Management of Thrips and IYSV in Onions

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Supported by
CA Garlic and Onion Research Advisory Board

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.

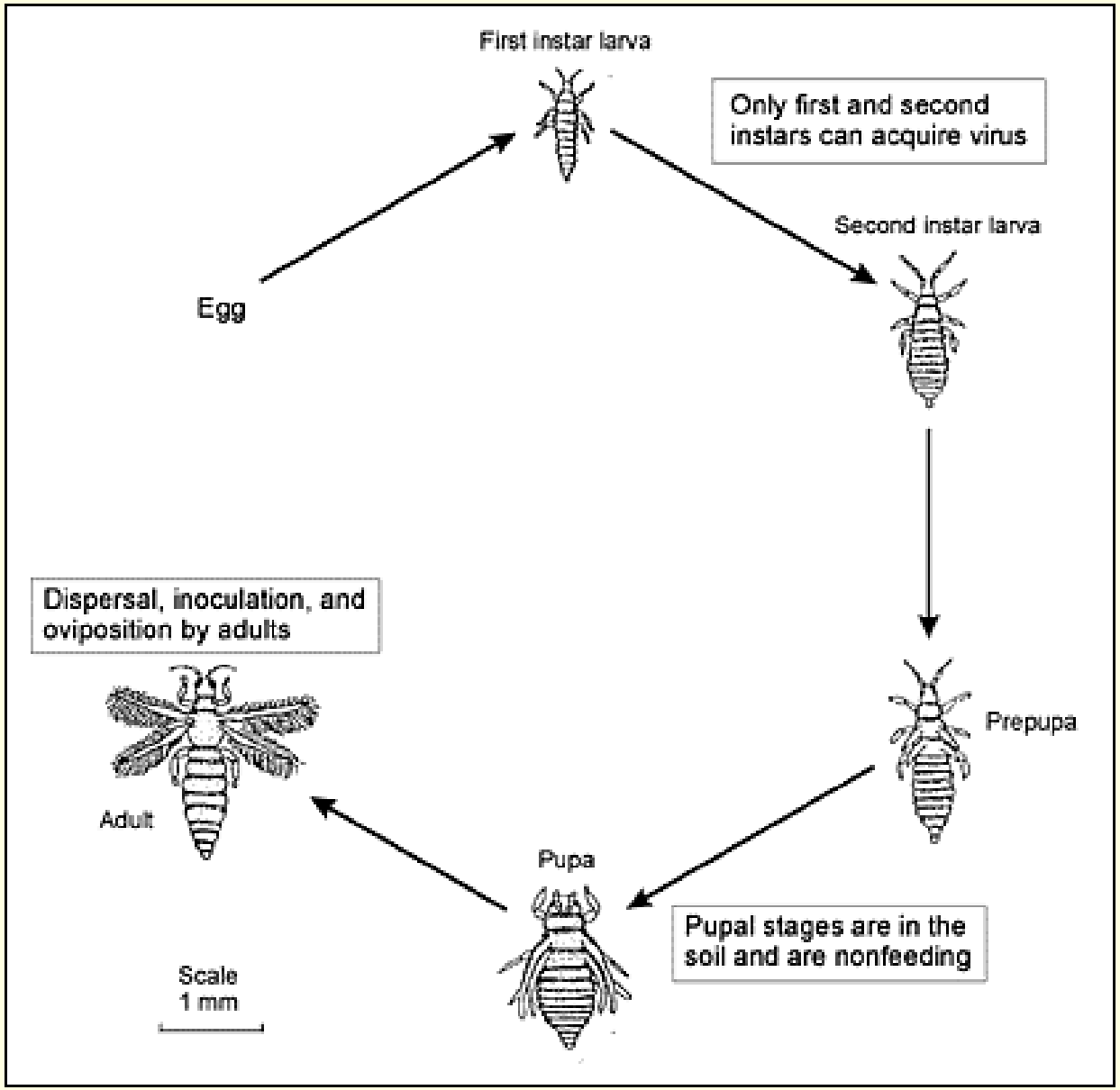
Thrips species vary in color from pale yellow to light brown or black.

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



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 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.**
- **Both species are vectors of Tospoviruses, but only onion thrips transmits the Tospovirus, *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.**
- **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.**

Onion field heavily infected with IYSV.

