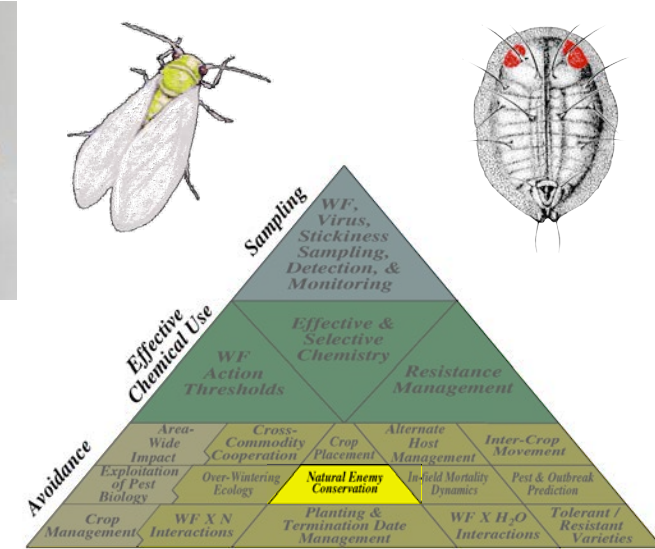


Peter C. Ellsworth, Naomi Pier, Isadora Bordini, Steven E. Naranjo
 Virtual Tent Talk, 19 August 2020



Making the Right Decisions with Predator Thresholds For Whitefly Management in Cotton

Funding and Support

Grants from:

Arizona Cotton Growers Association
