North Carolina spotted wing drosophila update

Northeastern IPM SWD Working Group Meeting
30 October 2013

Hannah J. Burrack

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Growing season summary

- No infestations in reported commercial fields during spring 2013 season
- Significant infestations in research plots
  - *Are infestations present at grower sites?*
- Research day neutral plantings heavily infested
- Day neutral strawberry grower in western NC reported “soft fruit” last week
  - *2-3 larvae per fruit in salt tests*

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Growing season summary

- Remains the most heavily damaged
- Growers are treating 1-2 times per week and picking frequently
- Growers still experienced infestation “incidents” even with regular treatment
- Infestation pattern-”0 to 100”
- Interested in trapping patterns associated with water sources and non crop habitat
  - *Katie Swoboda, graduate student*

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Growing season summary

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Growing season summary

- Season long management programs
- Efficacy & application method data
- Pesticide residues & MRLs
- Infestation very low during highbush season
- Infestation increased during rabbiteye season and in processing fruit
  - *Discussion about when, how, and why to sample processing fruit*

2013 Activities

Season long insecticide rotation programs

Efficacy of unregistered materials & impact of spray volume on insecticide efficacy

Infestation variability between blueberry varieties

Multistate bait comparison

Effects of post harvest storage on immature SWD

Interactions between larval competition and diet quality

2013 Activities

Season long insecticide rotation programs

Blueberry

Strawberry

Efficacy of unregistered materials & ***Impact of spray volume on insecticide efficacy***

Infestation variability between blueberry varieties

Multistate bait comparison

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Interactions between larval competition and diet quality

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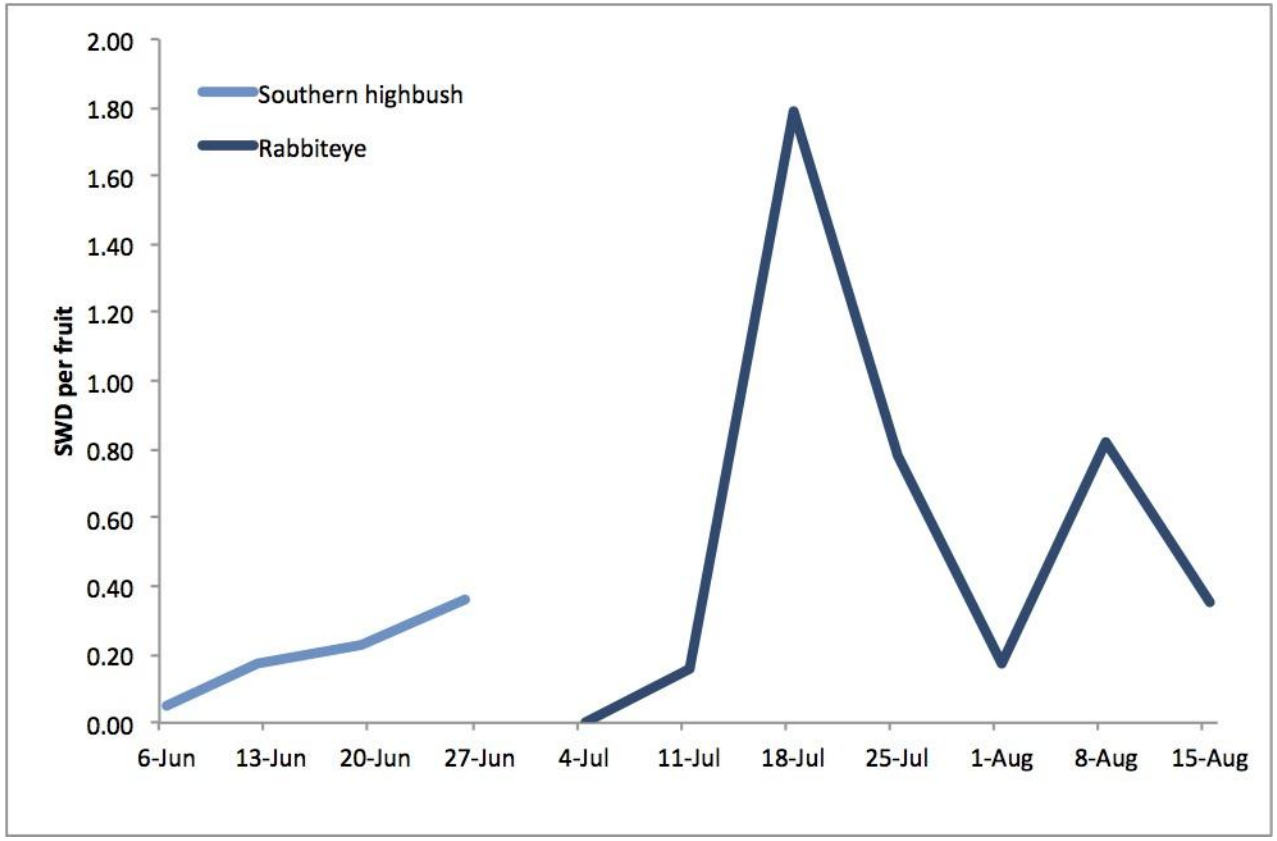
Seasonal infestation patterns Blueberry