Photo by Grant J. Poole.

Thrips cause direct feeding injury to garlic and onion crops

Thrips Management in Onions

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

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

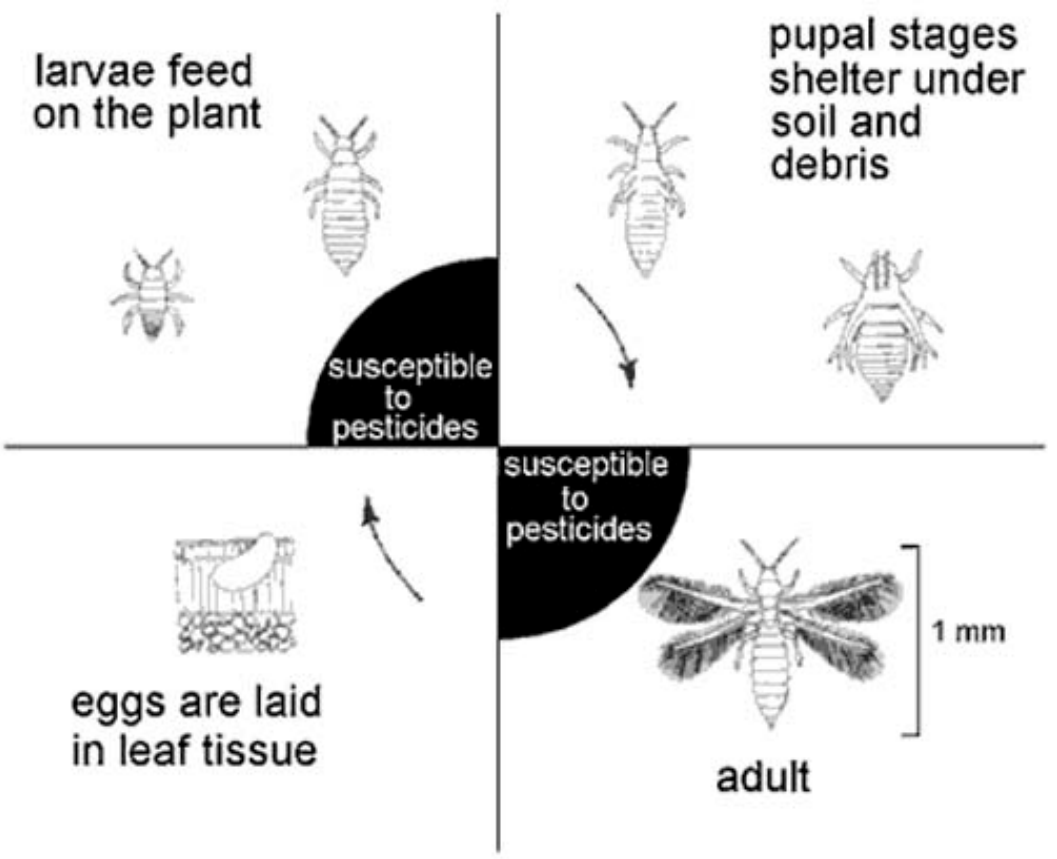
Insecticidal Control of Thrips

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, Movento, Mustang, Warrior, azadirachtin and Assail are efficacious against thrips.