Cotton Incorporated
USDA-NIFA, Extension Implementation Program



United States
Department of
Agriculture

National Institute
of Food and
Agriculture

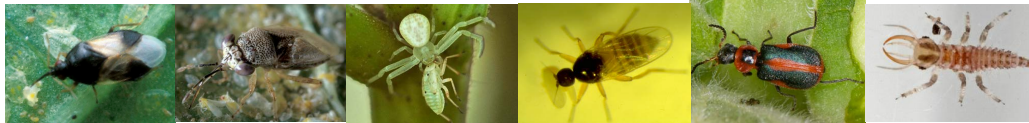
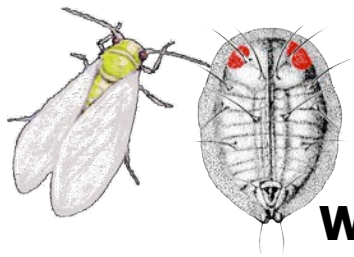
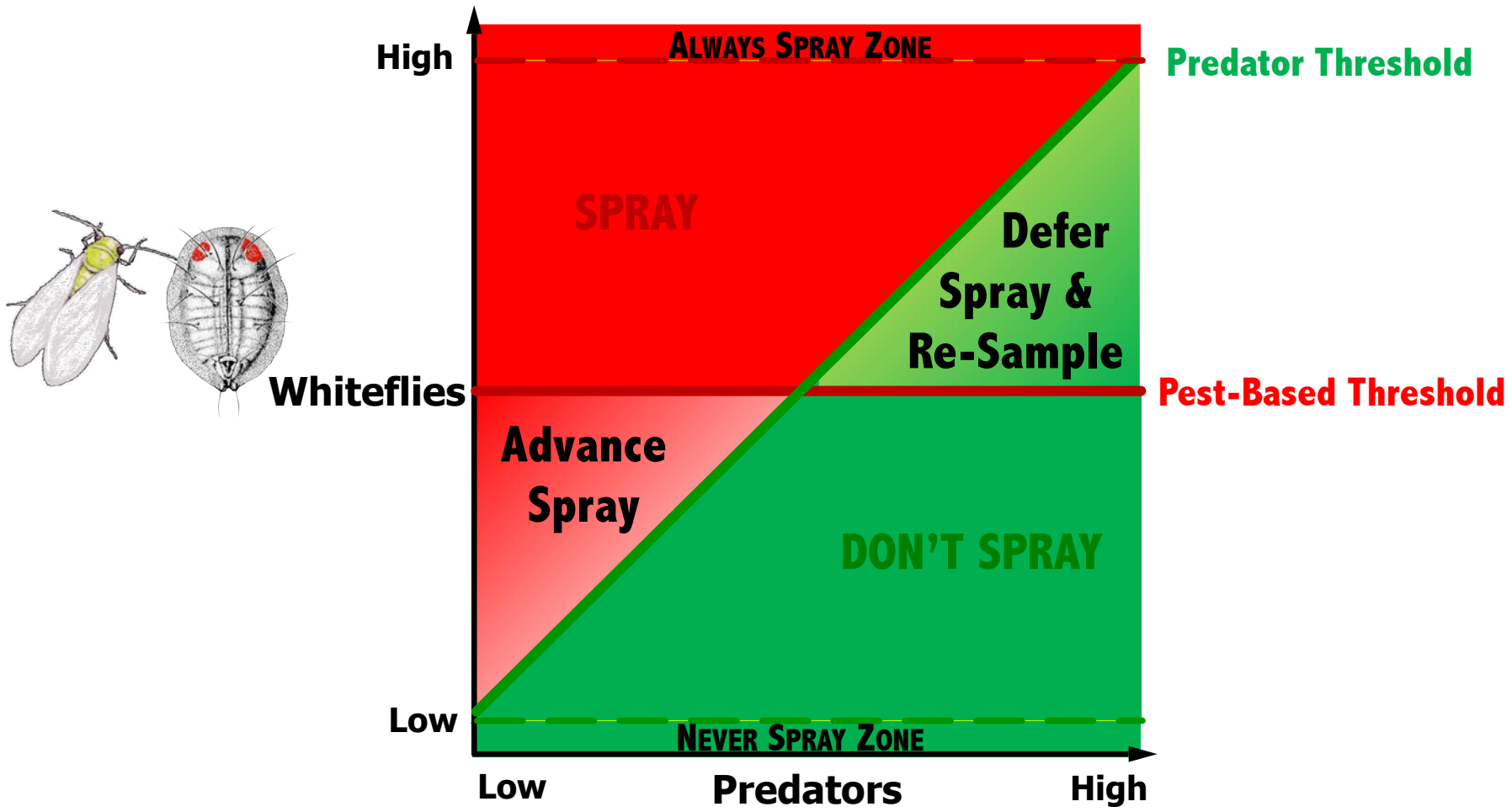
Collaborators:

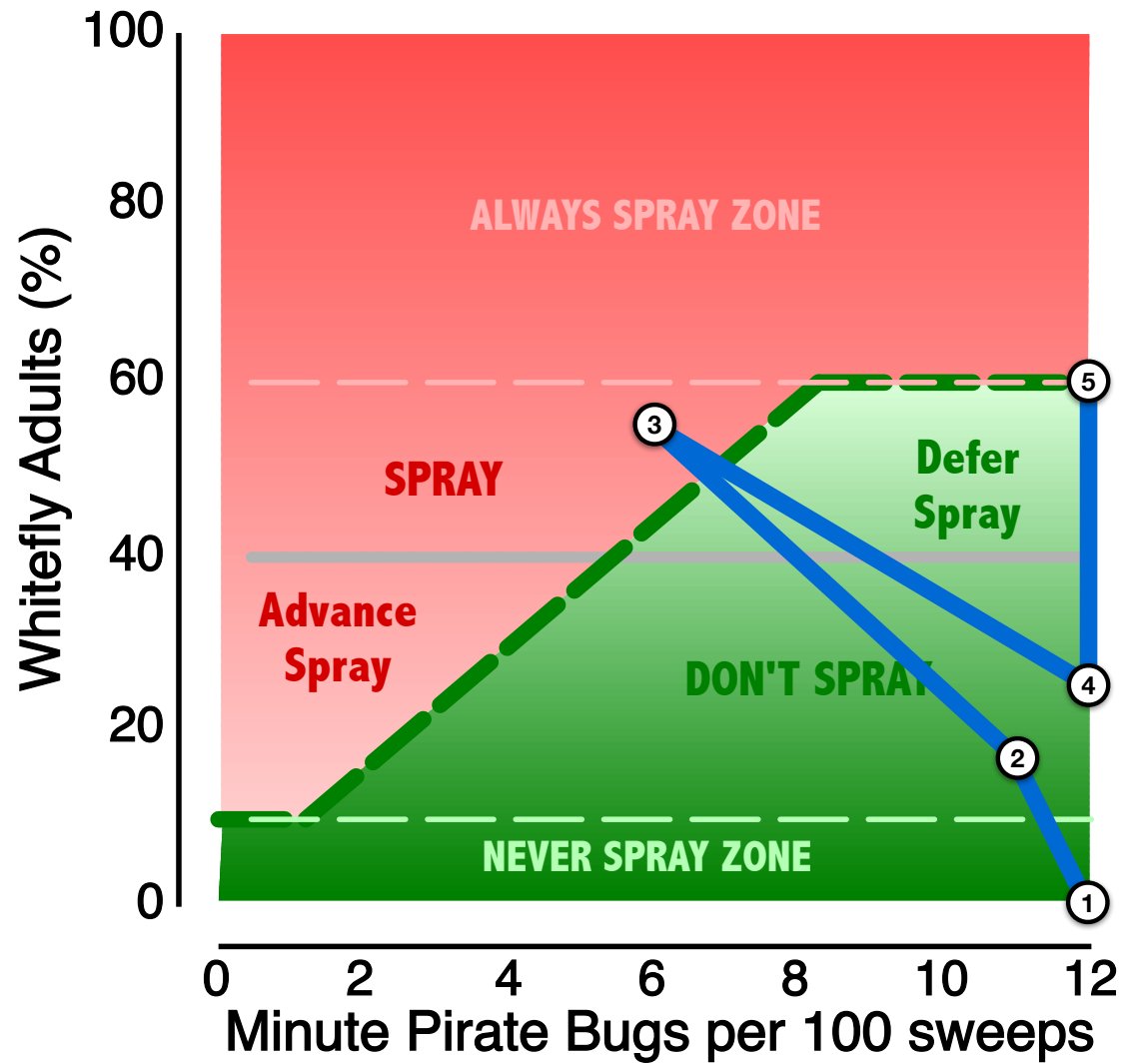
Dr. Peter Ellsworth
Isadora Bordini
Naomi Pier
Dr. Steve Naranjo
Dr. Al Fournier
Dr. Yves Carrière
Dr. Tim Vandervoet

