AgRx Citrus/Avocado Grower Meeting
February 28, 2017

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Insecticides - Citrus
Agri-Mek SC also has avocado

Foliar applied neonicitinoid insecticide, sucking pests – leafhopper, mealybugs, sharpshooters. *Citrus*: leafminer, Asian Citrus Psyllid, ants

Soil applied neonicitinoid, works particularly well on mealybug and ACP.


Dual mode of action providing broad spectrum control of major damaging citrus pests.
Watch for bee hazard icon throughout label for further instructions.
Applications can be made for both pests by ground or air.

When going by air, the resulting level and duration of control could be reduced compared to ground application.

Both products recommend using the higher rates if going by air:
- 3.75-4.25 oz./acre for Agri-Mek SC
- 8.5 oz./acre for Agri-Flex

For best results – use a minimum of
- 25 gpa for young trees; 50 gpa for large, mature trees

When there are high pest populations, dense foliage, or adverse conditions (i.e. High temps) use greater volume of water to ensure adequate coverage.
## Key Citrus Pest in Southern California

<table>
<thead>
<tr>
<th>Pest</th>
<th>Actara</th>
<th>Agri-Mek SC</th>
<th>Agri-Flex</th>
<th>Voliam Flexi</th>
<th>Platinum</th>
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<td>IRAC MOA</td>
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<td>28 + 4A</td>
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<td>RATE/A</td>
<td>5.5 oz</td>
<td>4.25 oz</td>
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<td>Citrus Thrip</td>
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<td>Citrus Rust Mite</td>
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<td>Citrus Red Scale</td>
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<td>Citrus Black Scale</td>
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<td>Argentine Ant</td>
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<td>California Red Mite</td>
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<td>Asian Citrus Psyllid</td>
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OBJECTIVE 1

This study was designed to determine the impact of dried residues if nymphs were to move about and make contact with a treated surface.
## Bioassays of ACP nymphs under laboratory and semi field conditions

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Class</th>
<th>Petri-dish (1\textsuperscript{st}-2\textsuperscript{nd} instar nymphs) 24h % mortality (# wks &gt; 50% mort)</th>
<th>Sleeve cage (3\textsuperscript{rd}-4\textsuperscript{th} Instar nymphs) 24h % mortality (# wks &gt; 50% mort)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actara (thiamethoxam)</td>
<td>Neonic</td>
<td>100% (4 weeks)</td>
<td>92% (2 weeks)</td>
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<tr>
<td>Leverage (imidacloprid + cyfluthrin)</td>
<td>Neonic/ Pyrethroids</td>
<td>100% (4 weeks)</td>
<td>99% (6 weeks)</td>
</tr>
<tr>
<td>Agri-Flex (thiamethoxam + abamectin)</td>
<td>Neonic/ Abamectin</td>
<td>98% (4 weeks)</td>
<td>92% (2 weeks)</td>
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<tr>
<td>Voliam Flexi (chlorantraniliprole + thiamethoxam)</td>
<td>Neonic/Chlorantraniliprole</td>
<td>100% (4 weeks)</td>
<td>87% (3 weeks)</td>
</tr>
<tr>
<td>Tombstone (cyfluthrin)</td>
<td>Pyrethroids</td>
<td>94% (2 weeks)</td>
<td>90% (&lt;1 week)</td>
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<tr>
<td>Danitol (fenpropathrin)</td>
<td>Pyrethroids</td>
<td>91% (2 weeks)</td>
<td>86% (&lt;1 week)</td>
</tr>
<tr>
<td>Baythroid (beta-cyfluthrin)</td>
<td>Pyrethroids</td>
<td>97% (2 weeks)</td>
<td>80% (2 weeks)</td>
</tr>
<tr>
<td>Mustang (zeta-cypermethrin)</td>
<td>Pyrethroids</td>
<td>74% (1 week)</td>
<td>59% (1 week)</td>
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</table>
Bioassays of ACP nymphs under laboratory and semi field conditions cont.

