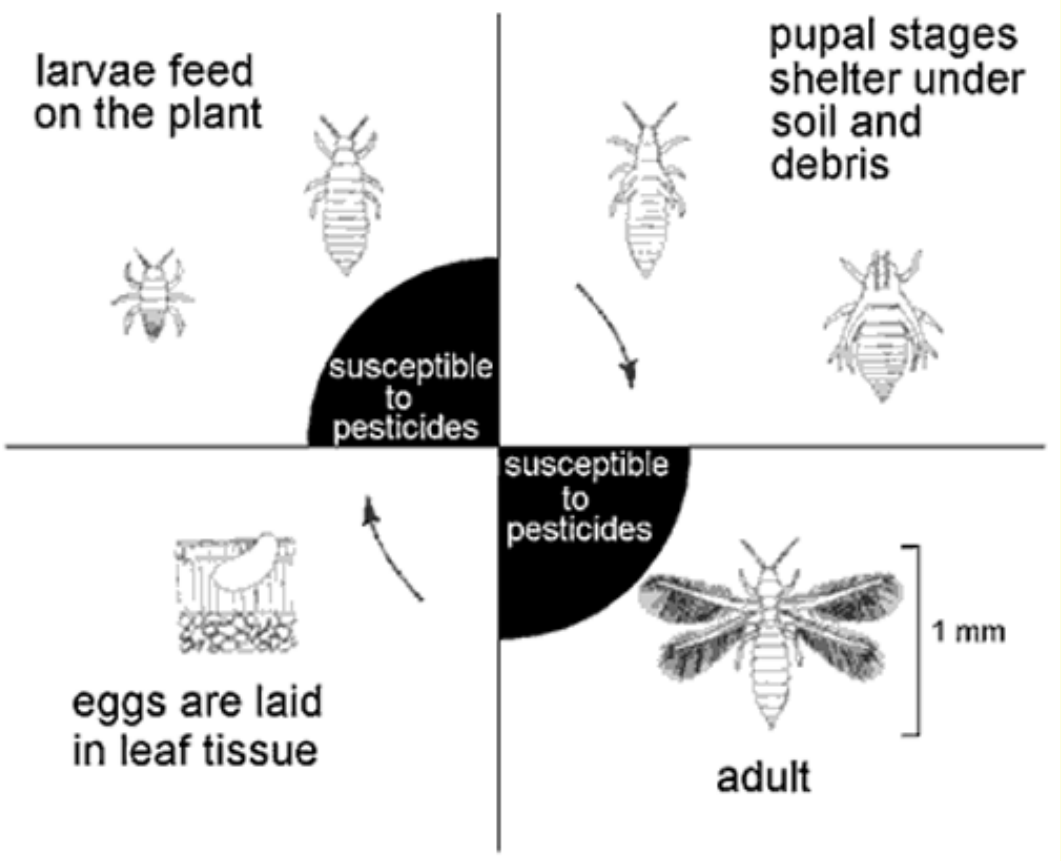
Insecticidal Control of Thrips

Timing of spray applications is critical to success. During hot weather, apply in the early morning or evening when it is cooler and thrips are more active.

Spreading surfactants help insecticides reach areas where larvae are hidden.

Insecticides such as Lannate, Vydate, Entrust, Radiant, Mustang, Warrior, and azadirachtin are efficacious against thrips.