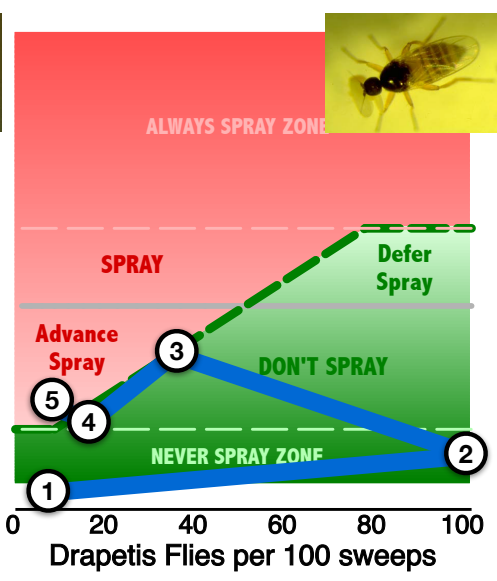
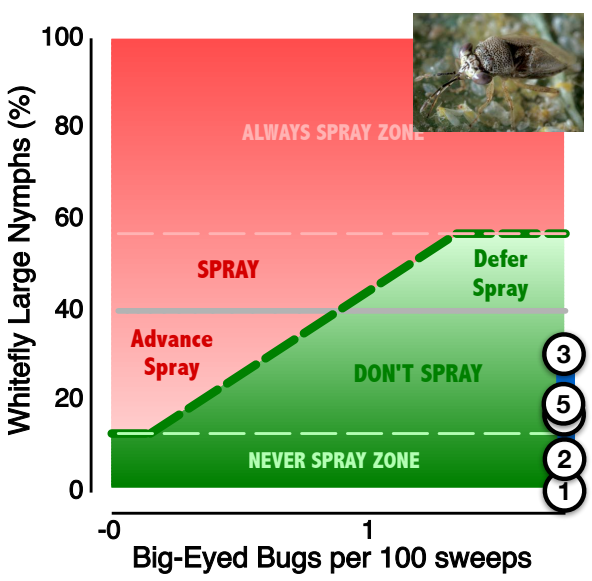
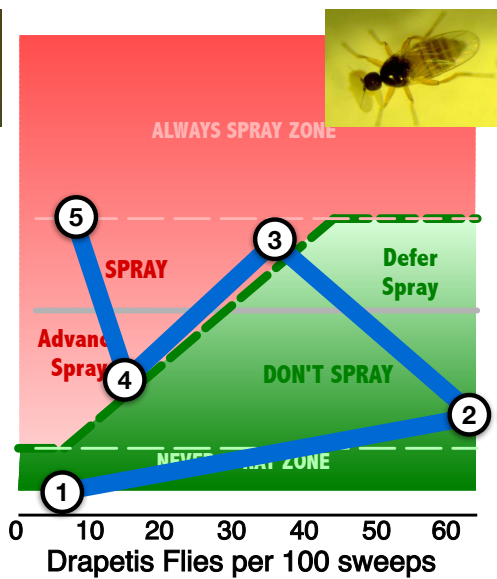
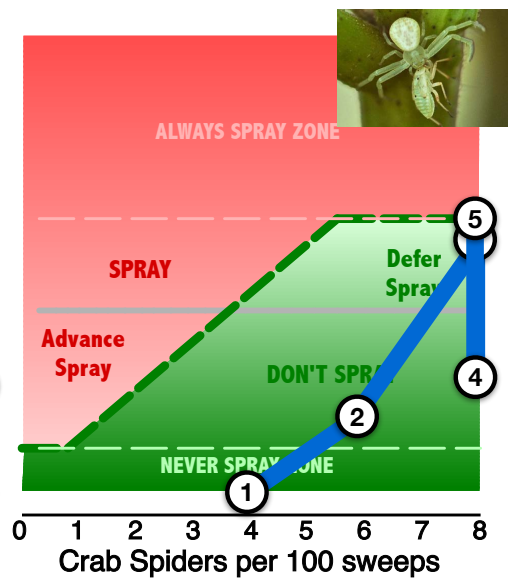
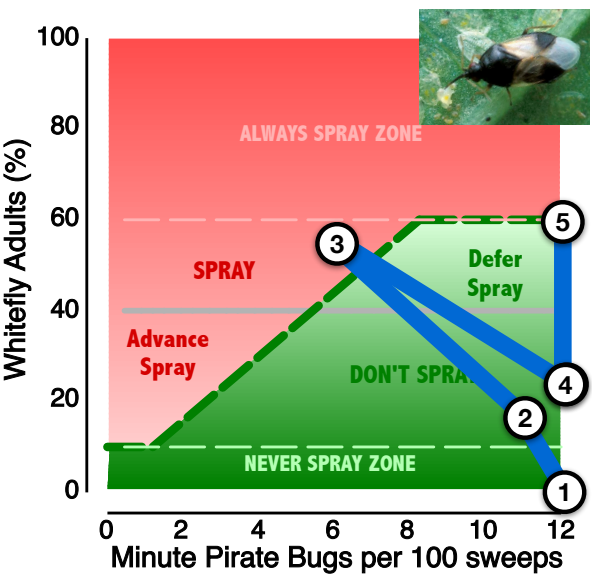


