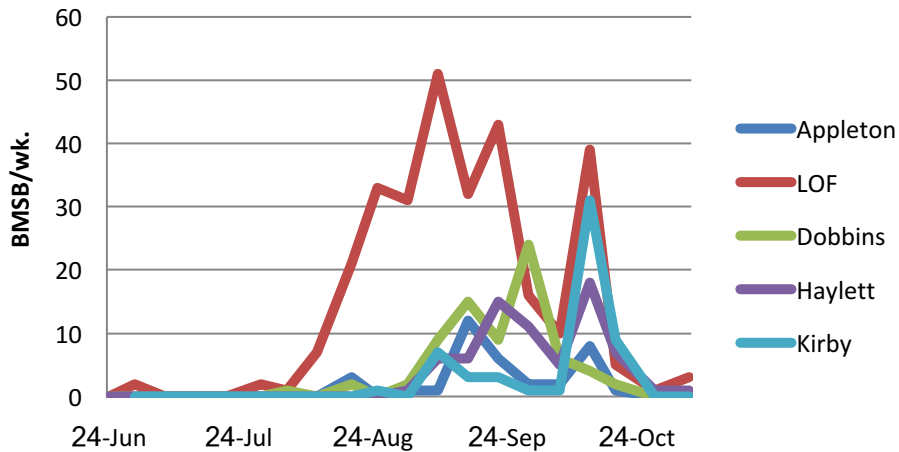
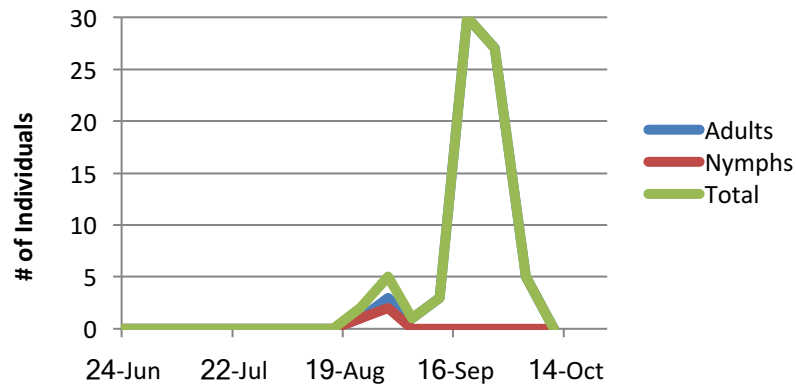


BMSB Feeding and Mortality Comparison on Sulfoxaflor and Bifenthrin Treated Apple.

Total BMSB; WNY-2016



BMSB; HV-2016 Clintondale



2016 Objectives

Majority of injury from BMSB occurs near harvest of late season apple varieties (Mid-August-November).

