

Recent UCR Research with Turbocide Gold®

Citrus Preclearance Meeting
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Joseph Morse, Lindsay Robinson, and Alan Urena
Department of Entomology
University of California, Riverside

Presentation Outline

- Review of bean thrips basic biology
- How to optimize fruit cutting to find adult bean thrips in the navel of navel oranges
- Factors affecting when bean thrips will fly into citrus in the fall
- Bean thrips found mostly on navel oranges
- Recent research with Turbocide Gold®

Bean Thrips Basic Biology

Egg laying ceases ca. early October and larvae disappear by ca. the middle of October

Late October to November, adults seek out overwintering sites, moving mainly to plants which are still green, on which they spend the winter in "hibernation", feeding a little whenever the weather warms (75-80°F)

Exposed overwintering adults appear to suffer mortality as a result of heavy rains; thus, they have evolved to seek out well protected areas in which to overwinter (e.g., the navels of navel oranges)

Bean Thrips Host Plants

Wide host range - Crop plants reported as hosts (those that carry egg, larval, and adult stages) include **alfalfa**, **almond**, apple, asparagus, avocado, **bean**, beet, cabbage, cantaloupe, carrot, cauliflower, clover, corn, **cotton**, fig, garlic, grape, hops, kale, leek, lettuce, melon, olive, onion, orange, peach, **pear**, pea, pepper, persimmon, plum, potato, prune, radish, Swiss chard, tangerine, tomato, turnip, and **walnut**

Not generally considered a pest on any of the above crops

Many native or uncultivated plants are also known to support bean thrips-- most common are buckeye, morning-glory, poppy, **prickly lettuce**, bur clover, white melilot, **common sow thistle**, **tree tobacco**, and wild vetch

Bean Thrips - Fruit Cutting

To maximize the likelihood of finding bean thrips if present:

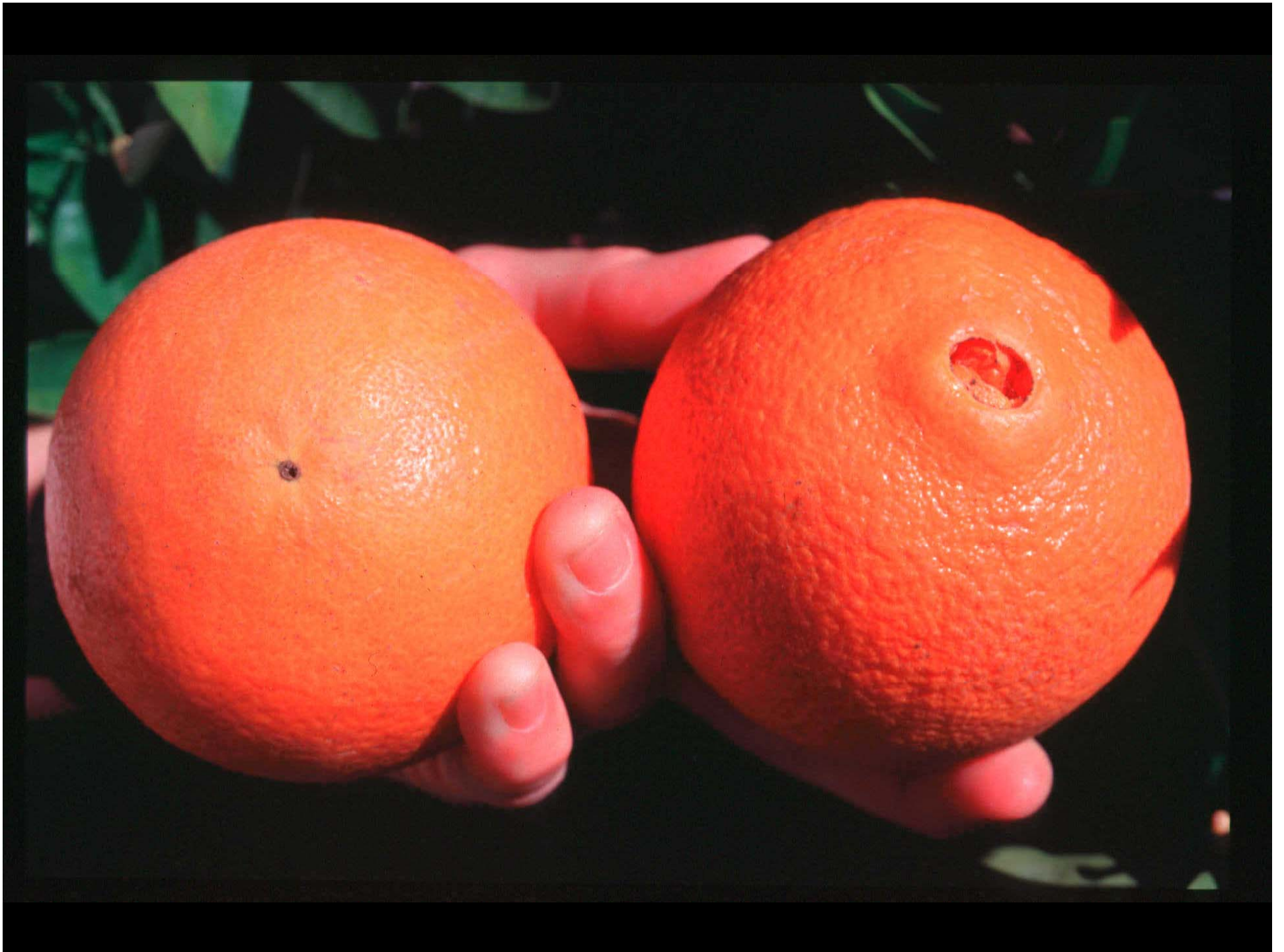
Select fruit from the outside of the block facing likely sources of bean thrips fly-ins (creek bed, weeds, nut crops, or other crops likely to harbor bean thrips in late summer)