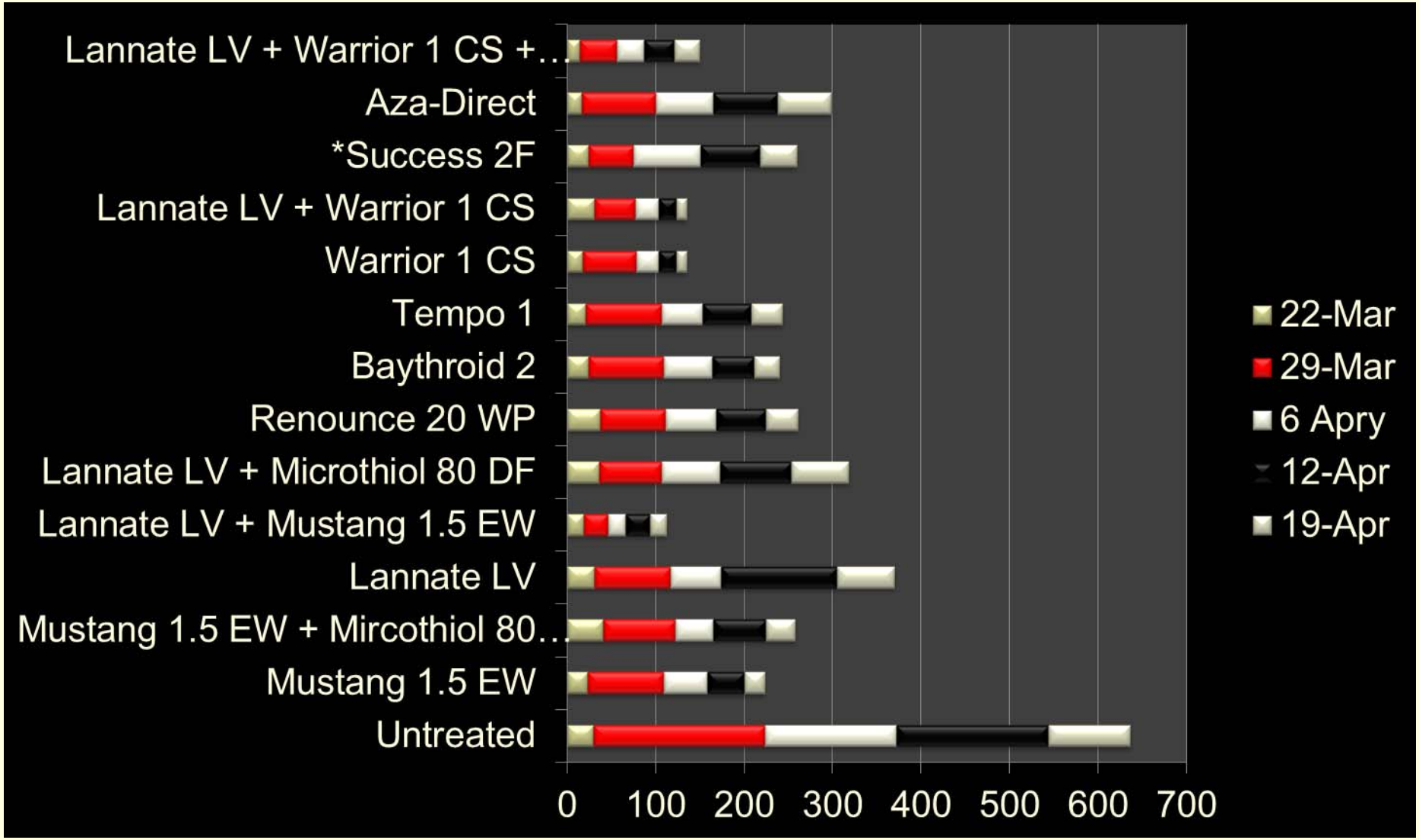
Use IRM practices such as rotating classes of chemistry to help present insecticide resistance.