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Class</th>
<th>Petri-dish (1st-2nd instar nymphs) 24h % mortality (# wks &gt; 50% mort)</th>
<th>Sleeve cage (3rd-4th Instar nymphs) 24h % mortality (# wks &gt; 50% mort)</th>
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<tbody>
<tr>
<td>Delegate</td>
<td>Spinosyn</td>
<td>99% (3.5 weeks)</td>
<td>99% (&lt;1 week )</td>
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<tr>
<td>Sivanto</td>
<td>Butenolide</td>
<td>100% (4.5 weeks)</td>
<td>81% (&lt;1 week )</td>
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<tr>
<td>Movento 240 SC</td>
<td>Tetronicacid</td>
<td>100% (3.5 weeks)</td>
<td>88% (&lt;1week)</td>
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<tr>
<td>Agri-Mek SC</td>
<td>Avermectin</td>
<td>100% (1 week)</td>
<td>50% (&lt;2weeks)</td>
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<tr>
<td>Exirel</td>
<td>cyantraniliprole</td>
<td>100% (2.5 weeks)</td>
<td>98% (&lt;1week)</td>
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<tr>
<td>Micromite 80 WGS</td>
<td>Benzylurea</td>
<td>97% (&lt;1 week)</td>
<td>89% (&lt;1week)</td>
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<tr>
<td>FujiMite 5 EC</td>
<td>Meti insecticide</td>
<td>98% (2.5 weeks)</td>
<td>92% (&lt;1week)</td>
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<tr>
<td>Minecto Pro</td>
<td>cyantraniliprole + abamectin</td>
<td>94% (1 week)</td>
<td>100% (&lt;1week)</td>
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<tr>
<td>Entrust (Spinosyns)</td>
<td>Organic</td>
<td>82% (1 week)</td>
<td>65% (&lt; 1week)</td>
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<tr>
<td>Pyganic</td>
<td>Organic</td>
<td>76% (&lt;1 week)</td>
<td>51% (&lt;1week)</td>
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OBJECTIVE 2

Study the impact of fall and spring areawide insecticide treatments on psyllid levels in southern California.

- 2015 Fall applications – air vs. ground
- 2016 Spring applications – air vs. ground
MATERIALS AND METHODS

- Objective I: 2015 Fall application
  - Monitor ACP weekly (adults by tap, nymphs and eggs by flush examinations) in 10 orchards in Pauma Valley, San Diego County treated.
  - 15 flushes per row and 45 flushes per orchard.
  - %Reduction was calculated relative to the pretreatment counts.

Applications by air (50 gpa): Oct, 2015
  - Actara (5.5 oz)
  - Delegate (6 oz) + 2% oil
  - Entrust (9 oz) + 1% oil

Applications by ground (400 gpa): Oct, 2015
  - Movento (10 oz) + 1.25% oil
  - .25% 440 Oil
Oct 2015 Application:
ACP adults by tap; nymphs & eggs by flush examination in 10 Pauma Valley orchards

Fall [Oct-Nov 2015], data - 2 groves/trmt. averaged

% Reduction

Days Post Application

- Movento + oil
- Oil
- Actara
- Delegate + oil
- Delegate + oil
- Entrust + oil
MATERIALS AND METHODS

- Objective II: 2016 Spring application

Applications by air (50 gpa): Feb 16, 2016
  - Danitol (21 oz)
  - Actara (5.5 oz)
  - Entrust (9 oz) + 1% oil

Applications by ground (400 gpa): March 22, 2016
  - Danitol (21 oz)
  - Actara (5.5 oz)
  - Entrust (9 oz) + 1% oil
Feb 16, 2016 (AIR)

Actara Air

Mean adults per sweep & nymphs and eggs/flush

Date
Days After Treatment

<table>
<thead>
<tr>
<th>Date</th>
<th>Days After Treatment</th>
<th>Presample</th>
<th>3</th>
<th>8</th>
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Mean adults per sweep & nymphs and eggs/flush: Egg, Nymph, Adult

Danitol Air

Mean adults per sweep & nymphs and eggs/flush

Date
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Mean adults per sweep & nymphs and eggs/flush: Egg, Nymph, Adult
March 22, 2016 (GROUND)