Observed infestation (field and laboratory) in 7 SHB and 4 RE varieties

No significant differences in infestation in the field

No significant differences in oviposition or developmental success in laboratory

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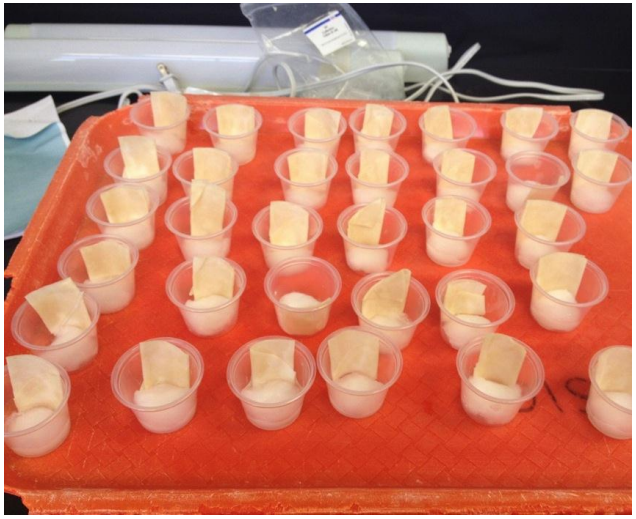
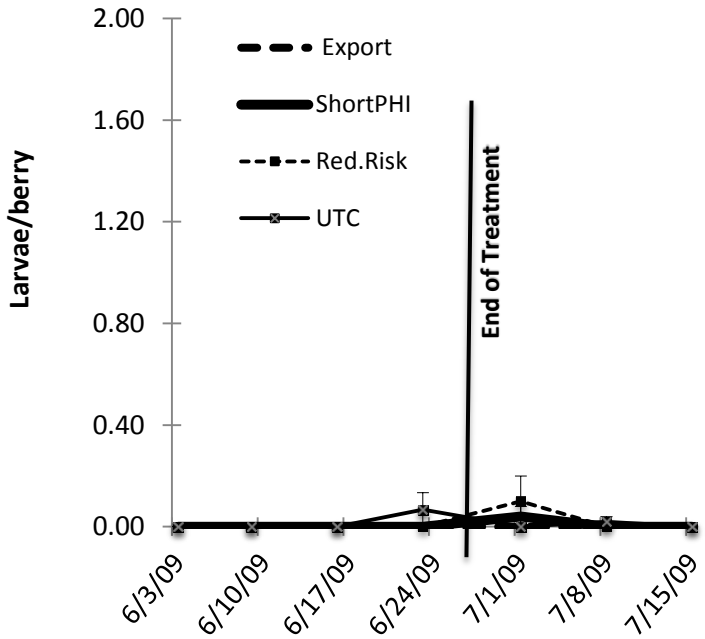
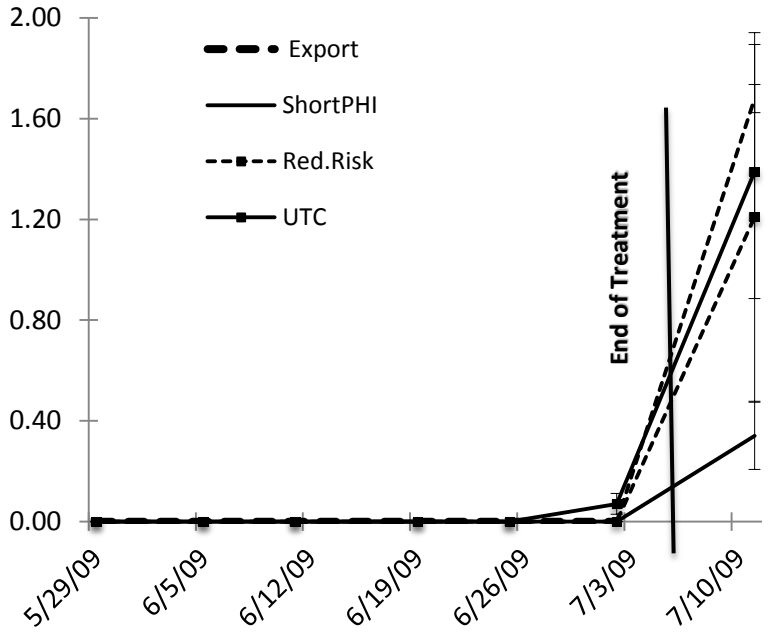
Season-long rotation programs



