Keeping it Fresh – Insect Management Updates in Fresh Market Vegetables

Fresh Market Pests

New Mite In Delaware!

Wireworms

Seedcorn Maggot

Rotten Tomatoes

Diamondback Moth

Other

Corn Earworm and
Other Swt Crn Pests

Striped Cucumber Beetle


Through Husk
© 2005

UD Insect Trapping Program

Insect Trapping Program

- Looking At Possibly Moving a Site or Two

WEEKLY CROP UPDATE

FROM UD COOPERATIVE EXTENSION

CURRENT ISSUE / ABOUT WCU / ISSUE & WEATHER ARCHIVE /

VEGETABLE CROP INSECT SCOUTING

JUNE 10, 2022 / KGYOUNG

David Owens, Extension Entomologist, owensd@udel.edu

Cucurbits

Spider mites are building up along edges of fields. In 2021, spider mite populations peaked in the fourth week of June. Mite thresholds are 1-2 mites on 50% of crown leaves. When selecting a miticide, be sure to check the labels for impacts to pollinators, beneficial mites, and adjuvant requirements (especially on abamectin labels).

In squash and zucchini plants, scout for squash bug and squash vine borer. Squash vine borer should be emerging out of the soil soon. It is a day flying moth that looks somewhat like a wasp. It lays single eggs on leaf petioles or on main vines. Frequent pyrethroid applications should prevent neonates from successfully boring into the vines, but beware that they can also cause aphid flare-ups. In susceptible vine crops, one of the first signs of infestation is a wilting leaf on an otherwise healthy vine. Look for white frass along the main vine.

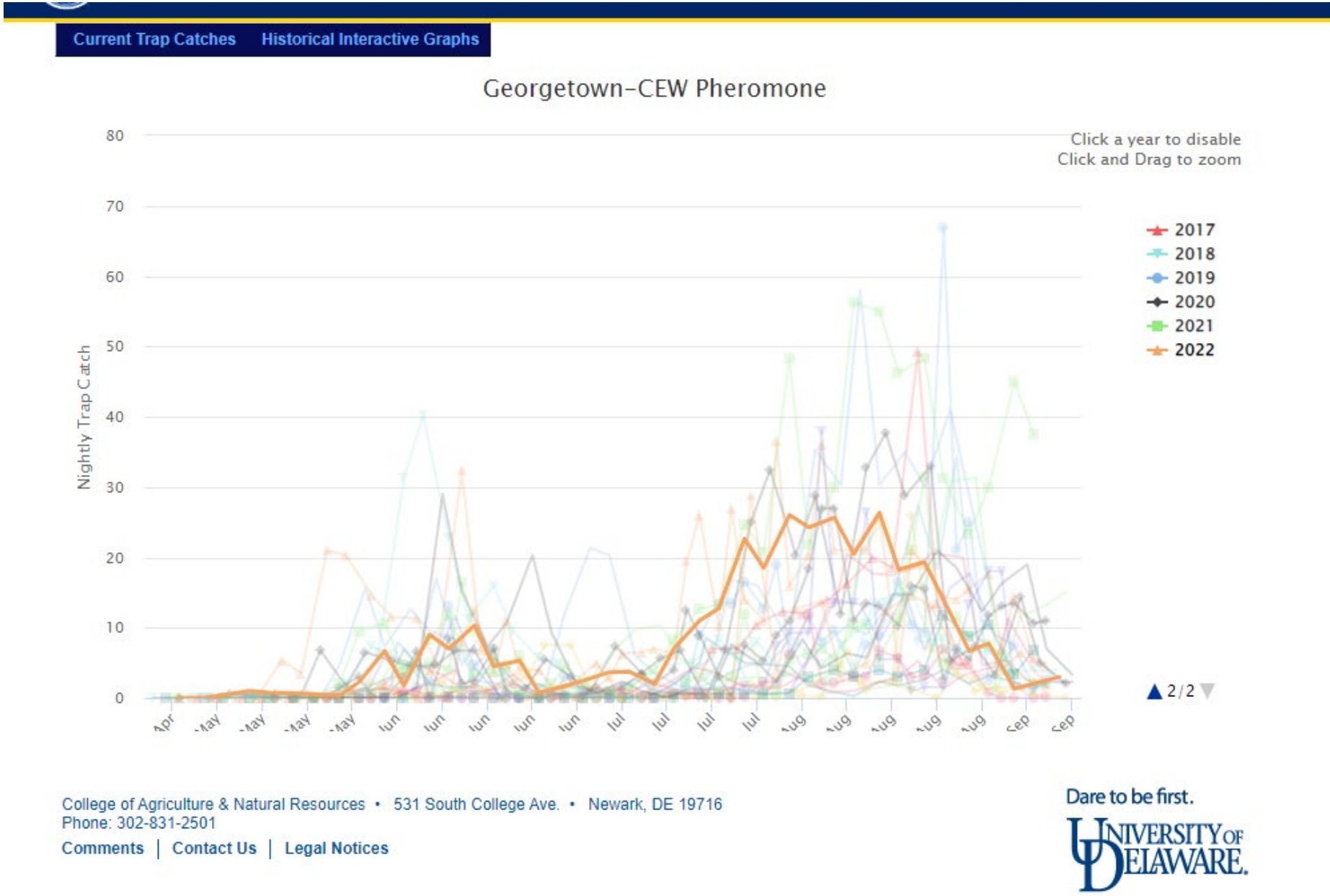
Squash bugs are also actively laying egg masses. Thresholds are 1 egg mass per plant, but wait to treat until egg masses begin hatching. Eggs cannot be killed by insecticide sprays, but nymphs are very susceptible. Be sure to get good coverage along the base of plants where adults like to hide.

Sweet Corn

Corn earworm counts are steadily increasing in pheromone traps. A four-day spray interval should be sufficient for most locations unless a trap near or adjacent to your sweet corn is capturing more. So far, pyrethroid susceptibility is fairly high in vial tests. Trap counts from Thursday are as follows:

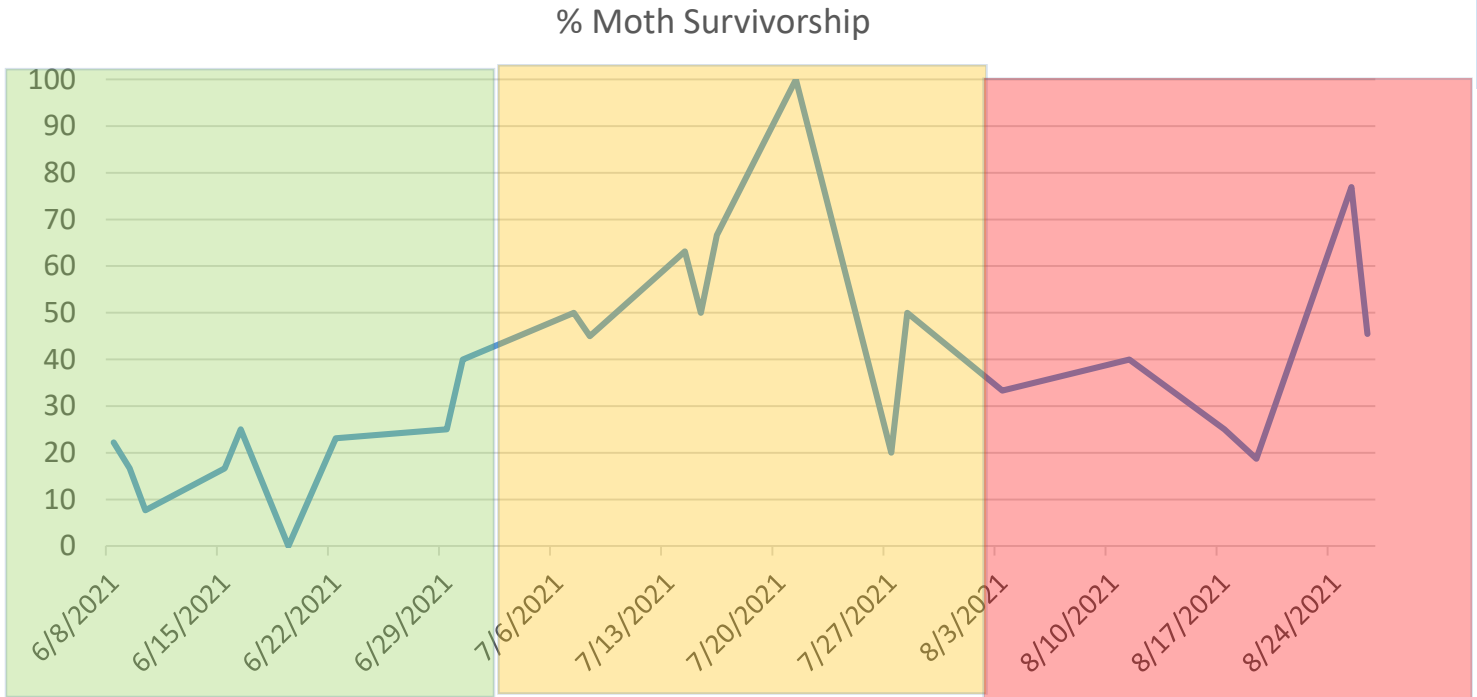
Trap Location	BLT – CEW	Pheromone CEW
	3 nights total catch	
Dover	0	10
Harrington	1	38
Milford	0	35

- Early flight moderately low
- Main flight moderately high, sustained, and slightly early



Historical Pyrethroid Resistance Patterns

Moth resistance fairly low early in season, builds in mid July, plateaus in August, but with high pressure.