Actara Ground

Mean adults per sweep & nymphs and eggs/flush

Date
Days After Application

Presample  2  13  23  28  37  49  59  66  72  80  94

Mean adults per sweep & nymphs and eggs/flush

Date
Days After Treatment

Presample  2  13  23  28  37  49  59  66  72  80  94

Mean adults per sweep & nymphs and eggs/flush

Date
Days After Application

Presample  2  13  23  28  37  49  59  66  72  80  94

Danitol Ground

Mean adults per sweep & nymphs and eggs/flush

Date
Days After Treatment

Presample  2  13  23  28  37  49  59  66  72  80  94
MATERIALS AND METHODS

● Objective II: 2016 fall application

Applications by air (50 gpa): Sep-Oct, 2016
Actara (5.5 oz)/A + Supreme Spray 440
Entrust (10 oz)/A + Supreme Spray 440
Delegate 6 oz/A + 1% Supreme Spray 440

Applications by ground (400 gpa): Sep-Oct, 2016
Actara (5.5 oz)/A + Supreme Spray 440
Entrust (10 oz)/A + Supreme Spray 440
Delegate 6 oz/A + 1% Supreme Spray 440
Leverage 6.4 fl.oz/A + 1% Supreme Spray 440
Exril 20.5 fl.oz/A + 1% Supreme Spray 440
Agri-Flex 8.5 fl.oz/A + 1% Supreme 440
Surround 50 lbs/A
CONCLUSIONS

- No insecticide completely eliminated psyllids.

- Fall 2015: Actara was the most effective treatment when populations were high.

- Spring 2016: All treatments worked well in spring when populations were low.

- Entrust SC was not effective when psyllid populations were moderate to high.
CONCLUSIONS: Fall 2016

- Actara (air or ground), Exirel (ground), Leverage (ground) and Surround (applied 2x by ground) suppressed psyllids to very low levels for more than 7 weeks.

- Delegate (air or ground) and Agri-Flex (ground) showed only 2 weeks of reductions in psyllid populations.
Syngenta Herbicide Products for Citrus & Avocado

Registered: Citrus – not avocado. Translocating grass herbicide; especially good on bermudagrass. Will not injure young trees.

Contact herbicide; quick burn down of weeds & glyphosate resistant weeds. Great tank mix partner…burndown TM partner with pre-emergent.

2016: closed system regulations have changed, no longer required.
2017: very inexpensive

Economical residual weed control. Long residual reduces need for contact herbicides early in the season when you are busiest. Safe to targeted crops: avocado, lemon, oranges & grapefruit.
New Citrus Herbicide: Broadworks™
What is Broadworks herbicide?
Primarily a broadleaf weed herbicide which has great activity on wide selection of broadleaves, including glyphosate resistant weeds.

- **A Pre-emergence** herbicide for use in Citrus
- Has some Post activity but strength is pre-emergence
- HRAC Group 27 Herbicide - HPPD inhibitor
  - (first to be registered in these crops)
- Active Ingredient – Mesotrione
- Great tank mix partner
  - Create a comprehensive weed control solution when paired with a predominantly grass herbicide
  - Expand the spectrum of control with your preferred broadleaf herbicide or fill gaps that it misses
Progress towards Broadworks avocado registration……

- Two years of local trials have found crop safety acceptable
- Technical service staff in process now to find support from University for IR4 project.
Label at a glance

• Top Broadleaves
  – Marestail
  – Fleabane
  – Many Others

• Recommended Rate for PRE activity is 6 fl oz/A (all soil types)

• **Adjuvant Recommendations:**
  In general, any adjuvant approved for agricultural use is permitted and will enhance postemergence activity:
  – MSO (1% v/v) > COC (1% v/v) > NIS (0.25% v/v)
  – When tank mixing, choose adjuvant appropriate for other product
  – UAN (e.g. 28-0-0 (2.5% v/v) or AMS (8.5 lb/100 gal) will also enhance activity
Phythophthora Effects in Permanent Crops
Why is Root Health in Permanent Crops so Important?