Select fruit with a small exterior navel opening

Take thin slices across the navel and inspect for infestation; a head or hand lens is needed to confirm identification

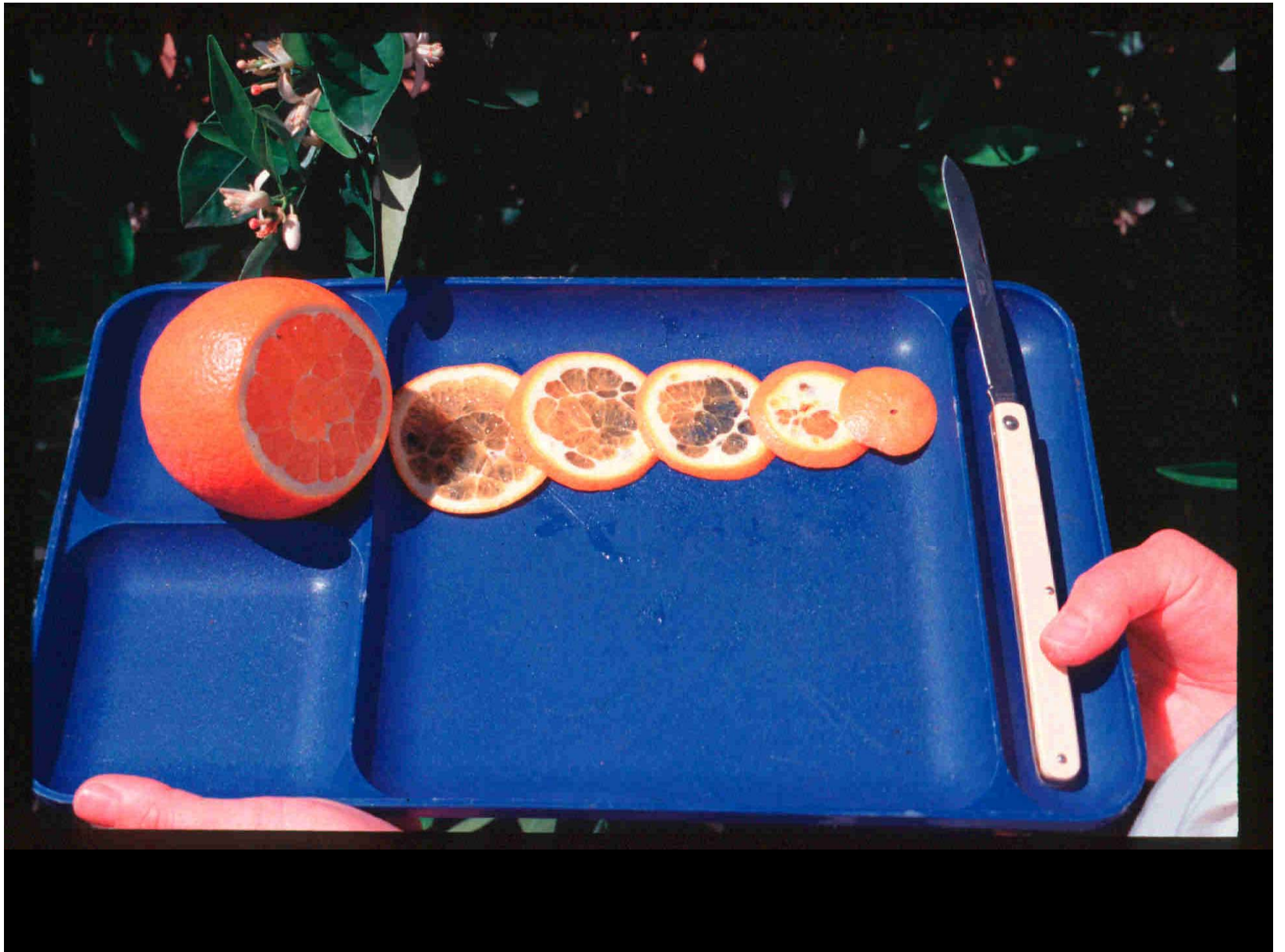
Some navels can go very deep into the fruit