Bioassays conducted with samples collected immediately after treatment and 7 DAT

Season-long rotation programs





Season-long rotation programs

Proportion dead after 24h exposure

	Week 1		Week 2		Week 3	
Treatment	Male	Female	Male	Female	Male	Female
Export	0.95 **a** [3]	0.90 **a** [3]	1.00 **a** [4]	1.00 **a** [4]	0.96 **a** [1]	0.85 **a** [1]
Short PHI	1.00 **a** [2]	0.97 **a** [2]	1.00 **a** [4]	1.00 **a** [4]	0.79 **a** [2]	0.86 **a** [2]
Red. Risk	1.00 **a** [1]	0.98 **a** [1]	0.28 **b** [5]	0.18 **b** [5]	1.00 **a** [1]	0.93 **a** [1]
UTC	0.83 **a**	0.68 **a**	0.15 **b**	0.00 **b**	0.23 **b**	0.07 **b**
df	3, 70	3, 70	3, 70	3, 70	3, 70	3, 70
f	0.75	1.63	24.17	26.05	14.44	15.08
p	0.527	0.1892	<0.0001	<0.0001	<0.0001	<0.0001

	Week 4		Week 5		Week 6	
Treatment	Male	Female	Male	Female	Male	Female
Export	0.85 **a** [6]	0.20 **b** [6]	0.60 **ab** [3]	0.55 **ab** [3]	1.00 **a** [4]	1.00 **a** [4]
Short PHI	1.00 **a** [4]	0.94 **a** [4]	0.73 **ab** [2]	0.67 **a** [2]	0.75 **ab** [2]	0.80 **ab** [2]
Red. Risk	0.65 **ab** [5]	0.35 **b** [5]	0.70 **a** [1]	0.65 **a** [1]	0.80 **a** [5]	0.60 **ab** [5]
UTC	0.15 **b**	0.00 **b**	0.20 **b**	0.05 **b**	0.30 **b**	0.25 **b**
df	3, 70	3, 70	3, 70	3, 70	3, 70	3, 70
f	15.85	15	6.65	7.5	10.08	9.43
p	<0.0001	<0.0001	0.0005	<0.0001	<0.0001	<0.0001

No effect of any materials 7 DAT

Materials:
[1]Spinetoram
[2]Zeta-cypermethrin
[3]Phosmet
[4]Malathion
[5]Acetamiprid
[6]Fenpropathrin

Season-long rotation programs
Pesticide residues

	Phosmet	Zeta-cypermethrin	Spinetoram	Malathion	Fenpropathrin	Acetamiprid
Maximum residue level (USA)	10.00	0.80	0.25	8.00	3.00	1.60
Maximum residue level (Canada)	5.00	-	0.50	8.00	3.00	1.60
NC Site 1						
Export	0.0020 – 0.1120	0	0.0002 – 0.0060	0.0040 – 0.0660	0.5820 – 0.8320	0.0030 – 0.0030
Short PHI	0.0007 – 0.0480	0.0020 – 0.1270	0.0006 – 0.0010	0.0050 – 0.0610	0	0.0010 – 0.0240
Red. Risk	0.0003 – 0.0560	0	0.0003 – 0.0350	0.0070	0	0.0002 – 0.0140
UTC	0.0005 – 0.0080	0	0.0001 – 0.0060	0.0060 – 0.0570	0	0
NC Site 2						
Export	0.0005 – 0.0850	0	0.0009 – 0.0460	0.0040 – 0.0610	0.0040 – 0.7240	0.0001 – 0.0020
Short PHI	0.0003 – 0.0020	0.1920 – 0.4600	0.0006 – 0.0010	0.0600 – 0.0980	0.0008 – 0.5780	0.0002 – 0.5090
Red. Risk	0.0006	0	0.0002 – 0.0390	0.0220 – 0.0600	0.0002 – 0.3200	0.0002– 0.0920
UTC	0.0110 – 0.0280	0	0.0001 – 0.0040	0.0280 – 0.0720	0.0170 – 0.9290	0.0170 – 0.1970