COLLEGE OF AGRICULTURE
AND LIFE SCIENCES

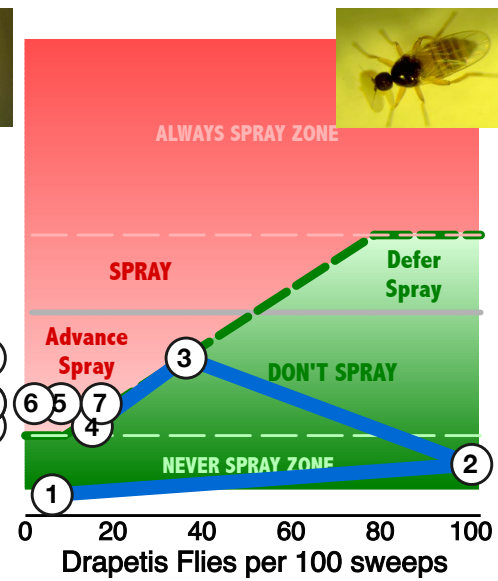
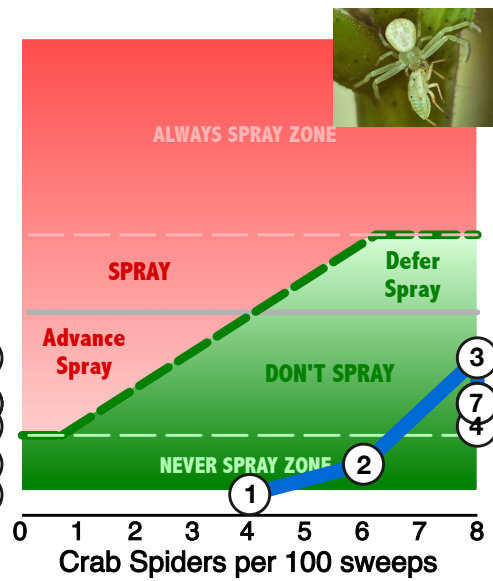
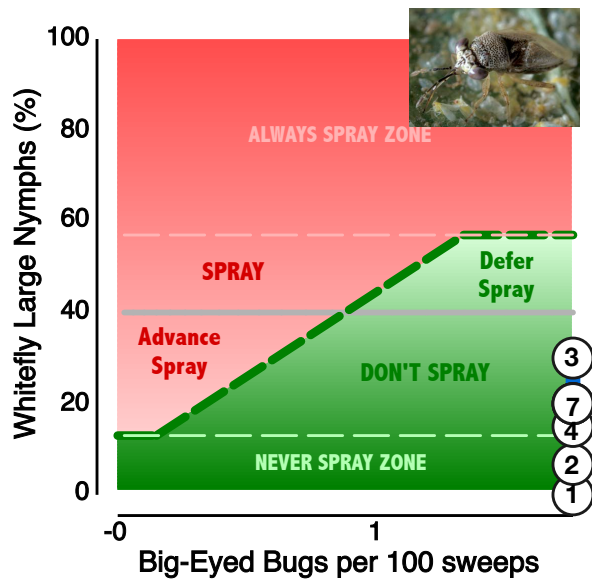
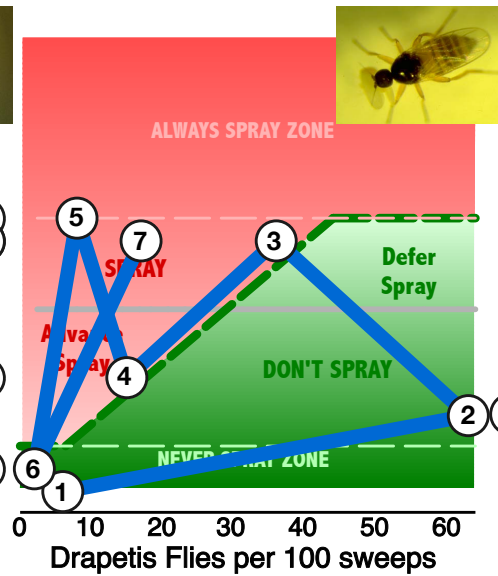
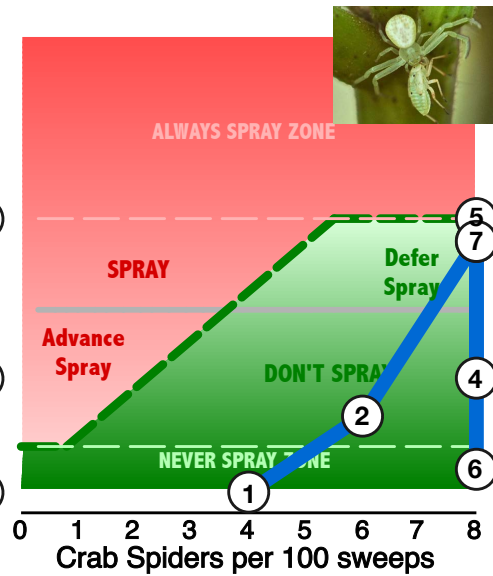
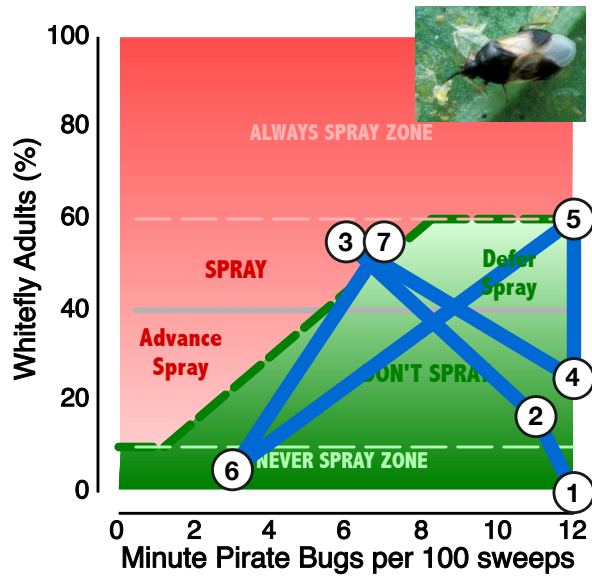
COOPERATIVE EXTENSION
Arizona Pest Management Center