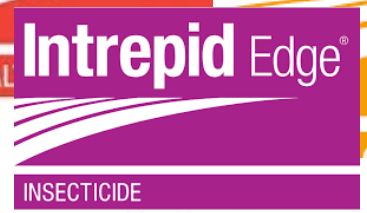


The Chemical Toolbox: 4 MOAs, all with drawbacks

Pyrethroid (3A) cheap, broadspectrum and formerly very effective

Carbamate (1A) – ovicidal, no residual activity, high oral and eye tox conerns

Diamides (28) Narrow spectrum, effective, longer residual, inconsistent alone under high pressure

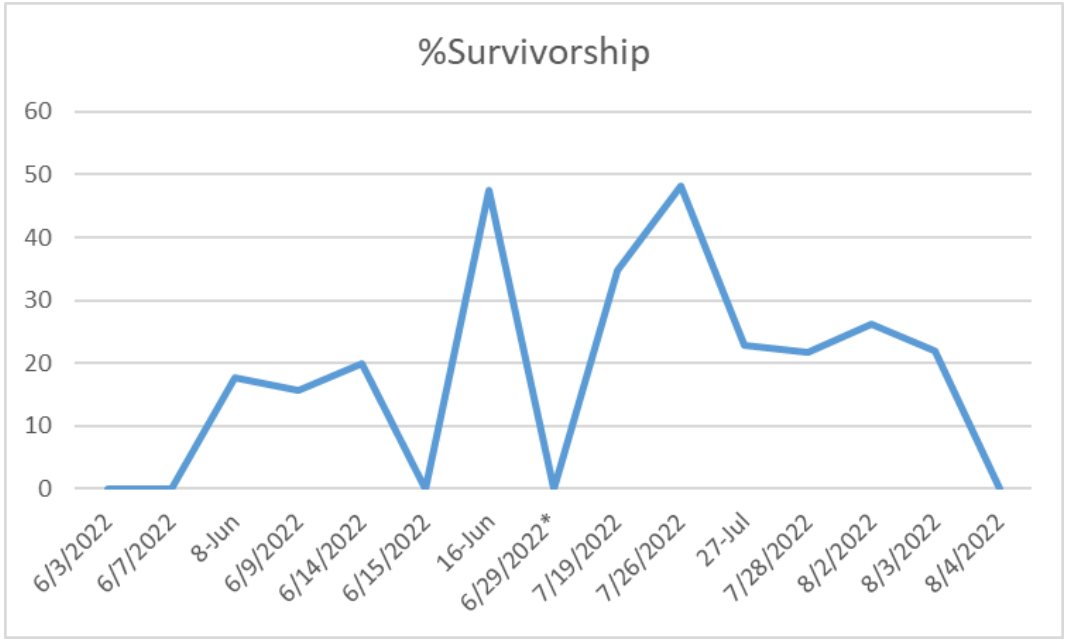


Spinosyns (5) – expensive, will not alone control CEW under high pressure

2022 Vial Testing

- Attempting to tailor lab test for current active ingredients

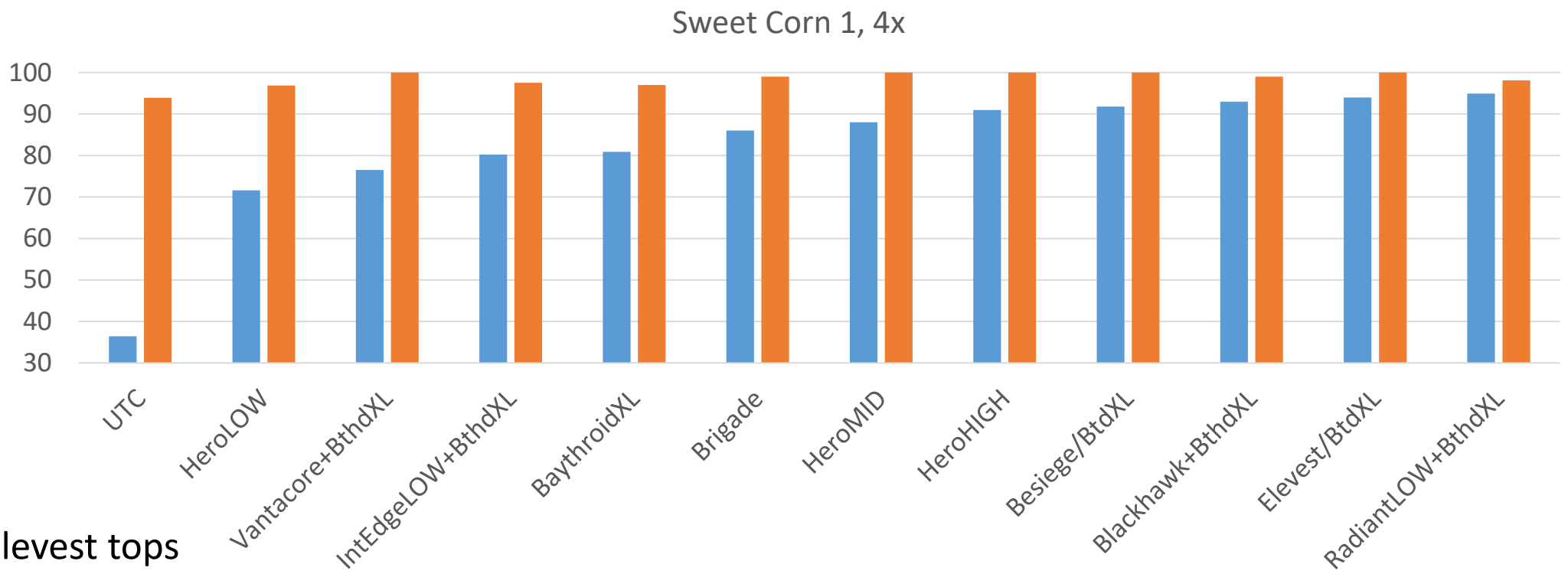
	Lab LD90
Bifenthrin	2.5
Cyfluthrin	1.4
L-cyhalothrin	3.5



Cypermethrin 2022

When tested at 5ug, killed 88+% wild moths; adjustments need to be made

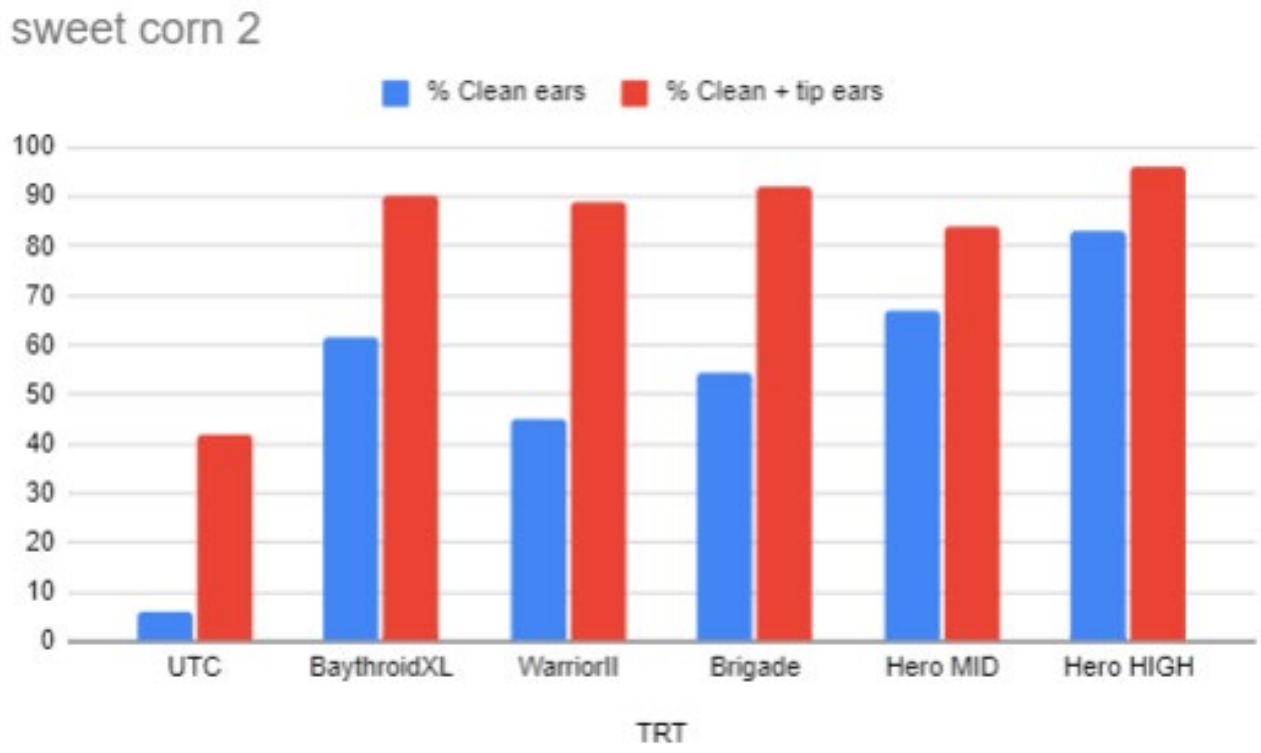
Spray Trial 1. Early Season. Moderate to Low Flight, Lower Resistance