- Compounding disease pressure with no “redo” factor
  - Annual crops can be replanted in season and year after year
  - You can learn from your mistakes
  - With permanent crops, you are stuck with what you have

- If a Phytophthora infection exists, it only gets worse, there is no ability to “redo”
  - Lingering stressors not only harm current but future yields as well
  - Affects ROI on all other inputs in the field
  - Roots are the foundation for growth and compromises here compound every aspect of growth and yield
Key phytophthora species – Citrus:

– *P. citrophthora*
  - winter rot that can also cause brown fruit rot and gummosis; active when roots are inactive and resistance to infection low
  - Sample timing January – March

– *P. parasitica*
  - Active during summer when roots are growing
  - Sample timing July - September
Key phytophthora species - Avocado:

- Pythophthora spp.
  - Main is P. cinamomomi
    - Causes fruit rot, decline of tree vigor
    - Fibrous root system lends itself to rot at low infection levels
  - P. citricola
    - Usually cause of fruit rot, collar rot, or canker
- Sample timing July - September
Phytophthora symptoms: Citrus & Avocado

- Slow decline of either tree crop
- Citrus leaves light green or yellow, may drop
- Avocado fruit has distinct circular black area near bottom of fruit—often found on lower limbs touching soil. Indicator of disease in soil
- Destroys feeder roots of susceptible rootstocks
  - If destroyed faster than regeneration then uptake of water & nutrients severely limited
  - Tree grows poorly, stored energy reserves depleted
  - Production decline
- Difficult to distinguish from nematode, salt, or flooding damage
  - Lab analysis can provide positive ID
- Nematode and phytophthora often present at same time
Phytophthora spp. are present and affect root health to some degree in every citrus/avocado grove

- *Phytophthora* spp. cause fibrous root rot on susceptible rootstocks and is difficult to assess directly.
- Phytophthora can survive adverse conditions as persistent spores in the soil.
- Under moist, 2017 conditions, large numbers of motile zoospores, are produced.

Zoospores are the infective agents that can swim in water for short distances and are carried in the irrigation water or rainwater to the roots.
Syngenta Phytophthora Sampling Program

• *Phytophthora* is difficult to assess directly
• We have demonstrated positive, cost effective results from use of Ridomil via rootbox trials, new planting trials
• 2015 began “Soil Pathogen Assessment Program” (SPA) in permanent crops
  – A no-cost soil pathogen evaluation program
  – No strings or business requirements attached
  – To help PCAs and growers determine if phytophthora was present in suspect blocks and if so was it at treatable levels
2016/2017 SPA – sampling process - consider participating

● PCA and Syngenta representative discuss which grower blocks may be candidates for testing.
● PCA fills out questionnaire for each treatment block.
● Syngenta representative (sales, ASR or intern) will visit field – finalize paperwork, and conduct sampling. Ideal sampling will occur in moist soil.
● Sample goes to 3rd party lab for testing and results given to PCA/growers in about 3 weeks.

● Types of tests:
  - ELISA – (Enzyme-linked immunosorbent assay)
    • samples of roots either disease present or absent
  - Propagule – soil sample around roots taken
    • Treatable levels – Avocado: 5 propagules/gm of soil;
      - Due to fibrous, shallow root system have seen significant root rot & tree decline at levels lower than 5
    • Treatable levels – Citrus: 10+propagules/gm of soil
QUESTIONS ??
Thank you

Product performance assumes disease presence.


Some seed treatment offers are separately registered products applied to the seed as a combined slurry. Always read individual product labels and treater instructions before combining and applying component products.

Trivapro is sold as a combination of separately registered products: Trivapro A and Trivapro B fungicides. Orondis Opti is a combination of separately registered products: Orondis Opti A and Orondis Opti B. Orondis Ridomil Gold is a combination of separately registered products: Orondis Gold 200 and Ridomil Gold SL. Orondis Ultra is a combination of separately registered products: Orondis Ultra A and Orondis Ultra B.

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