**Making
More
Confident
Whitefly
Control
Decisions**



Making More Confident Whitefly Control Decisions

System	Sampling Bout -->	1	2	3	4	5	6	7
Pest-Centric	WF Large Nymphs	Never	Never	Don't	Don't	Don't	Don't	Don't
	WF Adults	Never	Don't	Spray	Don't	Spray	Never	Spray
Predator to Whitefly Adult	Minute Pirate Bugs	Never	Don't	Spray	Don't	Defer	Never	Spray
	Crab Spiders	Never	Don't	Defer	Don't	Defer	Never	Defer
	Drapetis Flies	Never	Don't	Spray	Advance	Spray	Never	Spray
	Collops Beetles	Never	Advance	Spray	Advance	Spray	Never	Spray
Predator to Whitefly Large Nymph	Big-eyed Bugs	Never	Never	Don't	Don't	Don't	Don't	Don't
	Crab Spiders	Never	Never	Don't	Don't	Don't	Don't	Don't
	Drapetis Flies	Never	Never	Don't	Don't	Advance	Advance	Advance
	Lacewing Larvae	0	0	0	0	0	0	0
Net Decision -->		Don't	Don't	Don't	Don't	Don't	Don't	Don't

For more information...

Cotton Insecticide Use Guide – Knowing and Balancing Risks

<https://acis.cals.arizona.edu/docs/default-source/ipm-shorts/cottoninsecticiderisk.pdf>

Making Use of Predators in Cotton

<https://acis.cals.arizona.edu/docs/default-source/agricultural-ipm-documents/publications/ptoplaminate.pdf>

Making Whitefly & Predator Counts

<https://acis.cals.arizona.edu/docs/default-source/ipm-shorts/predatortopreyratios.pdf>

Predator “Thresholds”

<https://acis.cals.arizona.edu/docs/default-source/ipm-shorts/wfbit.pdf>

Slide 1

Today I'm going to share with you a rough cut of an educational video we are working on to help teach practitioners about how to use our newly developed predator thresholds for whitefly management in cotton. After we view the video, we will return and go into a little more detail about how predator thresholds function and then work through a current central Arizona cotton example. I'd welcome your questions at any time. Post event, you can always reach me at peterell@cals.arizona.edu
Virtual Tent Talk, 19 Aug 2020, 63 participants, 30 min.