THRIPS MANAGEMENT IN ONIONS

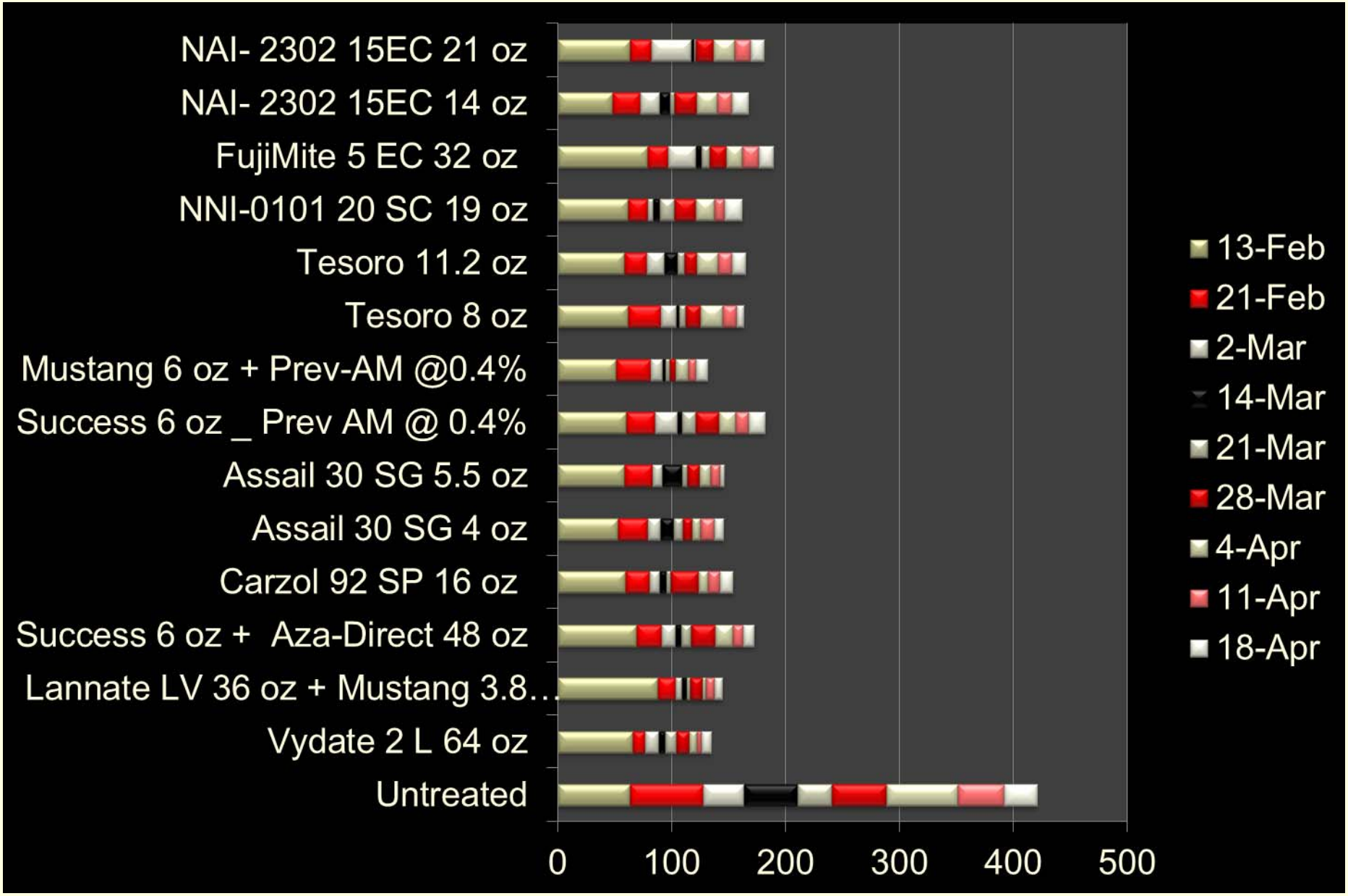
- **Don’t plant onions near small grain crops.**
- **Overhead irrigation may help suppress thrips populations.**
- **Control thrips before the early bulb. Onions can tolerate higher thrips populations near harvest.**
- **Randomly sample entire onion plants by pulling leaves apart and counting all thrips using a hand lens, on the inner leaves near the bulb, as well as those under the leaf folds.**
- **Sample at least 5 plants from 4 separate areas of the field. A suggested treatment threshold is 30 thrips per plant mid-season (lower for very young plants and higher for larger mature plants).**