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



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

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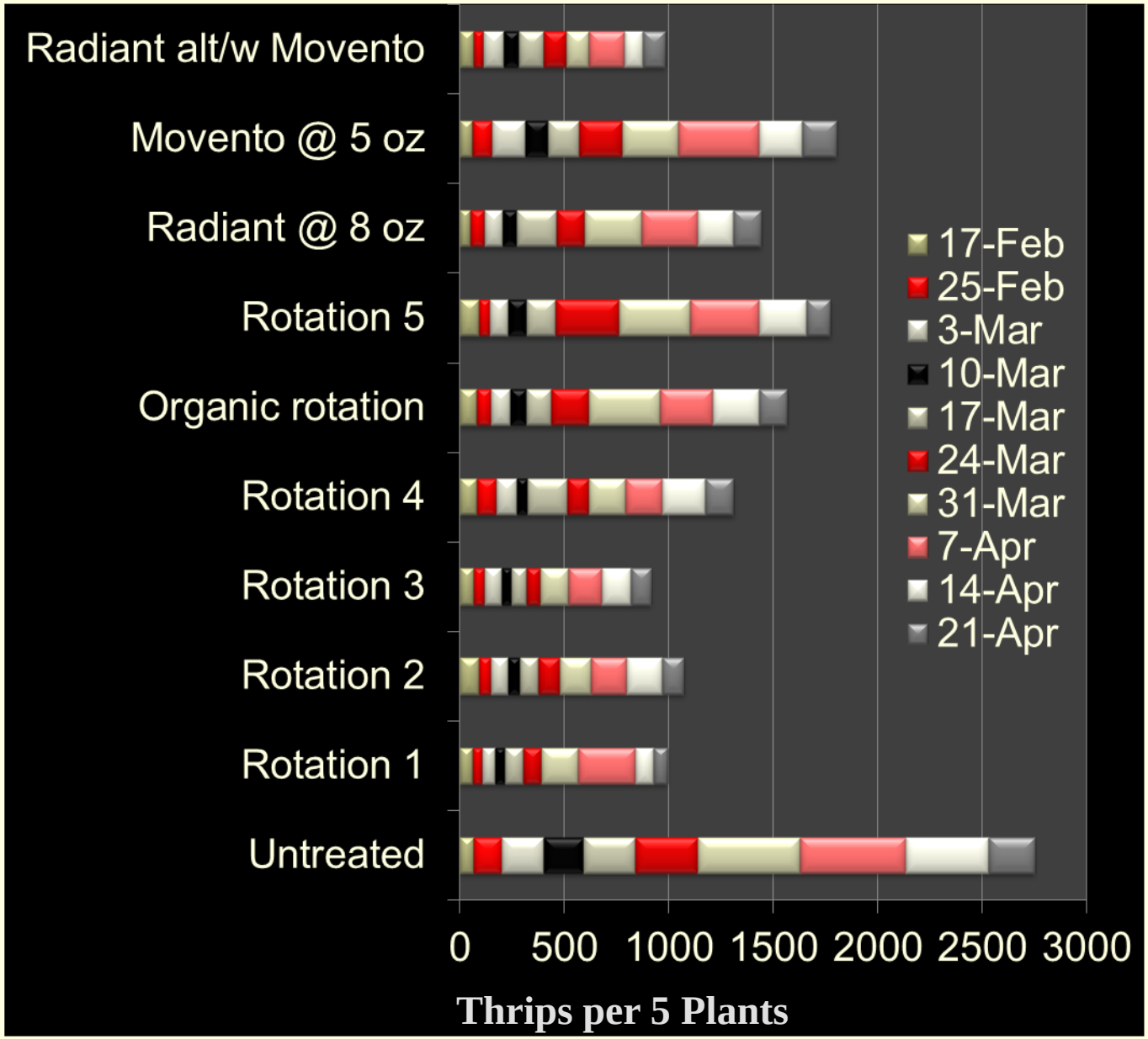


Thrips Insecticide Efficacy Trial on Onion, Spring 2011.

Treatment	Oz/acre	Appl. Dates
Untreated check	--------	----------
Torac 15EC*	24.0	15 Feb, 1, 15, 29 Mar, 12 Apr
Mustang* f/b Lannate LV* f/b Radiant SC*	4.0 f/b 36.0 f/b 8.0	15 Feb, 29 Mar 1 Mar, 12 Apr 15 Mar
Admire Pro f/b Movento* R/W Radiant SC*	14.0 f/b 5.0 f/b 8.0	22 Oct 15 Feb, 15 Mar, 12 Apr 1, 29 Mar
Admire Pro f/b Movento* R/W Lannate LV*	14.0 f/b 5.0 f/b 36.0	22 Oct 15 Feb, 15 Mar, 12 Apr 1, 29 Mar
Movento*	5.0	15 Feb, 1, 15, 29 Mar, 12 Apr
Lannate LV*	36.0	15 Feb, 1, 15, 29 Mar, 12 Apr
Radiant SC*	8.0	15 Feb, 1, 15, 29 Mar, 12 Apr
Torac 15EC + Lannate LV*	24.0 + 36.0	15 Feb, 15 Mar, 12 Apr 1, 29 Mar
Torac15EC† f/b Radiant SC† f/b Lannate LV† f/b Mustang†	24.0 f/b 8.0 f/b 36.0 f/b 4.0	15 Feb, 12 Apr 1 Mar 15 Mar 29 Mar

***Dyne-Amic @ 0.25 %vol/vol added to foliar spray mixtures.**
†NIS @ 0.25% vol/vol added to foliar spray mixtures.

Onion Insecticides, Holtville, California, 2011.