Slide 2

The funding that helped support the development of these predator thresholds was supplied by the Arizona Cotton Growers Association and Cotton Incorporated, along with capacity support from the USDA Extension Implementation Program. The educational video is being sponsored by the Western Sustainable Agriculture Research & Education program, courtesy of Dr. Randy Norton, University of Arizona State SARE Coordinator.

Slide 3

Let's examine this new Biological Control Informed Threshold system. Whitefly levels can be below, above, or at threshold. When whiteflies are very low, you know that you never need to spray; when whitefly levels are very high, you know that you have to spray no matter what. They're just too high. How do things change when you consider predator numbers? The green line represents these new predator thresholds, a ratio actually, where predator numbers needed increases as whitefly levels increase. So when whiteflies are higher than threshold, but predators are also high, you can probably safely defer your spray and re-sample in a few days. This saves you money. Conversely, when whitefly numbers are low but approaching threshold and numbers of predators are also low, biocontrol is compromised and you will want to advance your spray.

This prevents whitefly damage and also saves you money by making your control efficient.

Slide 4

Let's go through a real world, working example where we have been tracking a field for the last month on 5 different sampling dates (1-5). On the first date (1), the whitefly adult infestation rate was 0 and the number of minute pirate bugs per 100 sweeps exceeded our scale (16/100, actually). On the 2nd date (2), whitefly levels were up but pirate bug numbers were still very high. The 3rd date is interesting because we exceeded the pest-based threshold (gray line) and the new predator-based threshold, and pirate bugs did decline in number. The temptation might be to spray, but this is not the only piece of information available to us. We can and should look at whitefly large nymph levels and perhaps the levels of other key predators. In any event, we decided not to spray and were rewarded on the 4th date (4) with higher pirate bug numbers (45/100, off the chart!) and lower whitefly numbers. Then our sample from earlier this week placed whitefly levels on the cusp of the "always spray zone" but still with ample pirate bug numbers (28/100). My suggestion is to continue deferring a spray in favor of the excellent biological control taking place. But let's consider the full suite of predator numbers available to us. While a practitioner should choose to track only the predators that are abundant on any given date, we collected information for all 6 key predators in this next slide.

Slide 5

What's interesting here is to look back at date 3 when we first exceeded the pirate bug (and whitefly adult) threshold. On that date, crab spiders were very abundant, as were big-eyed bugs, and Drapetis flies and Collops were present, too, but at more moderate to low levels. I.e., 4 of 8 predator thresholds supported the notion of deferring our spray, which as it turns out was

good advice. Now at date 5, we can see that pirate bugs, crab spiders, and big-eyed bugs all look great, further creating confidence in a no-spray recommendation here! [Note, we didn't plot the lacewing larvae, the 8th predator threshold, because we have yet to collect one from this field.] So here in mid-August, we are still far from deploying a whitefly spray in this field, which is a hairy leafed cultivar, a known risk factor for whitefly infestation.

Slide 6

POSTSCRIPT. We sampled this field on 8/20/20 (date #6), and again on 8/24/20 (date #7), to see if whitefly populations were going to build into the 'always spray zone'. However, instead we measured much lower, sub-threshold whitefly infestation levels (adults & large nymphs), even as some predator populations declined somewhat. The whitefly adult levels temporarily fell off into the NEVER SPRAY ZONE. Collops beetles numbers were low and Pirate bug and Drapetis fly numbers were borderline but variable. However, crab spider and big-eyed bug numbers remain strong. It looks like it will be quite awhile yet before this field is ready to be sprayed. **The moral to this story is that the pest-based threshold, albeit for whitefly adults only and not for large nymphs, would have guided us to a spray on the 3rd date, some 16 days ago. However, knowing what our predators were doing gave us confidence to avoid that unnecessary spray and to instead cash-in on the free biological control that was and is continuing to take place. Use predator-based thresholds to improve your whitefly control decisions and to give you greater confidence in the outcome.**

Slide 7-8

A summary of "spray" decisions through time is provided. Please refer to our short publications for more information about using cotton insecticides and the predator threshold system.