Spray volume effects on efficacy *0 DAT*

Material and rate per acre	Spray volume (per acre)	Proportion of SWD dead					
		1 DAI		3 DAI		5 DAI	
		Males[1]	Females	Males[1]	Females[1]	Males	Females[1]
Malathion 8F, 2.5 pt	2-5 gal	0.65 ab	0.64 ab	0.78 ab	0.78 ab	0.85 a	0.78 ab
Malathion 8F, 2.5 pt	5 gal	0.90 a	0.86 a	0.98 a	0.98 a	1.00 a	1.00 a
Malathion 8F, 2.5 pt	25 gal	0.91 a	0.74 a	1.00 a	0.93 a	1.00 a	1.00 a
Malathion 8F, 2.5 pt	50 gal	0.95 a	0.85 a	1.00 a	0.93 a	1.00 a	1.00 a
Mustang Max, 4.3 fl oz	2-5 gal	0.51 bc	0.33 b	0.61 bc	0.46 bc	0.80 a	0.64 ab
Mustang Max, 4.3 fl oz	50 gal	0.50 bc	0.52 ab	0.68 ab	0.63 abc	0.95 a	0.78 ab
Untreated control (6)		0.28 c	0.28 b	0.28 c	0.28 c	0.30 b	0.38 b
	$F_{treatment}$	9.94	6.78	10.08	7.24	10.03	5.26
	df	6,44.1	6,44	6,44.1	6,44.1	6,44	6,44.1
	p	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0004

Spray volume effects on efficacy *9 DAT*

Material and rate per acre	Spray volume (per acre)	Proportion of SWD dead					
		1 DAI		3 DAI		5 DAI	
		Males[1]	Females[1,2]	Males	Females	Males[2]	Females
Malathion 8F, 2.5 pt	2-5 gal	0.35 bc	0.25 ab	0.90 a	0.65 ab	0.90 ab	0.75 ab
Malathion 8F, 2.5 pt	5 gal	0.80 a	0.26 ab	0.90 a	0.69 ab	1.00 a	0.95 ab
Malathion 8F, 2.5 pt	25 gal	0.73 ab	0.40 a	0.80 a	0.60 abc	0.93 ab	0.80 ab
Malathion 8F, 2.5 pt	50 gal	0.75 ab	0.31 a	0.95 a	0.73 a	1.00 a	1.00 a
Mustang Max, 4.3 fl oz	2-5 gal	0.55 abc	0.27 ab	0.60 ab	0.27 abc	0.60 ab	0.35 bc
Mustang Max, 4.3 fl oz	50 gal	0.20 c	0.00 c	0.25 b	0.00 c	0.40 ab	0.10 c
Untreated control (6)		0.13 c	0.00 bc	0.13 b	0.00 bc	0.13 b	0.07 c
	F	3.64	2.89	9.00	5.16	3.88	7.54
	df	6,16	6,16	6,16	6,16	6,16	6,16
	p	0.0180	0.0417	0.0002	0.0040	0.0139	0.0006