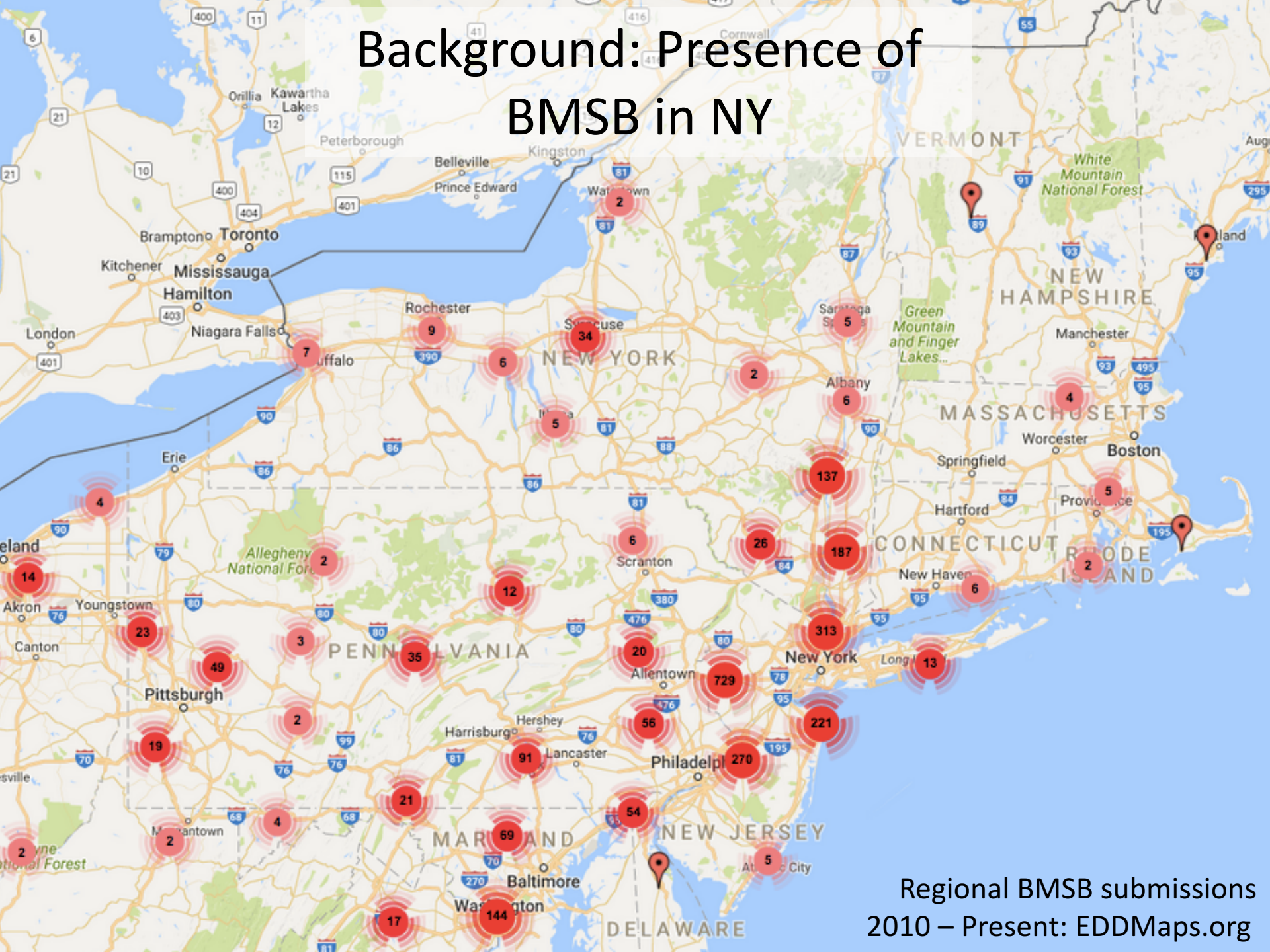
- Pre-harvest intervals of effective insecticides ≥ 14 d

Sulfoxaflor has been re-registered as of Oct. 14, 2016

- 7d PHI; 4 applications / season
- 1. To determine if 'Confined Field Population' of BMSB can be used as indicators of insecticide efficacy.***
 - 1. Test Sulfoxaflor to determine its efficacy as an anti-feedant near harvest of apple.***