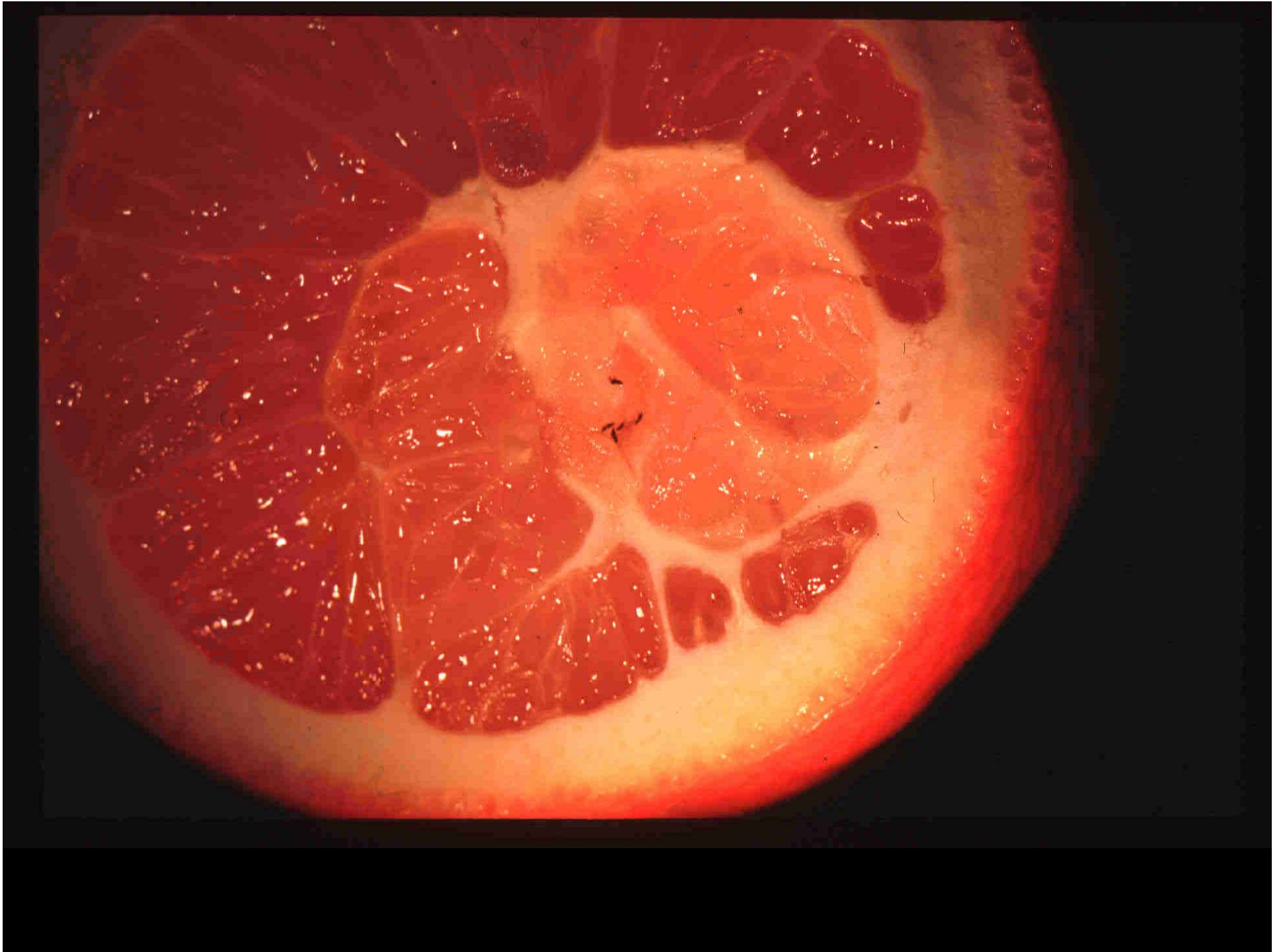
Differentiate live bean thrips from other insects or mites and from the blackened tip of a flower stigma often found in the navel (thin slices result in it often being the length of a bean thrips)