Multistate trapping experiment

Treatment 1
Apple cider vinegar + soap

Treatment 2
Yeast & sugar solution

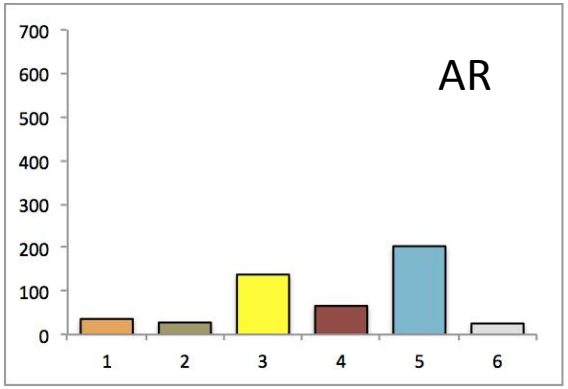
Treatment 3
Fermenting bait plus ACV

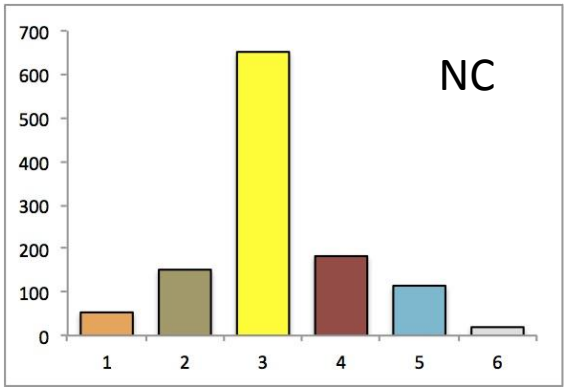
Treatment 4
Droskidrink

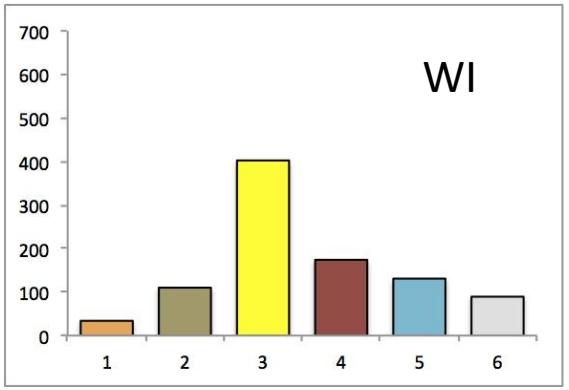
Treatment 5
Synthetic lures over ACV

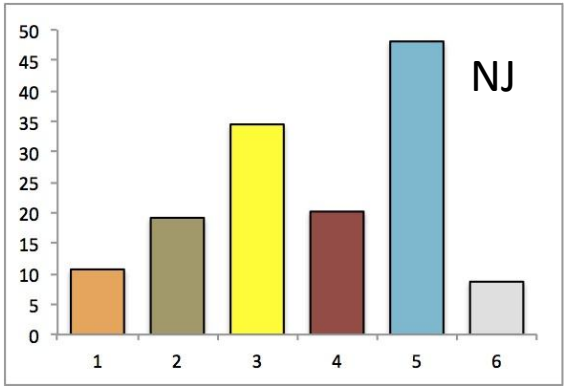
Treatment 6
Synthetic lures over drowning solution

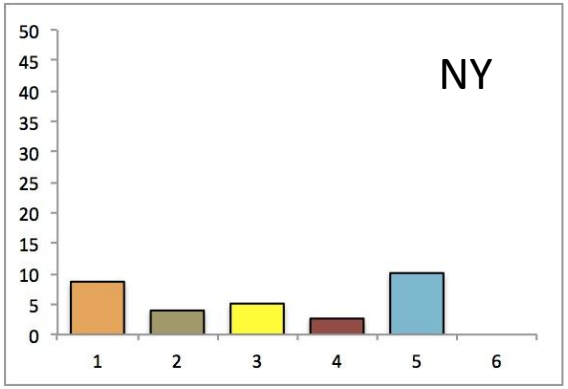
Multistate trapping experiment
Very preliminary observations

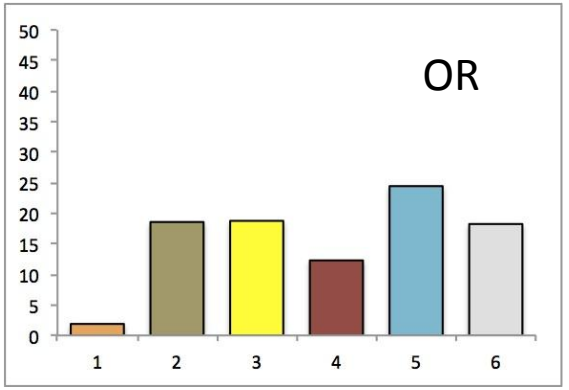












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Effects of diet quality on survival and performance

Why is this interesting?

Further informs our understanding of SWD host choice

SWD populations feeding on high quality diets may grow larger faster

Upcoming meetings

WERA 1021 – Nov 14, Austin, TX

eFly – January 8-9, Savannah, GA

Contact Hannah for registration information (hjburrac@ncsu.edu)

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