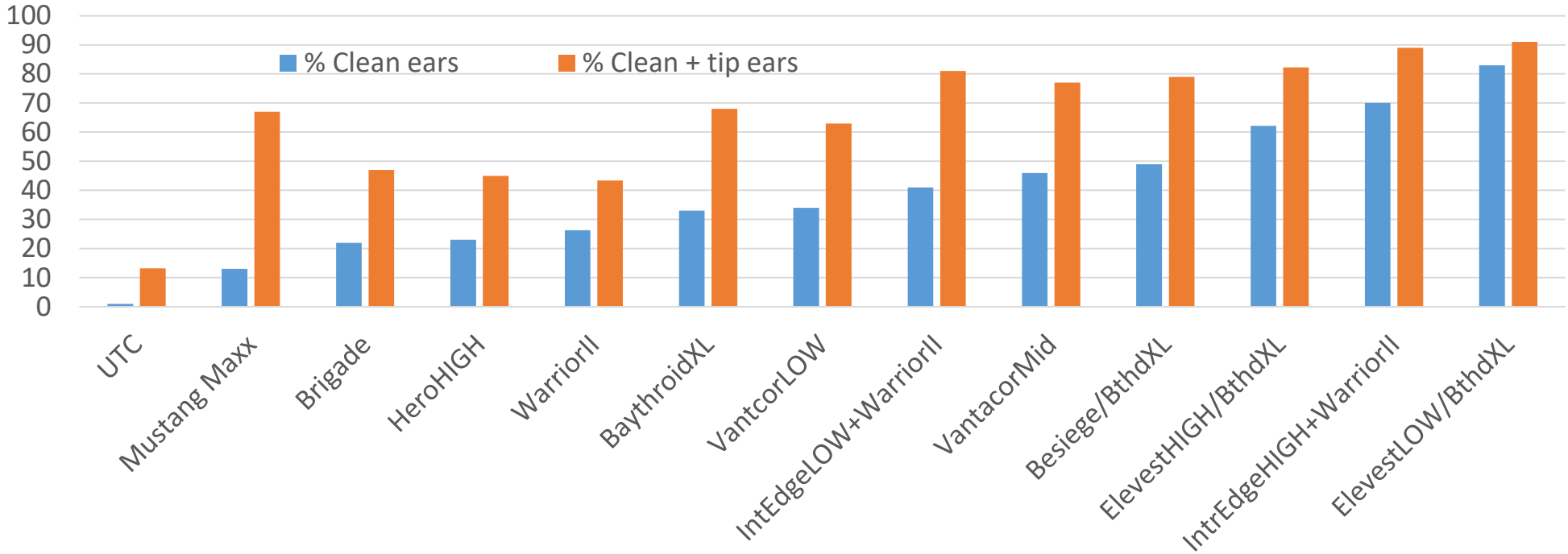
- Besiege and Elevest tops
- No statistical difference among any treatment
- Hero at low rate appeared to be weakest trt; mid and high rates good

Spray Trial 2

- Early August, moderately high flight, 6 applications
- Hero at high rate performed best
- Lower separation between Baythroid XL and Warrior II



Spray Trial 3: It Pays to Not Be Late



- Mid August. 6 applications beginning at full silk
- Worst Baythroid XL performance in 4 years of testing. Only slight pyrethroid differences and not followed historical patterns.
- Vantacor alone as good as pyrethroids
- If using Hero as a standalone, do not go lower than 9 fl oz
- Best treatments: Elevest/Baythroid, Intrepid Edge (HIGH) + Warrior II

Vantacor

- Personally, I believe pyrethroids need to be in every application
- Regional goal to investigate making first application or so more IPM friendly

Melon Aphid Outbreak

- Know your aphids
- Yellow = Melon aphids
- Green = Corn leaf aphid or Green peach aphid
- Straw color and Round = Parasitized
- Dark Green with Red Bum = BCOA

Aphid Control in Sweet Corn

- Assail low rate
- Sivanto Prime and Transform with 7 day PHI
- Assail 2.1 – 2.9 oz, 1 day PHI; labeled for up to 5.3 oz for sap beetles, PHI = 7 d

Got Other Aphids?

Virginia Cooperative Extension
Virginia Tech • Virginia State University
www.ext.vt.edu

Insecticides for aphid control on vegetables

Authored by Tom Kuhar, Helene Doughty, Kelly McIntyre (Virginia Tech); Jim Walgenbach (NC State); David Owens (University of Delaware); Kris Holmstrom (Rutgers); Brian Nault (Cornell University); Tom Bilbo (Clemson University).

Recommended insecticide treatment*
Aphid Management in Produce Crops - 2022
Relative Efficacy Index For Aphids

Product	IRAC MOA	Green peach aphid	Potato aphid	Melon aphid	Pea aphid	Foxglove aphid	Cabbage aphid
Lannate	1A						
Dimethoate	1B						
Orthene	1B						
Pyrethroid	3						
Imidacloprid/Admire	4A						
Actara/Platinum	4A						
Assail	4A						
Tansform	4C						
Sivanto	4D						
Senstar	7C+23						
PQZ	9B					**	
Fulfill	9B						
Versys	9D					**	
Sefina	9D						
Torac	21A						
Movento	23						
Exirel/Verimark	28						
Harvanta	28						
Beleaf	29						

Good residual control	* Always consult the label before applying any of these products on leafy vegetables or cole crops.
Marginal control; suppression	
Poor control	** Has activity, but best control achieved on smaller, open plant

* Recommendations based on John Palumbo's aphid control ratings in an article in American Vegetable Grower, December 2021 (Meister Media), as well as a consensus of entomologists (Tom Kuhar, Helene Doughty, Kelly McIntyre [Virginia Tech]; Jim Walgenbach (NC State); David Owens (University of Delaware); Kris Holmstrom (Rutgers); Brian Nault (Cornell University); Tom Bilbo (Clemson University).

Handy Bt Sweet Corn

The Handy Bt Trait Table - Sweet Corn Production

The latest version of the table is always posted at https://www.texasinsects.org/bt-corn-trait-table.html
For questions & corrections: Ben Phillips, Michigan State University (phill406@msu.edu)
Contributor: Pat Porter, Texas A&M University (web site host)

New February 2020

Corn 'events' (transformations of one or more genes) and their Trade Names

Trade name for trait	Event	Protein(s) expressed	Primary Insect Targets, *Herbicide Tolerance*
Agrisure CB/LL	Bt11	Cry1Ab + *PAT*	corn borer + *glufosinate*
Agrisure GT	GA21	*EPSPS*	*glyphosate*
Agrisure Viptera	MIR162	Vip3Aa20	broad caterpillar control, except for corn borer
Roundup Ready 2	NK603	*EPSPS*	*glyphosate*
Yieldgard Rootworm	MON683	Cry3Bb1	rootworm
Yieldgard VT Pro	MON89034	Cry1A.105 + Cry2Ab2	corn borer & several caterpillar species