Rotation 1

Mustang f/b	4.0 oz
Lannate LV f/b	36.0 oz
Radiant SC	8.0 oz

Rotation 2

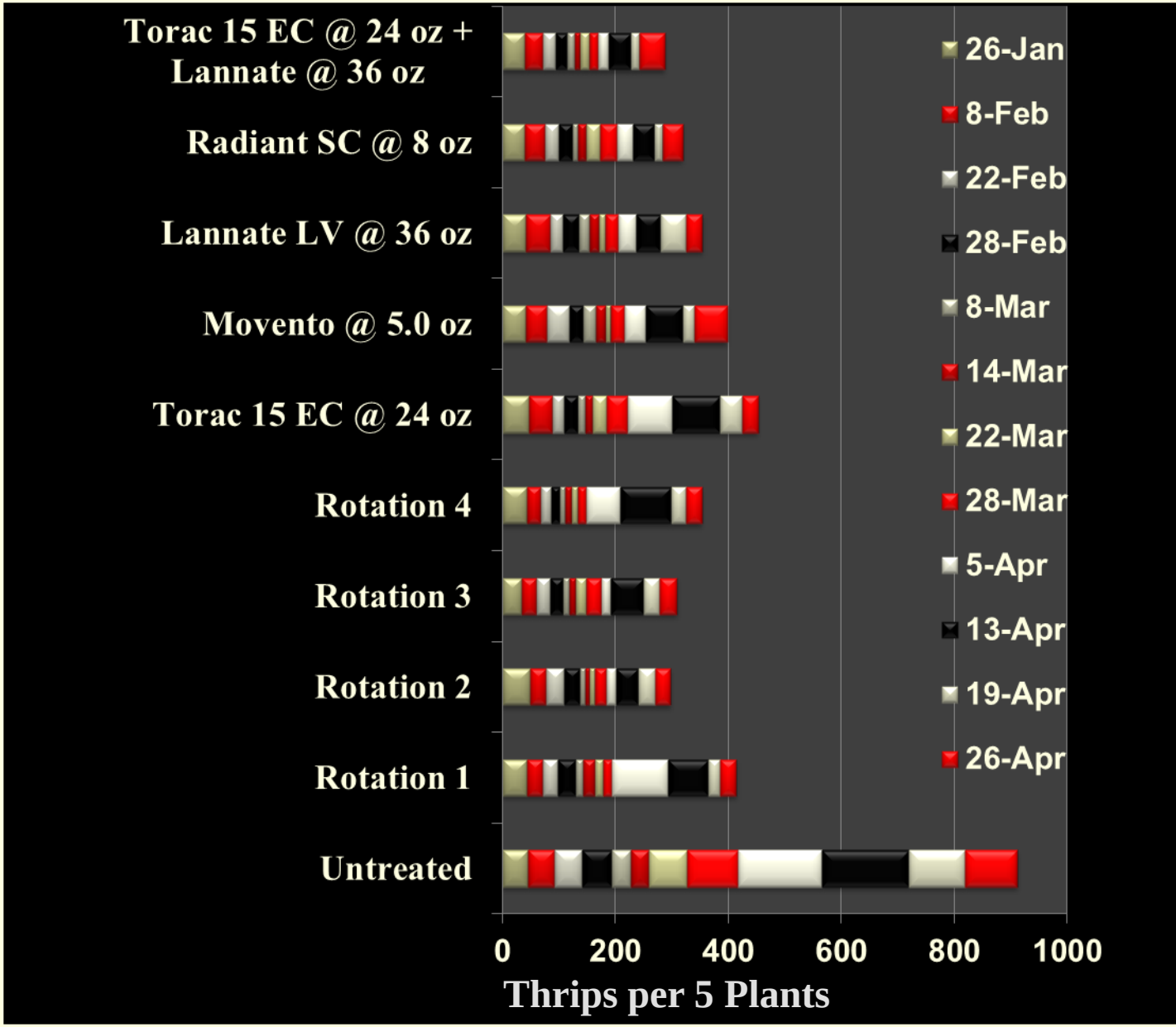
AdmirePro f/b	14.0 oz
Movento f/b	5.0 oz
Radiant SC	8.0 oz