Identifying Bean Thrips

- Thrips found in field samples -- mostly bean thrips, citrus thrips (yellow), and flower thrips adults (usually yellow but can see darker morphs)
- **Adult bean thrips are uniformly dark grayish-black and the front wings have transverse white bands with brown tips**



When during the fall / early winter do bean thrips fly to citrus?

- Two main factors appear to be important in fall and early winter
 - Winter rains keep alternate host plants succulent and delay flights to citrus (versus dry conditions)
 - Bean thrips are more active during warmer weather
 - fly less in cooler weather (60°F and below)
- Note: during winter, bean thrips will come out of the navel to feed on fruit and leaves during warm days

Systems Approach To Reducing The Likelihood Of Bean Thrips Introduction Into Australia

1. Remove nearby field weeds known to harbor bean thrips to the degree practical
2. Sticky card monitoring with green cards - OPTIONAL
3. Field fruit cutting
4. Packinghouse fruit cutting / inspection
5. Fruit warmed to 65°F for 8 h prior to fruit washing OR fumigation with Evergreen® or Turbocide Gold®
6. Lot labeling for trace-back, phytosanitary inspection
7. Pre-clearance in CA or inspection in AU

Turbocide Gold® Studies

- ❖ Full trade name of the product (MGK Co., Minneapolis, MN) = Turbocide Gold® with Pyrocide®
- ❖ With overhead Turbocide Gold® applications, the bottom bin yields the lowest mortality
- ❖ Present label allows 1 gram/ 1,000 cu ft applied up to 3 times
- ❖ MGK submitted a revised label to EPA allowing a higher use rate (24c expected in October)
- ❖ We conducted two research trials under a DPR Research Authorization using 5 g a.i. / 1,000 cu feet
- ❖ Based on past research, it appeared that bean thrips kill could be increased if the sweat room was not filled to full capacity