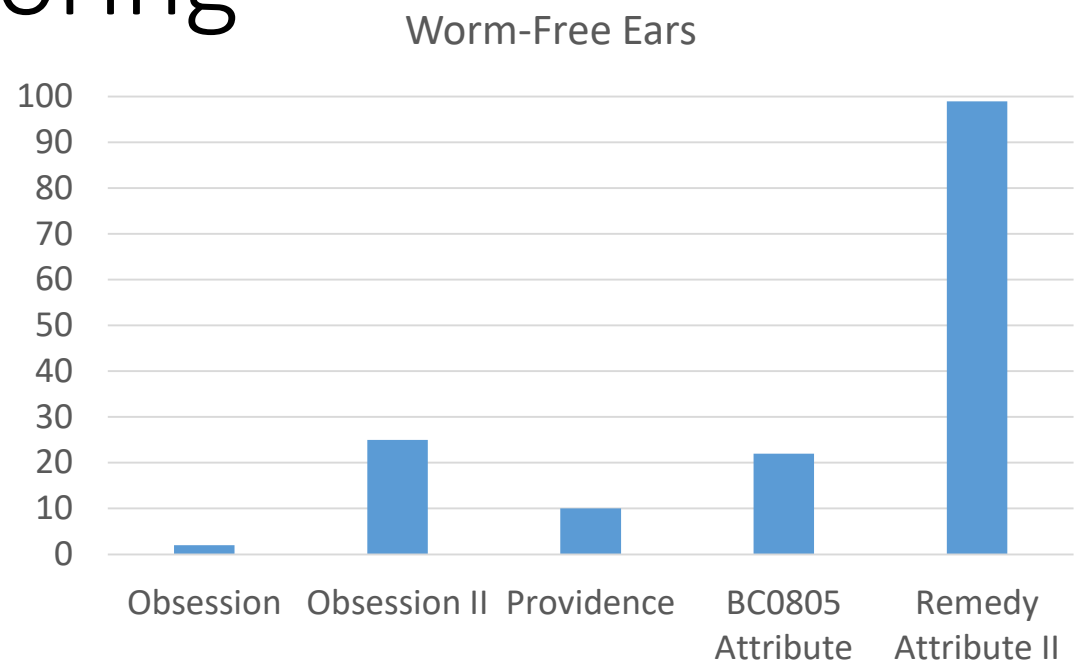
Abbreviations used in the Table

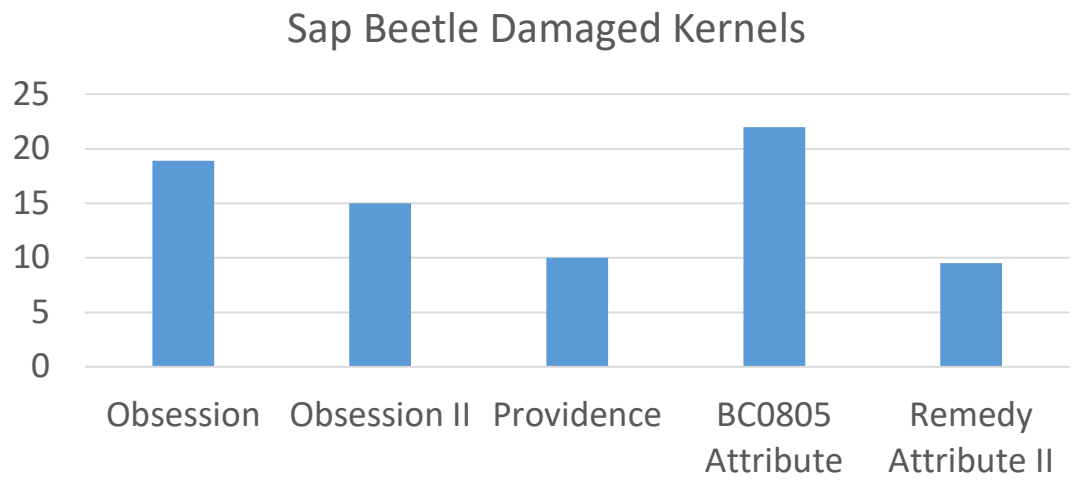
RR Roundup Ready / glyphosate-tolerant
LL Liberty Link / glufosinate-tolerant
CR corn rootworm
BCW black cutworm
CEW corn earworm
ECB European corn borer
FAW fall armyworm
SCB sugarcane borer
SWB southwestern corn borer
TAW true armyworm
WBC western bean cutworm

Bt Sweet corn packages & associated varieties in alphanumeric order	Bt protein(s)	Marketed for control of:								Resistant populations	Herbicide protein(s)	Herbicide Tolerance	
		BCW	CEW	ECB	FAW	SCB	SWB	TAW	WBC	CR			RR	LL
Seminis Performance Series Anthem II, sh2, bicolor Anthem XR II, sh2, bicolor Devotion II, sh2, white Obsession II, sh2, bicolor Passion II, sh2, yellow Temptation II, se, bicolor SV9010SA, sh2, bicolor SV9012SD, sh2, yellow SV9014SB, syn, bicolor	Cry1A.105 + Cry2Ab2 + Cry3Bb1		x	x	x	x	x			x	CEW	EPSPS	x	
Syngenta Attribute I Series BC0528, syn, bicolor BC0805, syn, bicolor BC0822, syn, bicolor BSS0977, sh2, bicolor BSS0982, sh2, bicolor GH0851, syn, yellow GSS0966, sh2, yellow WH0809, syn, white WSS0987, sh2, white	Cry1Ab		x	x	x	x					CEW	PAT		x
Syngenta Attribute II Series Aspire, syn, yellow Milky Way, syn, white Protector, sh2, yellow Pursuit, sh2, bicolor Remedy, syn, bicolor	Cry1Ab + Vip3A	x	x	x	x	x	x	x	x			EPSPS + PAT	x	x
Syngenta Attribute Plus Series BSS0761, sh2, bicolor Patriarch, sh2, bicolor	Cry1Ab + Vip3A	x	x	x	x	x	x	x	x			PAT		x

Sentinel Sweet Corn Monitoring

- Vip3A gene in Attribute II and Attribute Plus is worm proof
- May still need to treat for stink bug or sap beetle





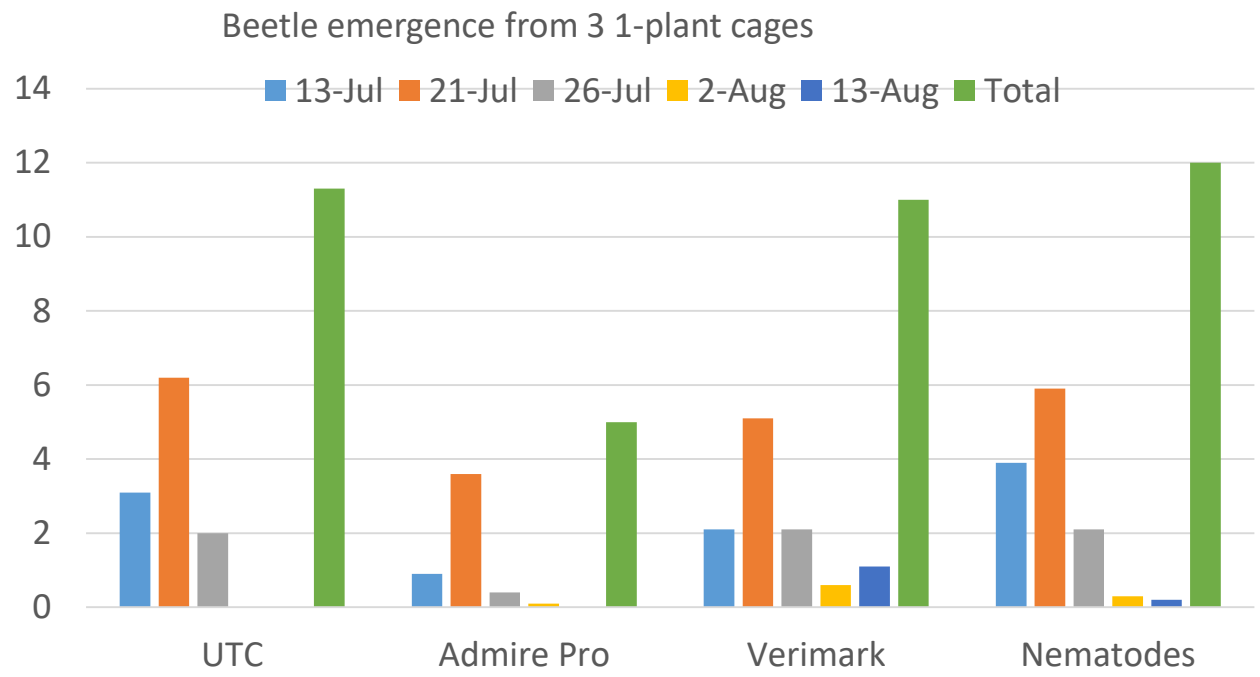
Striped Cucumber Beetle

- First appearance date can be somewhat variable, typically mid May, peaking around Memorial Day and declining by mid June.
- 2019 = May 14 (300 degree days base 55);
- 2020 = May 23 (200 degree days base 55),
- 2022 = May 19 (267 DD). Release aggregation pheromones in frass
- *Some fields may have begun flowering!*

2021 – Man, Why Did This HAVE To Be a MITE TRIAL!

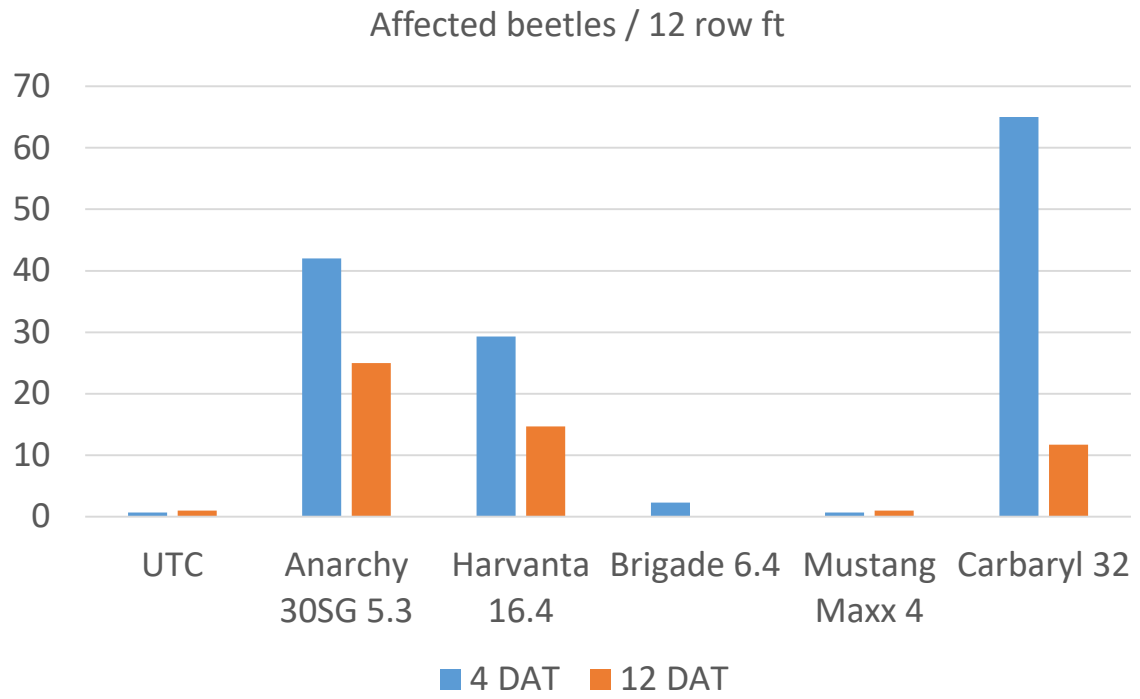
Striped Cucumber Beetle First Gen

- Typically begins emerging ~ July 4, peaking by 3rd week of July
- Can be up to a 5x increase



Striped Cucumber Trials

- In 2022, Installed 5 Watermelon Trials in 3 Locations!