2005 INSECTICIDE EFFICACY AGAINST THRIPS ON ONIONS, BRAWLEY, CA



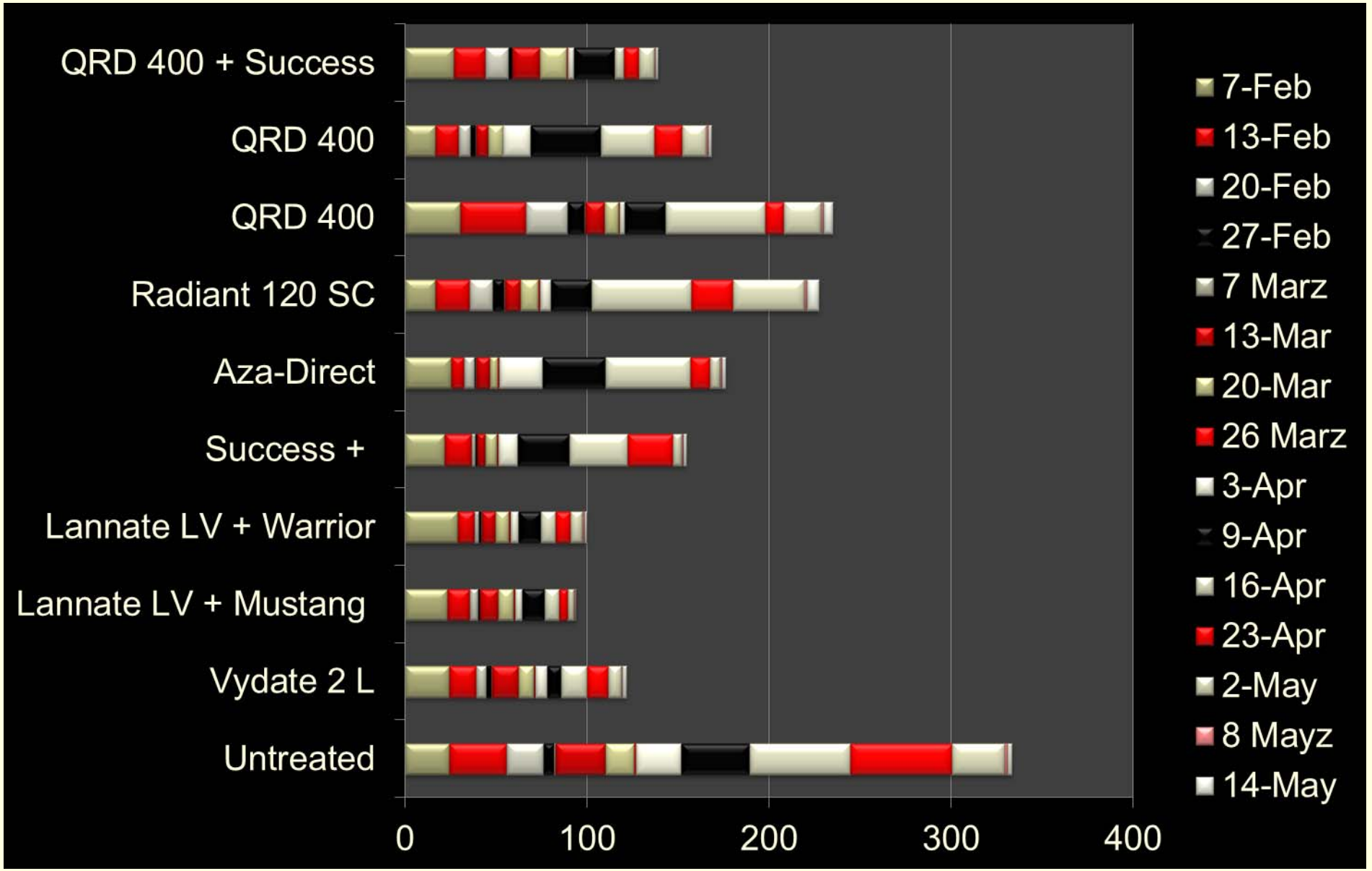
Thrips per 0.001 acre

Onion Insecticide Efficacy Trial, Thrips, Brawley, California, 2007.



Thrips per 5 Plants

Onion Insecticide Efficacy Trial, Thrips, Brawley, California, 2008.



Thrips per 5 Plants

Onion Insecticides, Holtville, California, 2010.