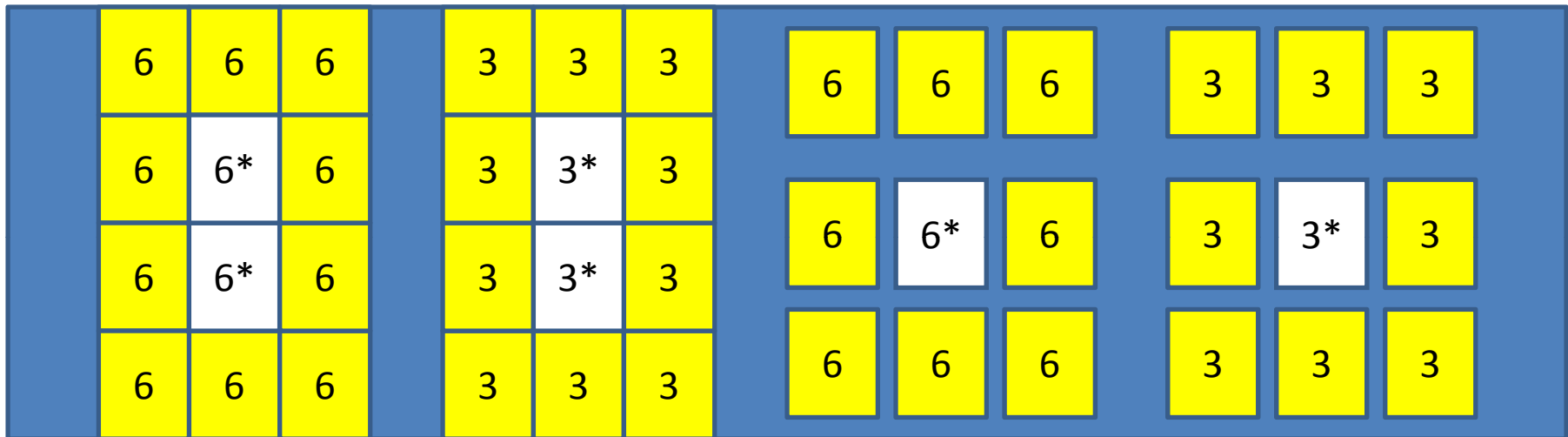
CAUTION CHILDREN CAN GET TRAPPED
AND SUFFOCATE IN THIS AIRTIGHT COOLER
KEEP OUT OF THEIR REACH WHEN NOT IN USE



March 18-19, 2010 Turbocide Gold Trial

Cooperators: Fruit Growers Supply; MGK; Tri-County Packinghouse, Orange Cove, CA

Sweathouse crate configuration (normal = 6 bins high, 4 stacks wide by 16 deep)



2 sets of 9 stacks on left - normal bin spacing here (4-6" between 4 rows, tight down the columns [normally 16 columns])