2021 Possible Pyrethroid Problems!

2022 Trials

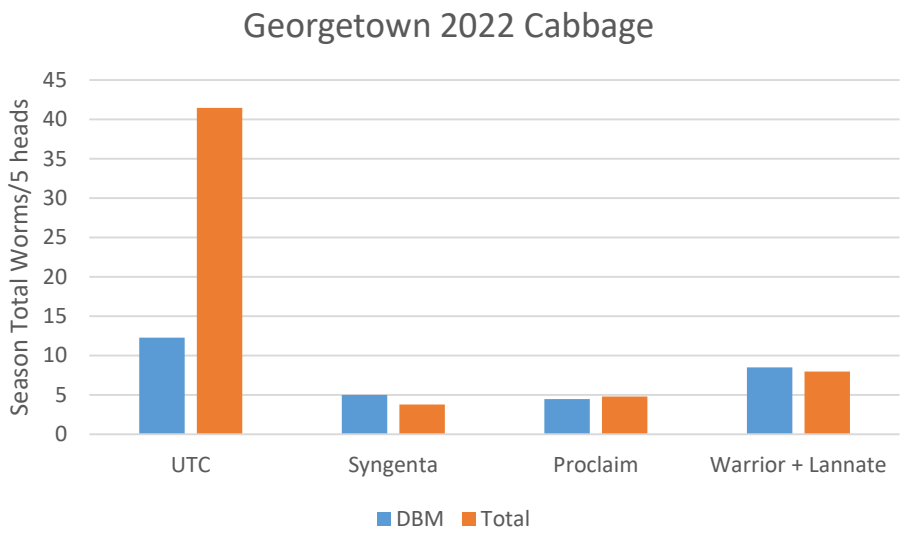
- Planted May 27. Seedling vigor issues delayed transplant.
- Highest counts ~ 1.5 beetle/5 plants, no clear signals of decreased product efficacy

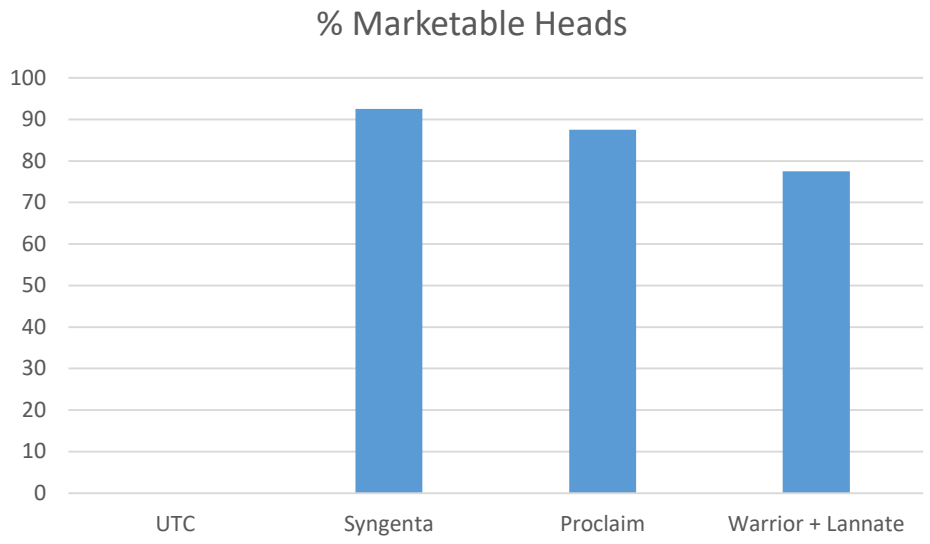
Adjacent Mite Trials Had VERY LOW injury.
2021 Beetle Damage not observed

I’m Listening

Cole Crops

- Cabbage Looper was down in 2022, Cross striped up
- Syngenta will soon be launching a new mode of action, Plinazolin; ~ 10-14 day residual





Chemical Management – 11 MOAs

Bt products 11A

Dipel, Agree, Javelin, Deliver, Crymax, **Xentari**, Thuricide, etc..
(B.t.aizawi more effective)

Residual <3 days

Diamides 28

Coragen, Exirel, Verimark, Harvanta

Spinosyns 5

Radiant, Entrust, Blackhawk

Combo spinosyn product

Intrepid Edge – 18 + 5

Avermectins 6

Proclaim

Combo diamide products

Durivo – 28 + 4

Besiege – 28 + 3

Minecto Pro – 28 + 6

IGRs 18, 15 – get small worms!

Intrepid, Confirm

15

Rimon, Dimilin

METI's 21

Torac

Also with powdery mildew activity

Pyrethroids 3A

Bifenthrin, lambda-cyhalothrin, permethrin, many others

SAVE FOR LATER IN SEASON

Organophosphate 1A/ carbamate 1B

Orthene (not for CEW)

Dibrom

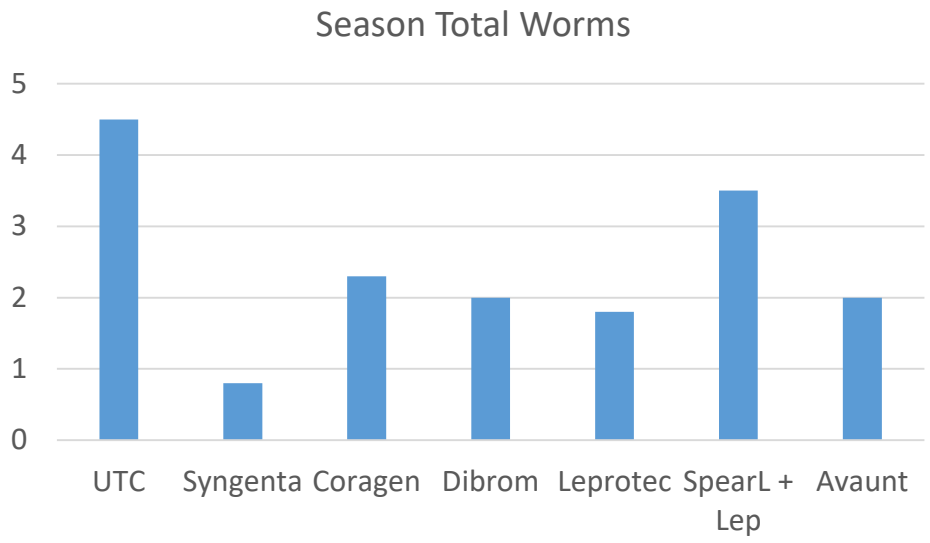
Lannate (no residual)

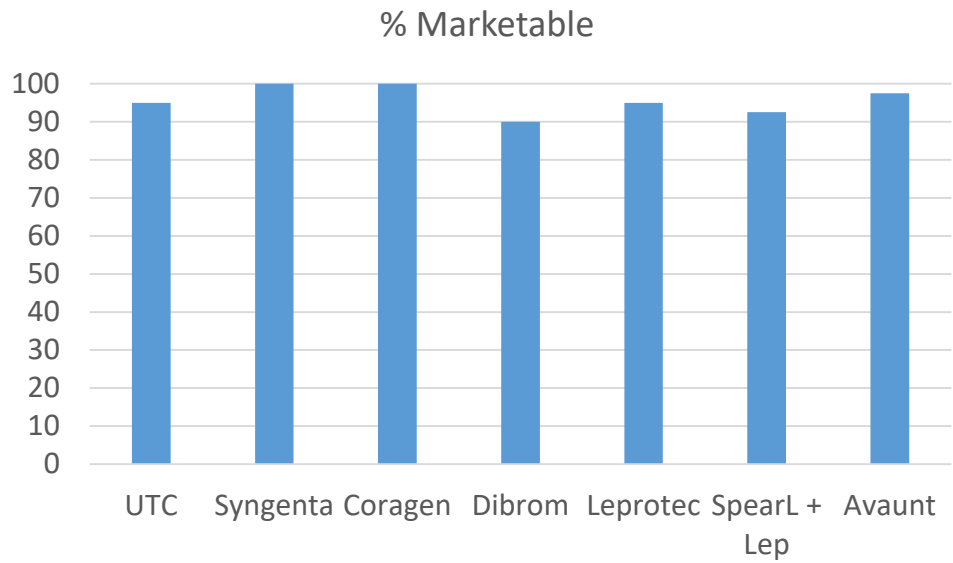
Na channel blocker, 22

Avaunt, Avaunt eVo

Cole Crops Cabbage # 2

- On a farm with spring cabbage, history of Coragen failure, and with brassica weeds
- 3 applications
- No Significant Treatment Differences!





