Unusual Chemistries to Consider for Controlling SWD

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The problem:

SWD infest soft fruit just before they are ready to pick

PHI: Days-to-harvest
REI: Re-entry interval
MRL: maximum residue limit
IRAC: classes active against SWD are not IPM friendly
OMRI: organic materials review institute

Plus, some crops (day-neutral strawberries, raspberries) have open flowers at the same time as ripe fruit
Possible solution (#1)

Extreme selectivity: find Bt active against SWD adults

Results:

Screened ~150 dipteran-active Bts, USDA collection

Zero hits
Possible solution (#2)

SWD are extremely sensitive to desiccation
Surround WP may be objectionable

Silica aerogel dust
  Lower mammalian toxicity
  Could dry application be approved?
  Already exempt from tolerance

Down sides: reapply after every rain event
  probably non-selective in effects on arthropods
Possible solution (#3)

Forget insecticides! Use mass trapping

Use of attractants to directly manage insects requires a U.S. EPA registration

Bioliberica is pursuing registration of Suzuki Trap bait
Mass trapping is inefficient by itself

Only 10 – 30% of SWD visiting a trap enter to drown

Integration (Possible Solution #4)

#1, Use traps for resistance management and adjunct to conventional spray program
#2, Use sprays only when exceeding trap threshold
#3, Use insecticides on the outside of trap and/or surroundings (Attract-and-kill program)
Ideal A&K program

Use insecticide on outside of trap only
no residue on surrounding fruit!
minimal amount of a.i. required
could achieve high selectivity

MRL, PHI, REI problems may vanish!

Application with phagostimulant can broaden effective modes of action
avoid IRAC classes used in foliar sprays, OR,
use potent, synergistic mixtures and high dosage for resistance management
Boric acid

Will not photodegrade
Blockage of multiple enzymes by complexing NAD
Low mammalian toxicity (<NaCl)
Already exempt from tolerance
Inexpensive

Field results
Promising, but selectively toxic to SWD males
Xanthene dyes require exposure to light, O$_2$, to generate free radicals. Almost deployed to control Medfly, replaced by spinosad.

Can this be practical against a fly that seeks out shade?
Insect growth regulators

Dimilin (diflubenzuron)
Esteem (pyriproxifene)

How can we determine efficacy? Adults are not killed.
Summary

Effective management of SWD begs for a new pesticide use paradigm with an A&K program

Minimal quantity of pesticides needed does not fit pesticide manufacturers’ economic model, they need to recover registration costs

Can IR-4 help to resolve paradox? Some products do not need residue data for registration.