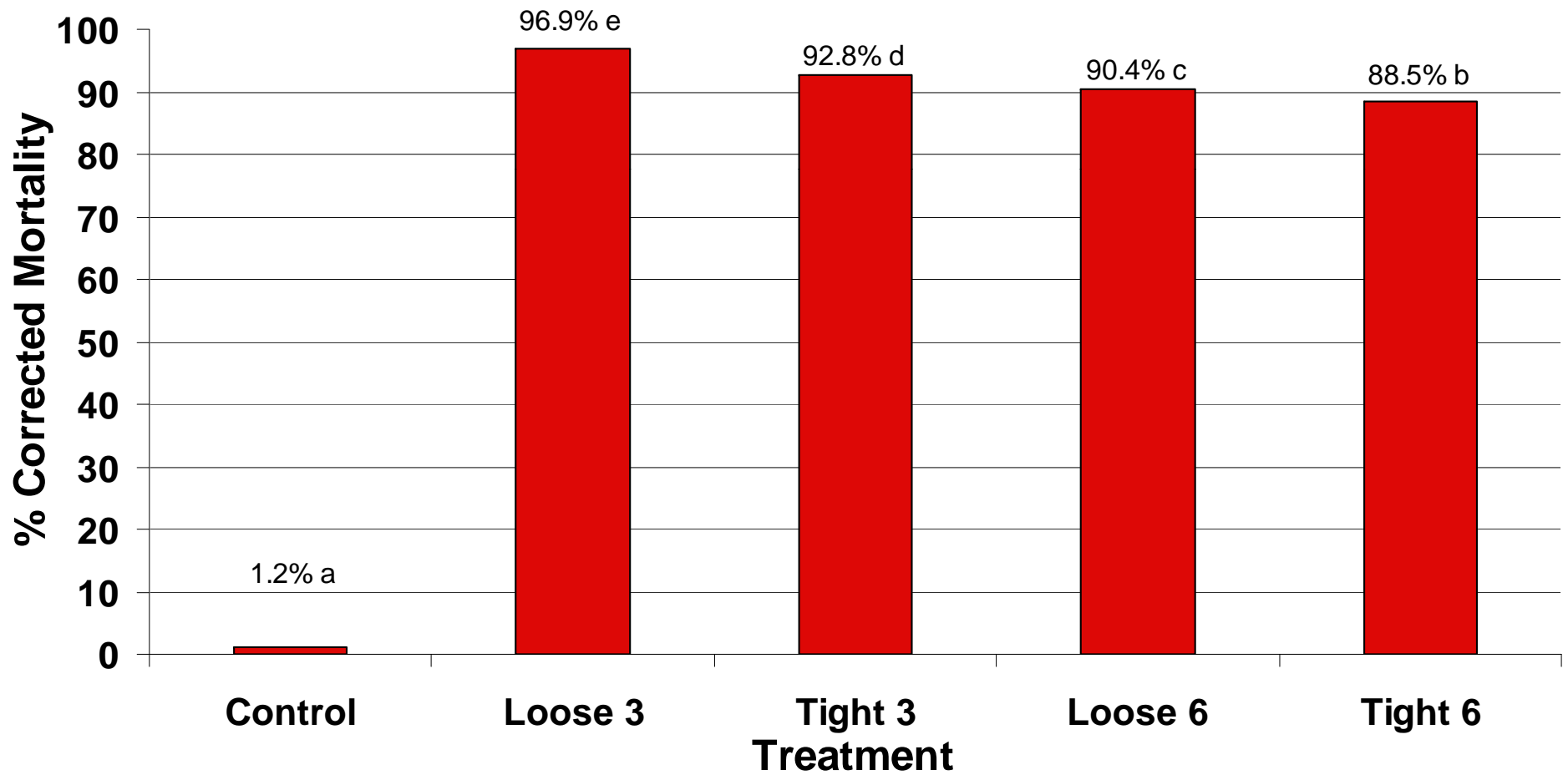
2 sets of 9 stacks on right - equal distance between walls and stacks in both directions

Numbers designate number of bins high in a stack – all bioassays were done in the top center of the bottom bin in the experimental stack