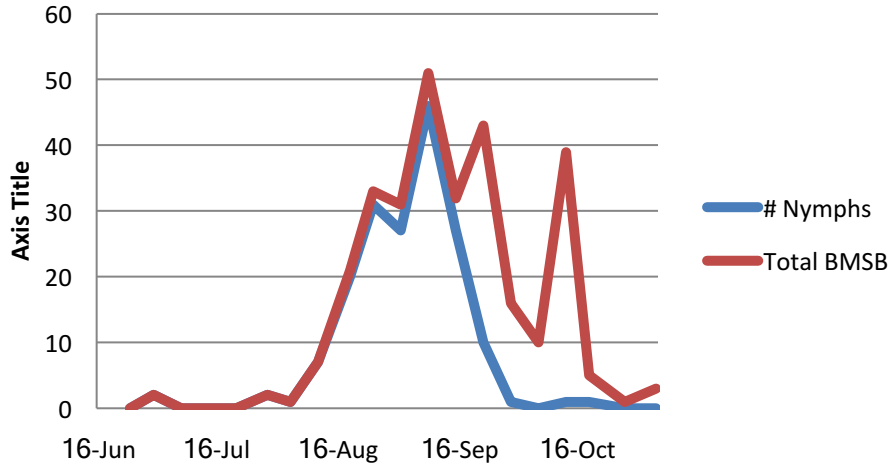
Background: Presence of BMSB in NY



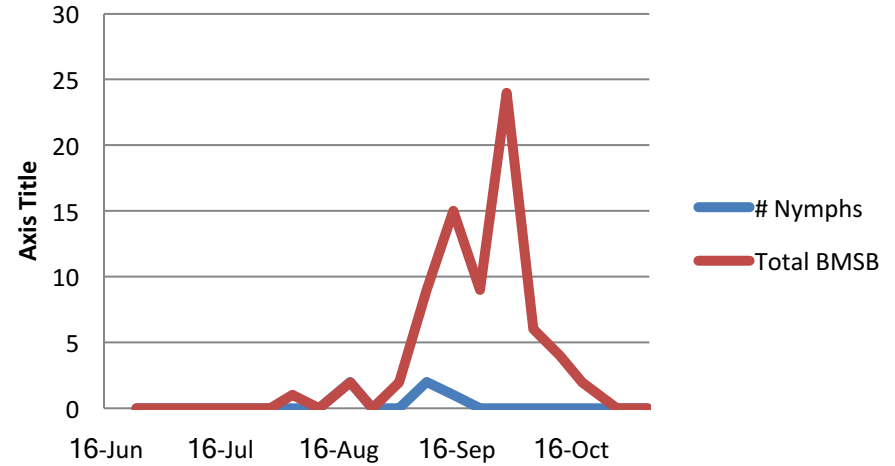
Regional BMSB submissions
2010 – Present: EDDMaps.org

Lake Ontario Fruit Growing Region - 2016

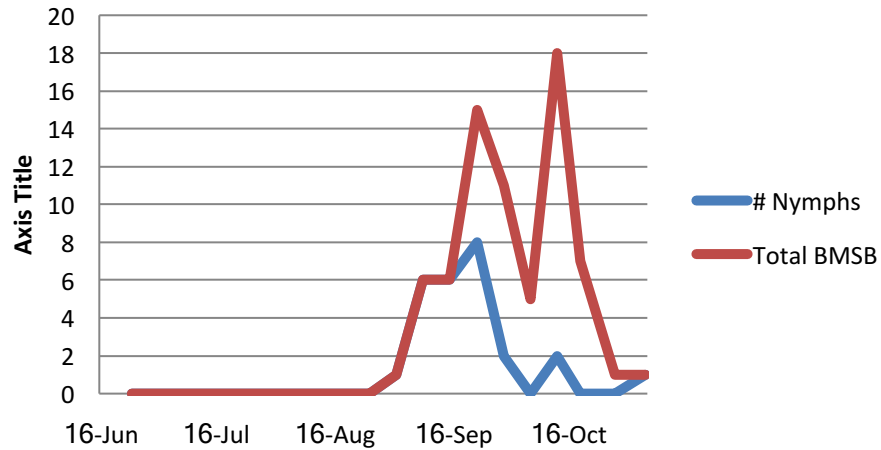
Albion.1, WNY (Orleans)



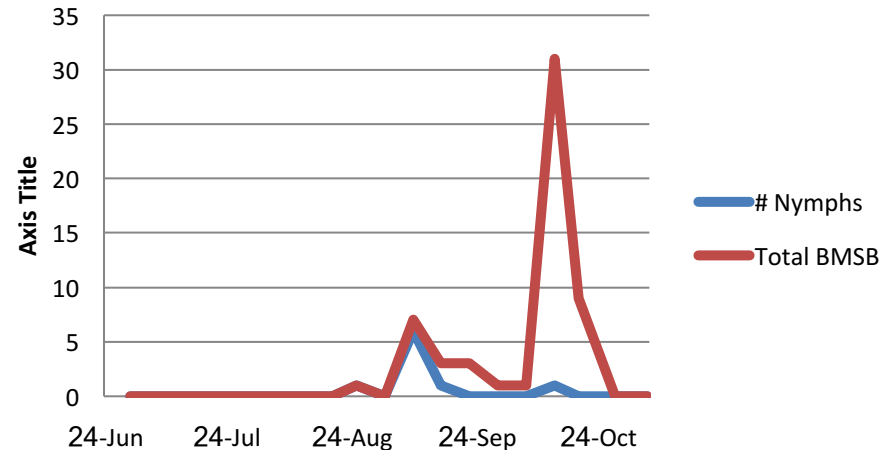
Lockport, WNY (Niagara)