Rotation 3

AdmirePro f/b	14.0 oz
Movento f/b	5 oz
Lannate LV	36.0 oz

Rotation 4

Torac f/b	24.0 oz
Radiant SC f/b	8.0 oz
Lannate LV f/b	36.0 oz
Mustang	4.0 oz



Torac has no US EPA or Cal DPR label

Severity of IYS-symptoms on plants symptomatic plants on 19 April 2011

- 0 = no symptoms
- 1 = 1 – 20 % of plant with IYSV symptoms
- 2 = 21 – 40 % of plant with IYSV symptoms
- 3 = 41 – 60 % of plant with IYSV symptoms
- 4 = 61 – 80 % of plant with IYSV symptoms
- 5 = 81 – 100 % of plant with IYSV symptoms

IYSV Ratings and Onion Yield, Holtville, CA. 2011.

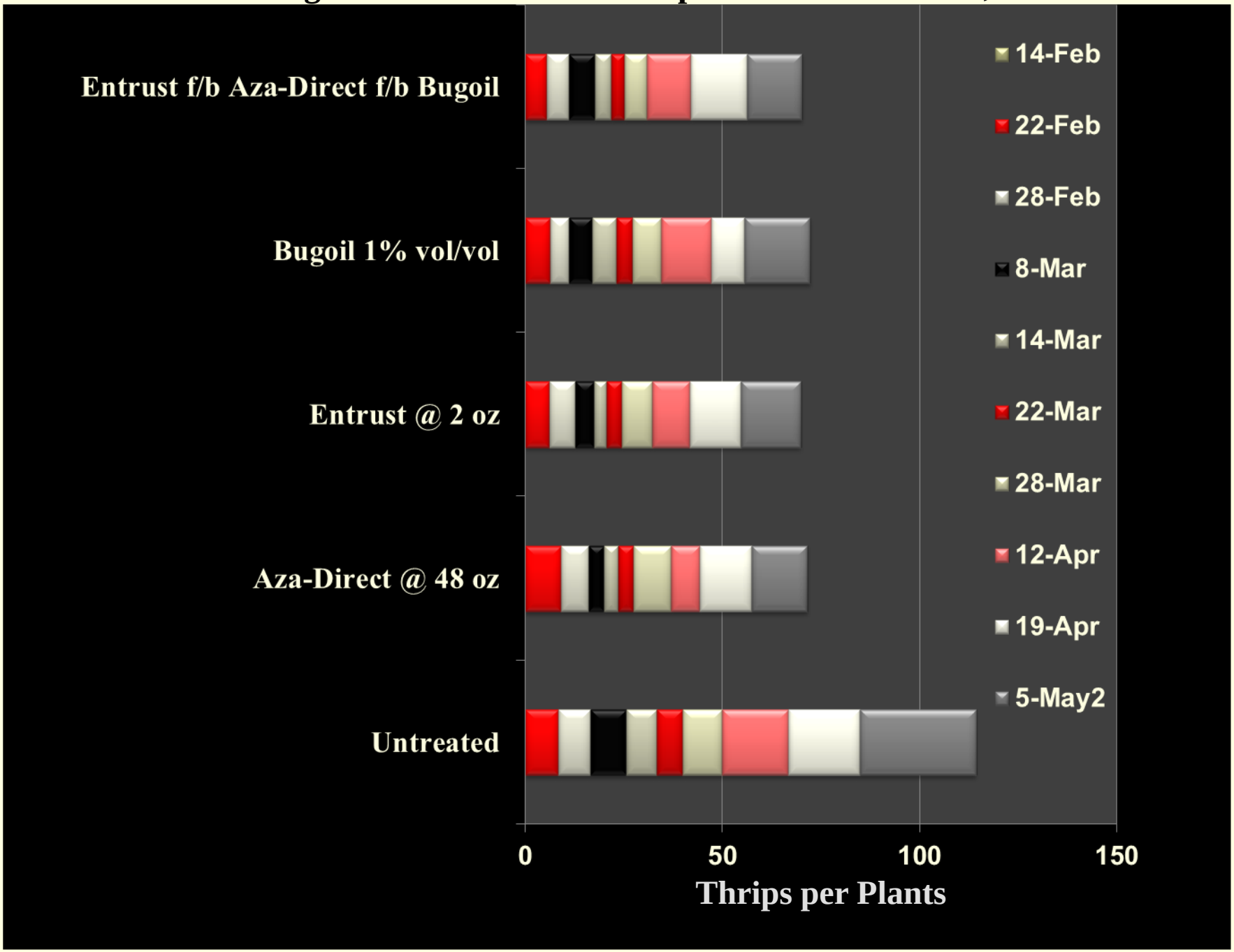
Treatment	oz/acre	IYSV Rating	Tons per acre
Untreated check	--------	0.70	13.94
Torac 15EC	24.0	0.85	14.66
Mustang f/b Lannate LV f/b Radiant SC	4.0 36.0 8.0	0.50	16.75
Admire Pro f/b Movento R/W Radiant SC	14.0 5.0 8.0	0.55	14.00
Admire Pro f/bMovento R/WLannate LV	14.0 5.0 36.0	0.55	12.40
Movento	5.0	0.60	13.43
Lannate LV	36.0	0.70	13.28
Radiant SC	8.0	0.85	13.59
Torac 15EC + Lannate LV	24.0 + 36.0	0.70	15.71
Torac 15EC f/b Radiant SC f/b Lannate LV f/b Mustang	24.0 8.0 36.0 4.0	0.65	14.64