Treatment	Oz/acre	Appl. Dates
1.Untreated	--------	----------
2. Vydate 2 L f/b Radiant SC + Aza-Direct f/b Mustang Max f/b Lannate	48.0 f/b 8.0 + 32 f/b 4.0 f/b 48.0	18 Feb, 18 Mar, 15 Apr 25 Feb, 25 Mar 4 Mar, 1 Apr 11 Mar, 8 Apr
3. HGW86 10 OD f/b Lannate f/b Radiant	13.5 f/b 48.0 f/b 8.0	18 Feb, 11 Mar, 1 Apr 25 Feb, 18 Mar, 8 Apr 4, 25 Mar, 15 Apr
4. HGW86 10 OD f/b Lannate f/b Radiant	20.5 f/b 48.0 f/b 8.0	18 Feb, 11 Mar, 1 Apr 25 Feb, 18 Mar, 8 Apr 4, 25 Mar, 15 Apr
5. Agri-Mek f/b Warrior II f/b Radiant SC f/b Movento	16.0 f/b 1.92 f/b 8.0 f/b 5.0	18 Feb, 18 Mar, 15 Apr 25 Feb, 25 Mar 4 Mar, 1 Apr 11 Mar, 8 Apr
6. Entrust f/b Aza-Direct f/b Bugoil	2.0 alt/w 48.0 1% v/v	18 Feb, 11 Mar, 1 Apr 25 Feb, 18 Mar, 8 Apr 4, 25 Mar, 15 Apr
7. Bridadier f/b Beleaf 50 WG f/b GWN 2119	5.5 f/b 2.8 f/b 3.0	18 Feb, 4, 25 Mar, 15 Apr 25 Feb, 18 Mar, 8 Apr 11 Mar, 1 Apr
8. Radiant SC	8.0	18 Feb, 4, 18 Mar, 1, 15 Apr
9. Movento	5.0	18 Feb, 4, 18 Mar, 1, 15 Apr
10. Radiant SC alt/w Movento	8.0 alt/w 5.0	18 Feb, 4, 18 Mar 1, 15 Apr 25 Feb, 11, 25 Mar, 8 Apr

Rotation 1

Vydate 2 L f/b	48.0 f/b
Radiant SC +	8.0 f/b
Aza-Direct f/b	32 f/b
Mustang Max f/b	4.0 f/b
Lannate	48.0