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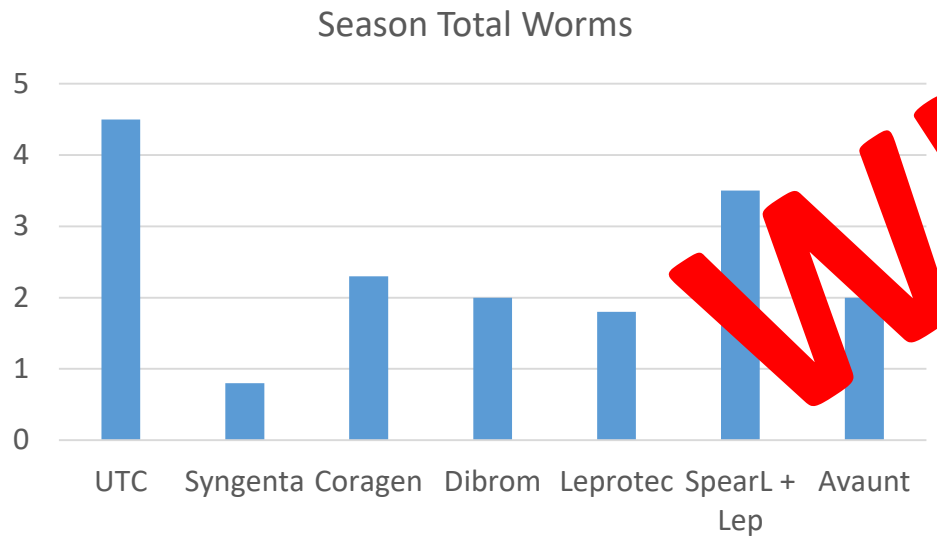
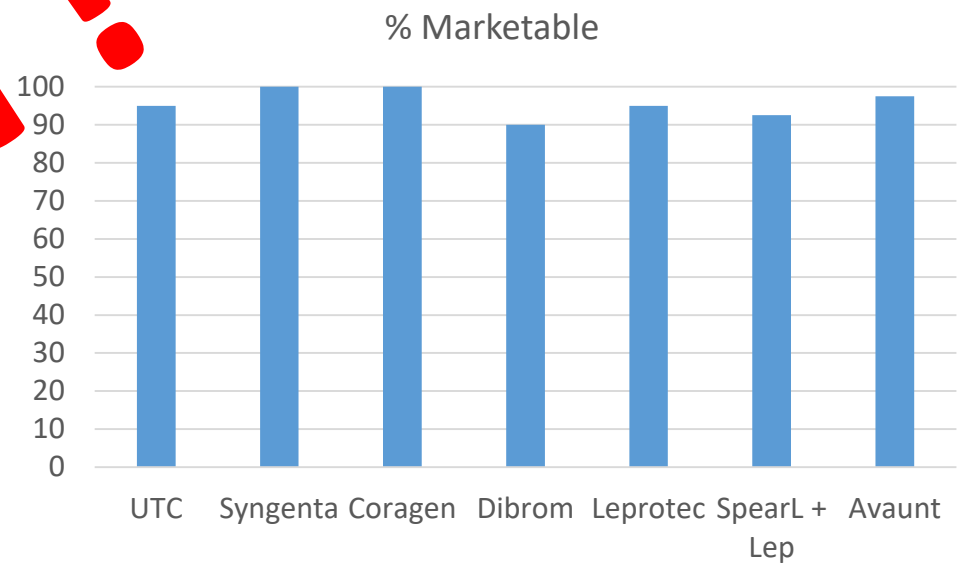


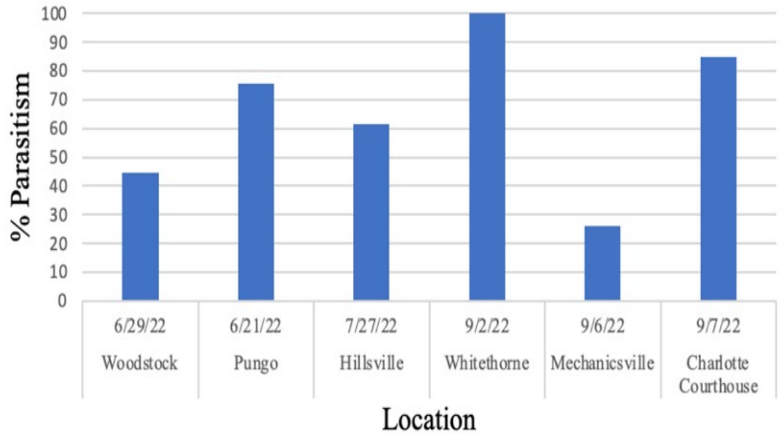
WHY?



Biological Control

Fig. 7. *D. insulare* adult and pupa.

Fig. 8. Diamondback moth pupa and a *D. insulare* pupa.



ig. 10. *O. sokolowskii* adult.

This Jerkwad took out all my first gen DBM

Tom Kuhar and Taylore Sydnor

Journal of Integrated Pest Management OPEN ACCESS
PROFILES

Natural History, Ecology, and Management of Diamondback Moth (Lepidoptera: Plutellidae), With Emphasis on the United States

C. R. Philips,[1,2] Z. Fu,[3] T. P. Kuhar,[4] A. M. Shelton,[5] and R. J. Cordero[6]

[1]Department of Entomology, University of Minnesota, 1861 Highway 169 Grand Rapids, MN 55744.
[2]Corresponding author, e-mail: cphilips@umn.edu.
[3]Department of Entomology, Washington State University, 166 FSHN Bldg. Pullman, WA 99164.
[4]Department of Entomology, Virginia Tech, 216 Price Hall, Blacksburg, VA 24061-0319

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Organophosphate 1A/ carbamate 1B

Orthene (not for CEW)

Dibrom

Lannate (no residual)

Na channel blocker, 22

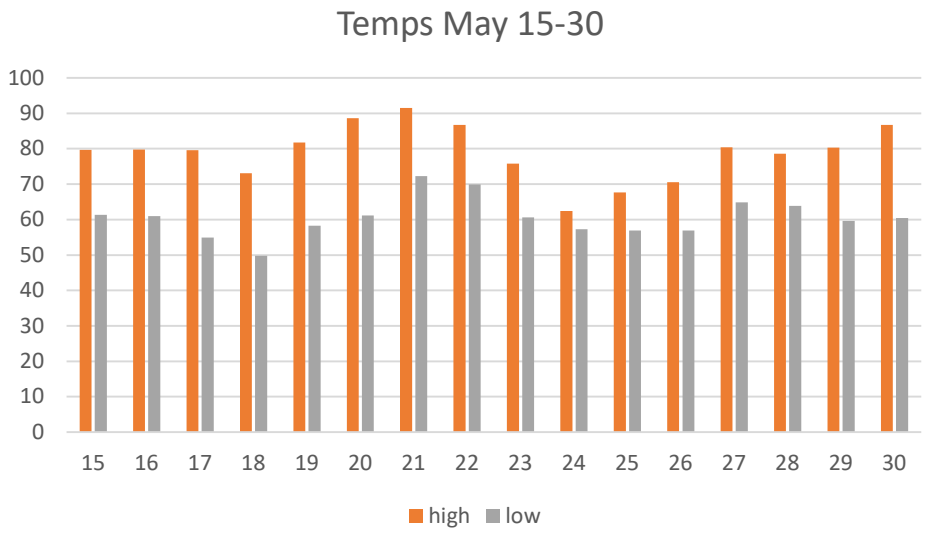
Avaunt, Avaunt eVo

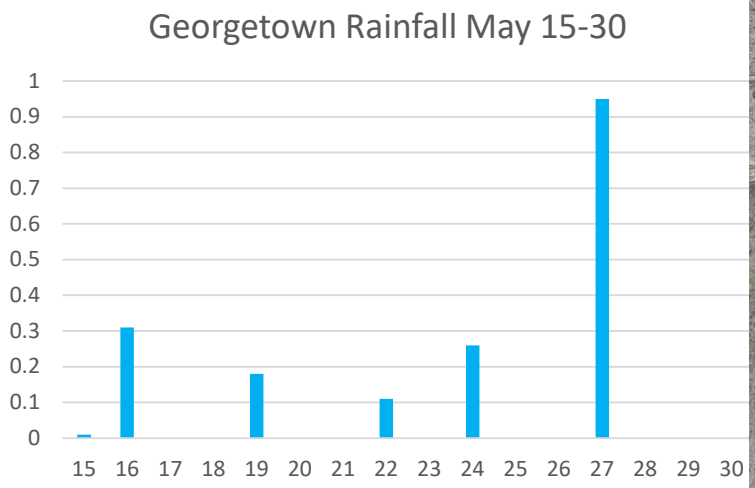
Seedcorn Maggot

- Usually a March-April threat
- Love tilled soil with O.M. incorporation
- Plant in warm soil, 3+ weeks after incorporation, avoid periods of wet cool weather right after planting.
- IST
- https://www.youtube.com/watch?v=nDhj8QTz8hw&t=2s : “UD Extension Seed Corn Maggot Control”

Unusually Late Activity

- May 23rd planted snap beans without IST
- Typically, warm soil, warm weather shuts SCM down.