Organic Insecticide Efficacy for Thrips on Onions, 2011.

Treatment	Oz/acre	Appl. Dates
Untreated	--------	----------
Aza-Direct	48.0	15 Feb, 1, 15, 29 Mar, 12 Apr
Entrust	2.0	15 Feb, 1, 15, 29 Mar, 12 Apr
Bugoil	1% v/v	15 Feb, 1, 15, 29 Mar, 12 Apr
Entrust f/b	2.0	15 Feb, 29 Mar
Aza-Direct f/b	48.0	1, 29 Mar
Bugoil	1% v/v	15 Mar, 12 Apr

Natural Wet @ 37.8 ml/4gal added to foliar spray mixtures.

Organic Insecticides for Thrips Control on Onions, 2011.



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- 5 = 81 – 100 % of plant with IYSV symptoms

IYSV Rating and Onion Yield. Holtville, CA. 2011

Treatment	oz/acre	Virus Rating	Tons per acre
Untreated	--------	0.36	16.12
Aza-Direct	48.0	0.20	15.87
Entrust	2.0	0.52	16.31
Bugoil	1% v/v	0.32	16.51
Entrust f/b	2.0 f/b		
Aza-Direct f/b	48.0	0.36	15.76
Bugoil	1% v/v		

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).**

Thrips Control Insecticides

- **Movento®** (spirotetramat) Bayer CropScience (MoA 23)
- **Neonicotinoids** (MoA A4)
  - Assail
- **Spinosyns:** (MoA 5)
  - Success® & Entrust® (a.i. spinosad) Dow AgroSciences
  - Radiant® SC (a.i. spinetoram) Dow AgroSciences
- **Carbamates:** (MoA A1)
  - Lannate® (a.i. methomyl) DuPont
  - Vydate® (a.i. oxamyl) dry bulb onion supplemental label
- **Pyrethroids:** (MoA 3) (several others not listed)
  - Mustang® (a.i. zeta-cypermethrin) FMC Corp.
  - Warrior® (a.i. lambda-cyhalothrin) Syngenta
- **Others:**
  - a.i. Azadirachtin (various products) (MoA 18B)
  - Torac (a.i. tolfenpyrad; under development Nichino Americas)

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.
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 appl. or more than 13.7 oz /ac/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