20 infested fruit, mean of 160.4 total bean thrips per treatment

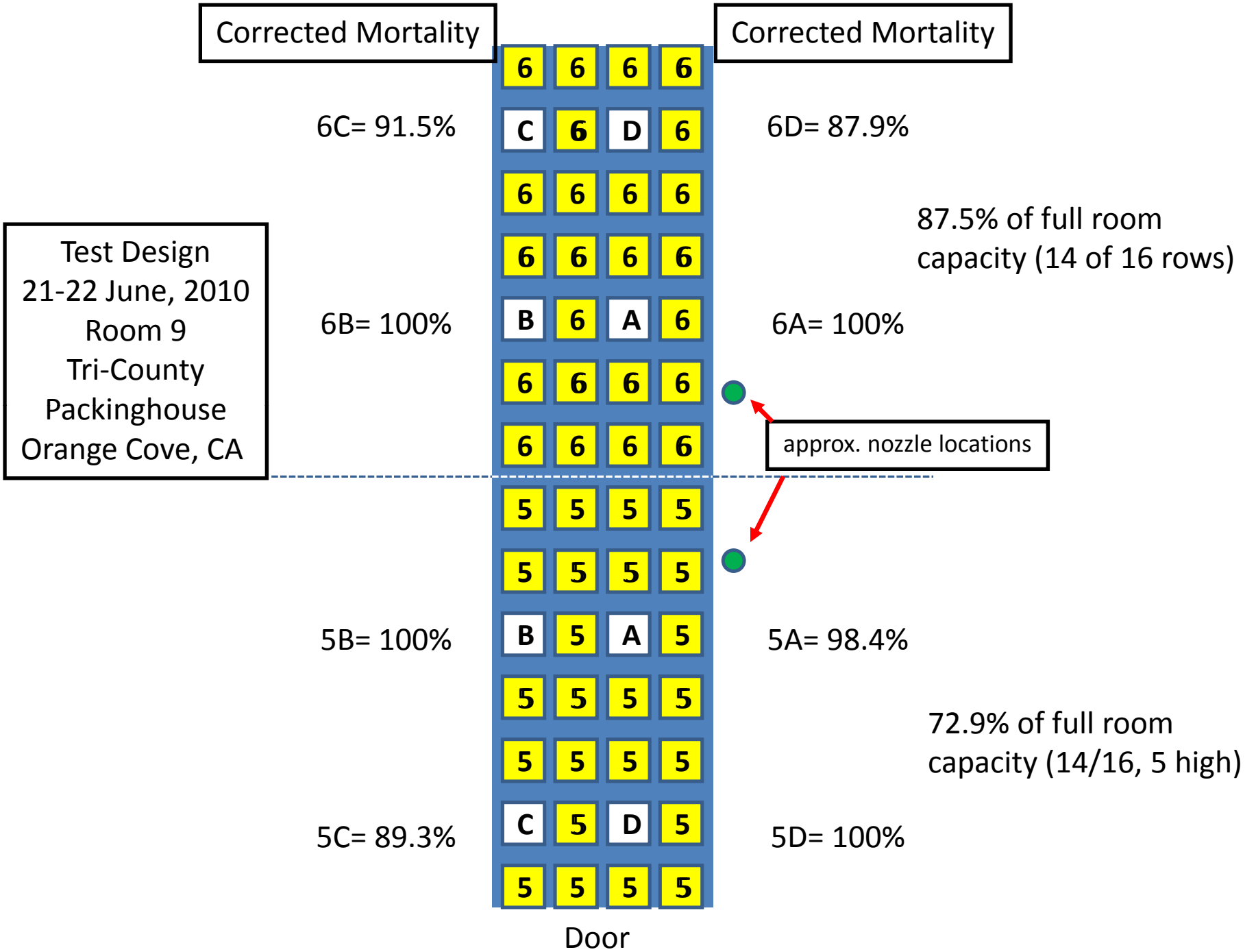
Turbocide Gold Trial 18 March 2010

Tri-County Packinghouse



21-22 June 2010 Trial





Acknowledgements

- Research was supported in part by the Citrus Research Board and USDA Foreign Agricultural Service, Technical Assistance for Specialty Crops Program
- Thanks to Marty Coert and Julie Doctor (Fruit Growers Supply) and MGK Corp. for assistance with recent Turbocide Gold® trials
- These trials would not be possible without the assistance of citrus packinghouses (Tri-County Packinghouse, Orange Cove, CA)

UCR Research on Postharvest Bean Thrips Treatments

- ❖ In our studies, we have treated during the afternoon and let the product sit overnight, opening up the room to vent it early the next morning
- ❖ We filled the room with 14 rows (4 bin stacks wide) instead of the full 16 rows of bins (with 6 bins high, 336 of 384 bins = 87.5% of room capacity)
- ❖ Further research will be done with the 5 g ai / 1,000 cu ft rate of Turbocide Gold® and Evergreen® -- What input do you have on what the priorities should be?
 - ❖ Comparison of bean thrips mortality in the bottom, middle, and top of the bin; comparison in various bins in the stack and throughout the sweat room
 - ❖ Impact on western flower thrips
 - ❖ Use of Evergreen® instead of Turbocide Gold®