Wireworms and Sweet Potatoes

- Need to control both current wireworm and ‘summer’ wireworm
- Wireworm control is very difficult. Most products put wireworms ‘to sleep’ only to resume activity ~ 2 months later.
- Lost Lorsban 2022
- Sampling pre-plant iffy

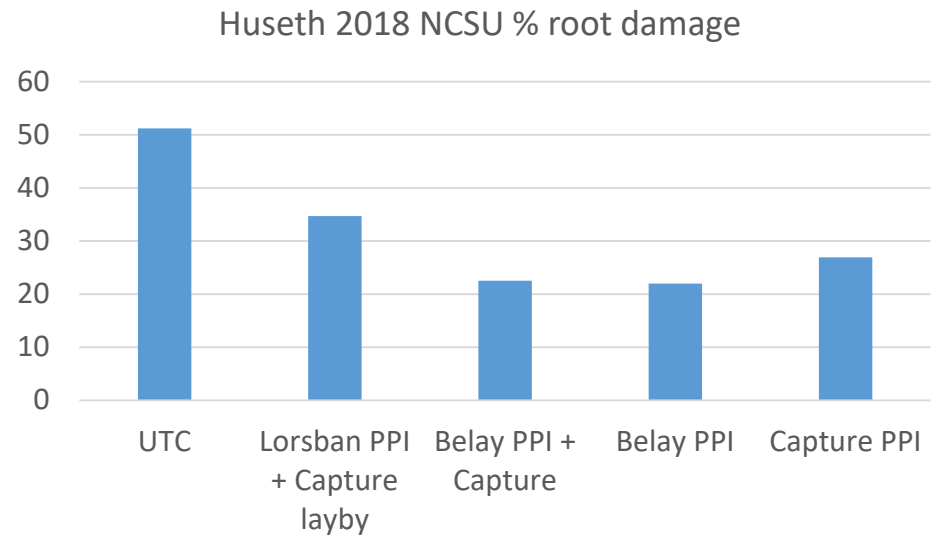
Soil insects: Wireworms, Flea Beetle Larvae, White Grubs, and Rootworms

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1B	Mocap EC*	5.1 to 6.9 fl oz/ 1000 row ft	ethoprop - **Pre-plant application in a 12-15-inch band on the row 2-3 w before planting.**	see label	48	H
3A	Brigade 2EC*	19.2 fl oz/A	bifenthrin - **at-planting in-furrow (wireworms)**	21	12	H
3A	Brigade 2EC*	3.2 to 9.6 fl oz/A	bifenthrin - **apply to soil prior to lay-by or first cultivation**	21	12	H
3A	Capture LFR*	12.75 to 25.5 fl oz/A	bifenthrin - **at-planting in-furrow or to soil prior to lay-by or first cultivation**	21	12	H

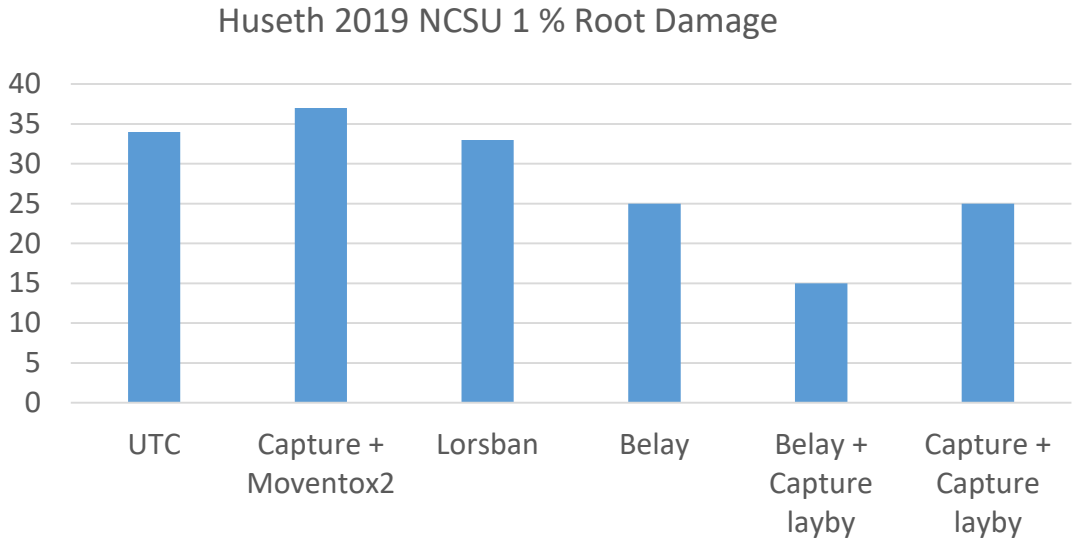
Cultural Controls

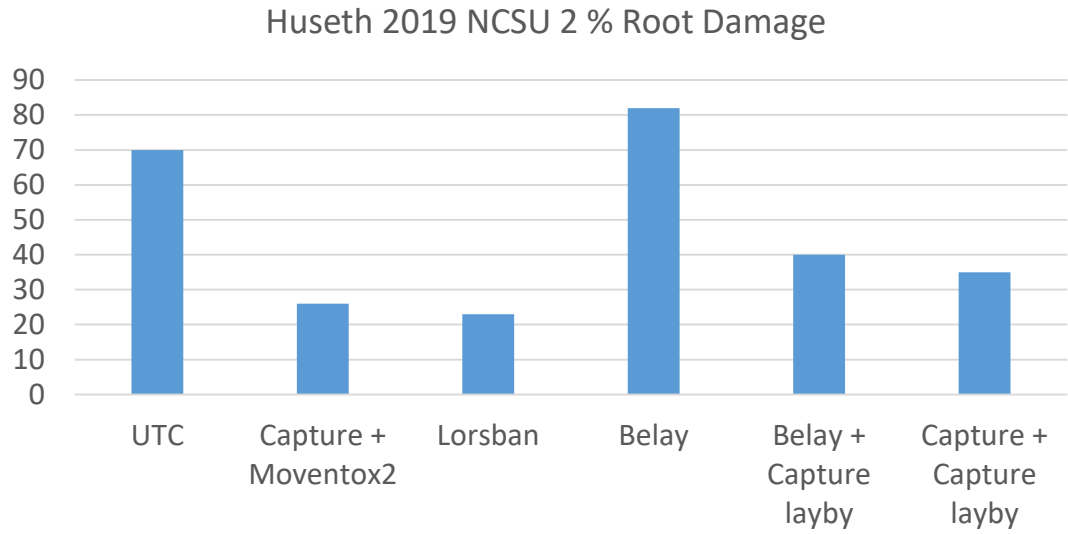
- Fall tillage before cover crop planting
- What species is present? When was corn in rotation?
- Layby treatments target Tobacco Wireworm, Conoderus spp.

Control Can Be Inconsistent

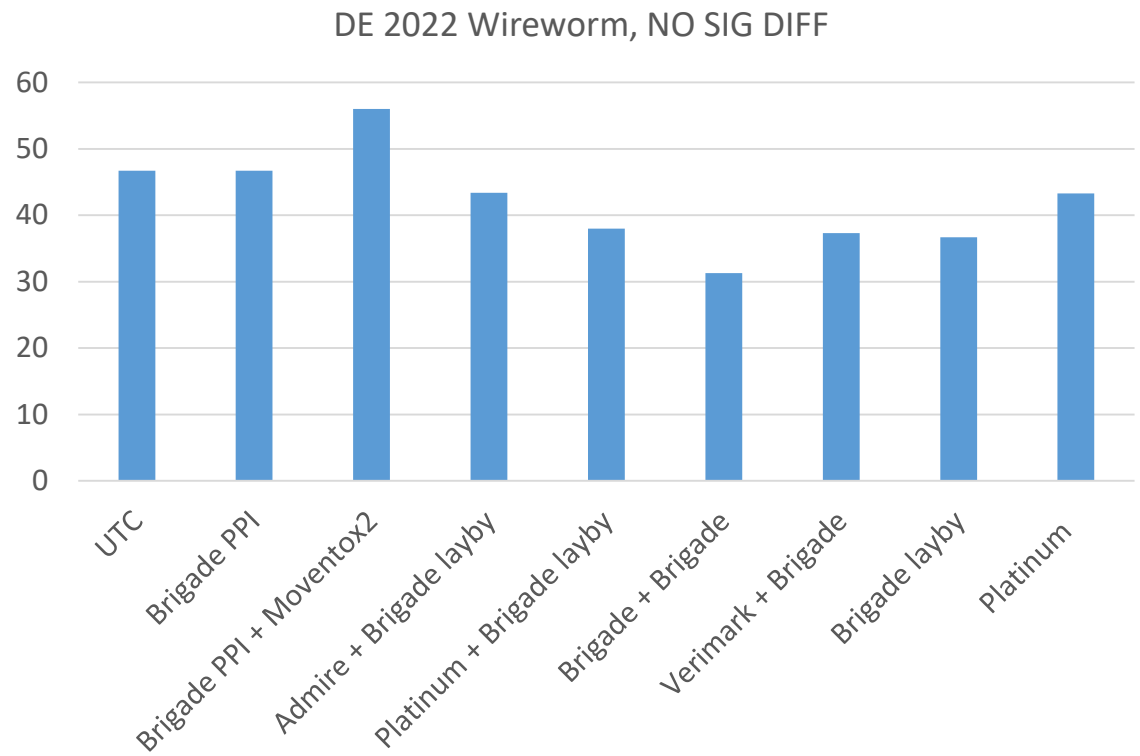


- Species differences?
- Very aggregated distribution?
- Broflanilide coming onto market (Nurizma)
- Treatments reduce proportion damaged roots but not damage severity