Rotation 2

HGW86 10 OD f/b	13.5 f/b
Lannate f/b	48.0 f/b
Radiant	8.0

Rotation 3

HGW86 10 OD f/b	20.5 f/b
Lannate f/b	48.0 f/b
Radiant	8.0

Rotation 4

Agri-Mek f/b	16.0 f/b
Warrior II f/b	1.92 f/b
Radiant SC f/b	8.0 f/b
Movento	5.0

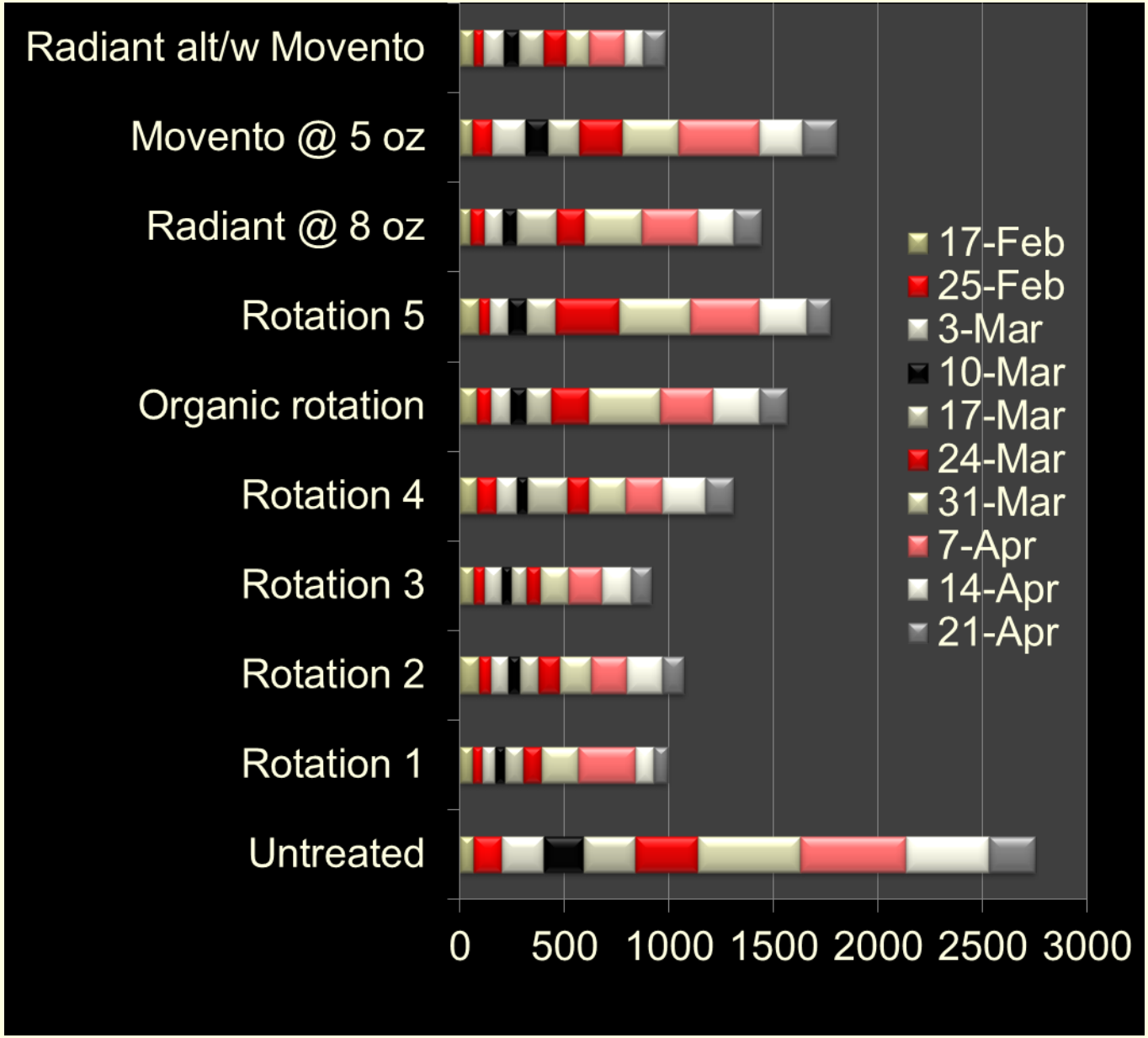
Organic Rotation

Entrust f/b	2.0 alt/w
Aza-Direct f/b	48.0
Bugoil	1% v/v

Rotation 5

Bridadier f/b	5.5 f/b
Beleaf 50 WG f/b	2.8 f/b
GWN 2119	3.0

Onion Insecticides, Holtville, California, 2010.



Thrips per 5 Plants

THRIPS CONTROL INSECTICIDES

Product	MOA Group	Rate as Oz/acre	P.H.I. days	Special Considerations
Radiant SC	5	6 - 10	1	5 - 9 pH; no more than 2 consecutive group 5 insecticides
Entrust	5	4 - 8	1	OMRI; No more than 9 oz /acre/season; pH>7
Mustang	3A	3.2 - 4.3	7	No more than 21 oz /acre/season. Other pyrethroids may be used, e.g. Warrior or Pounce.
Lannate SP	1A	Garlic – 8 Onion- 16	7	May tank mix with a pyrethroid
Vydate L	1A	2-4 pt	14	Dry bulb onion only under SL R-1053; garlic & onions in Modoc & Siskiyou counties
Assail	4A	30SG 5-8 & 70 WP 2.1-3.4	7	No less than 7 days between treatments. No more than 4 application or more than 13.7 oz /acre/season.
Aza-Direct; Ecozin Plus	UN	16 – 32; 15 - 30	0	OMRI; Optimum pH 5.5 - 6.5; do not exceed pH of 7.0. May be mixed with other insecticides.

Currently available insecticides are mostly ineffective for management of IYSV