DE 2022 Wireworm Trial

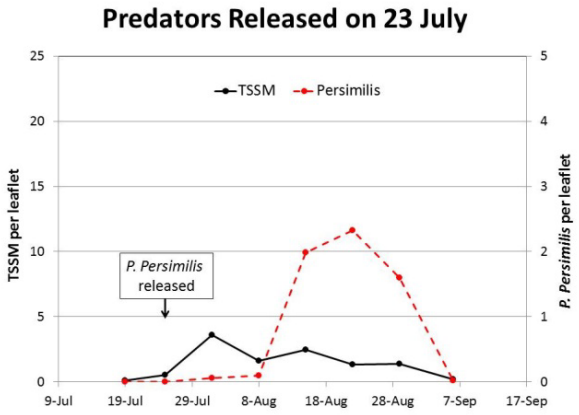


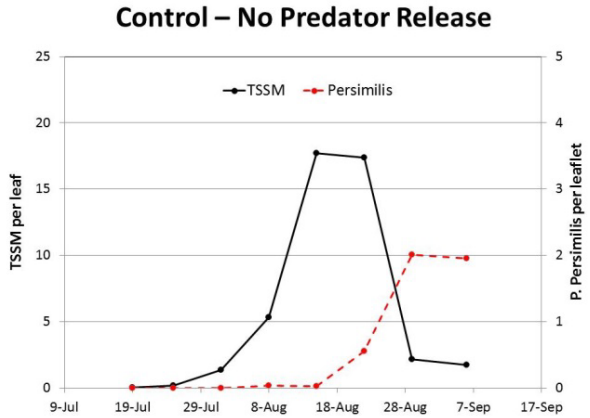
New Mite in Delaware

- Small population of Phytoseiulus persimilis discovered in Milton tomatoes October 13
- Have been testing in watermelon, commercially available
- Takes 3-4 weeks to establish, need to establish EARLY!
- Senstive to pyrethroids, OP's, Carbamates, Portal, Abamectin, moderately sensitive to Spinosyns, some neonics, Zeal
- Low sensitivity to Kanemite, Nealta, and Zeal

Persimilis Experiments in NC

- Release when TSSM average no more than 0.5 mites/leaflet, ideally 0.1 mites/leaflet.
- 300 persimilis in 3 rows x 25’ (comes out to 20,000 mites/acre; ~ $250+). Might not need to release over an entire field.

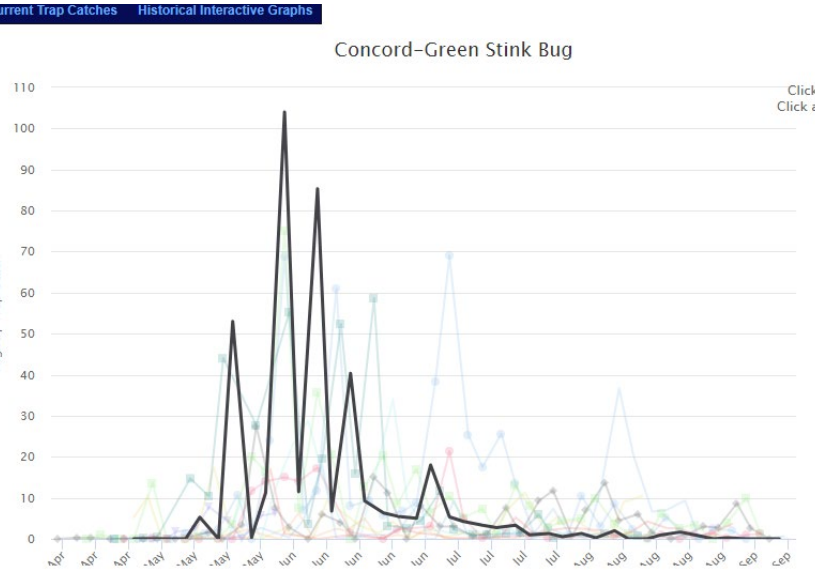


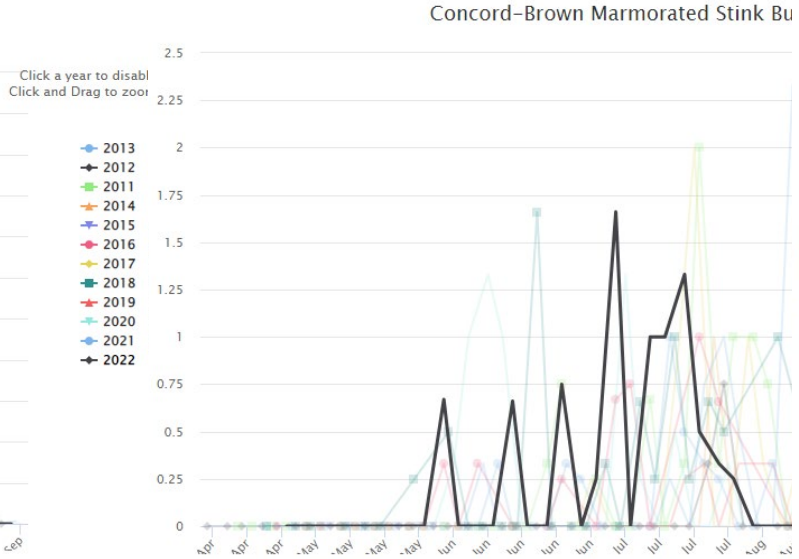


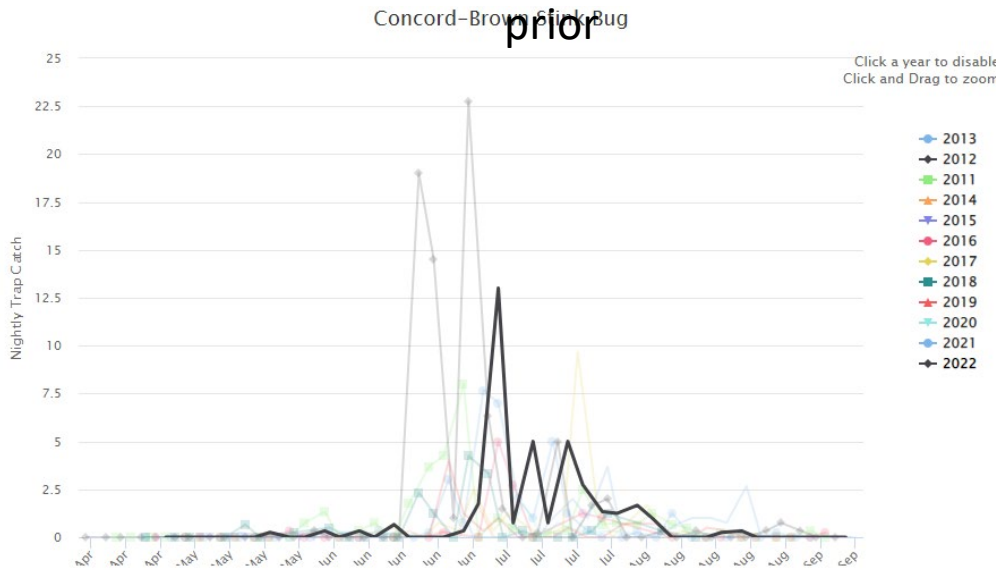
Stinky Tomatoes

- Blacklight trap data on GSB, BSB, and BMSB. #1 fruit pest June - August.
- Nault and Speese 2002: stink bug damage up to 40% May-planted tomatoes, 4% of July-planted tomatoes
- 2022: Reports of heavy damage mid-July

Damage could have been done 2-4 weeks prior







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Scouting For Bugs

- Greens, Browns, Brown Marmorateds, Leaf Footeds
- Threshold: 1 stink bug per 40 plants during green fruit stage
- Venom/Scorpion, Hero, Brigade best options, approximately 1” fruit
- Lannate can be used as well. Tank mix with a pyrethroid
- Use high water volume and pressure!!!
- ASSAIL is Fair at BEST; Thiamethoxam and clothianidin rated good, dinotefuran rated excellent

UKY Vegetable IPM Team

What Stinks About Stink Bug Control

- Spider mites June-early Agusut threat.
- 2-4 mites per upper canopy terminal leaflet. Usual threat.

Odd High Tunnel Tomato Threat

- Tomato Russet Mite
- High mag needed
- Browning, crinkling of leaves and fruit
- VT’s ESAREC Lorena Lopez reported multiple unique infestations
- Occasional i.d. requests from DE and MD
- Sulfur and abamectin

This Section Was Rated

(By an unbiased audience of 1 sleeping cat)

Pesticide Updates 2023

- Assail 30 SC liquid formulation now available
- Sweet Corn Aphid Control Section Correction: Assail, Sivanto, Transform are only aphicidal materials labeled.
- Sweet Corn, Potatoes, Sweet Potatoes: Nurizma (broflanilide) is now labled for in-furrow application targeting rootworm, seedcorn maggot, white grub, and wireworm
- Altacor reformulated to Altacor eVo. Half rate, 2x concentration

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- Delaware Dept of Ag SCBGP 21-07; AM180100XXXXG043
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- Carvel REC farm crew and staff
- James Adkins, Gary Calloway, Donnie Brittingham, Thomas Eliason, Papen Farms
- 2022 Trap Site Cooperators