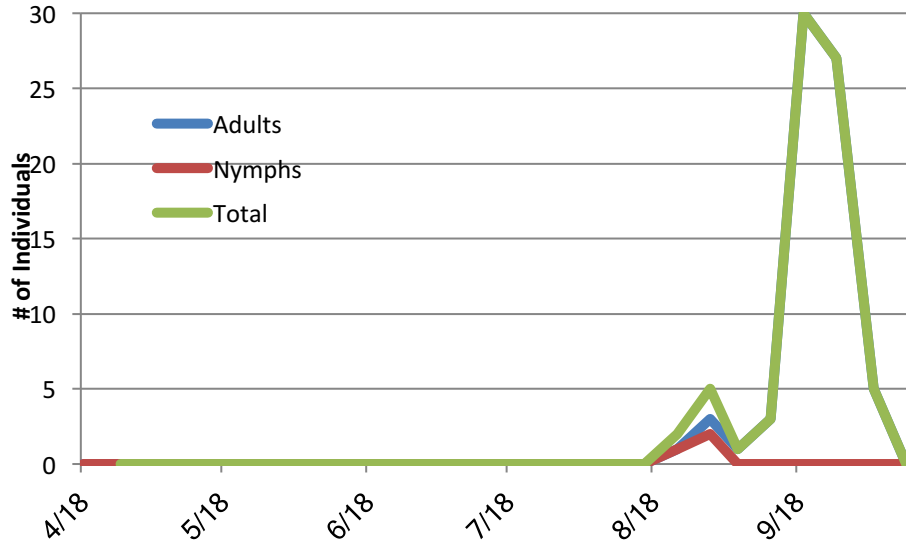
Albion.2, WNY (Orleans)



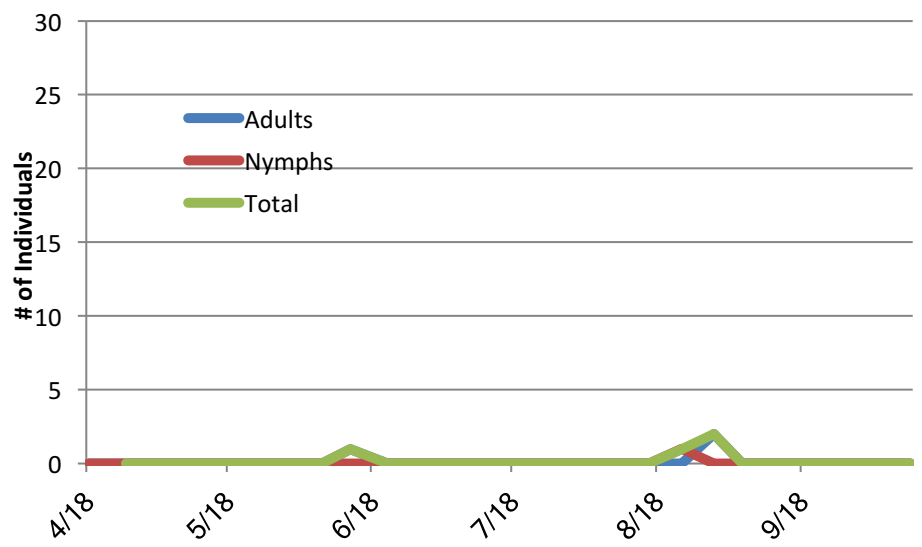
Brockport, WNY (Orleans)



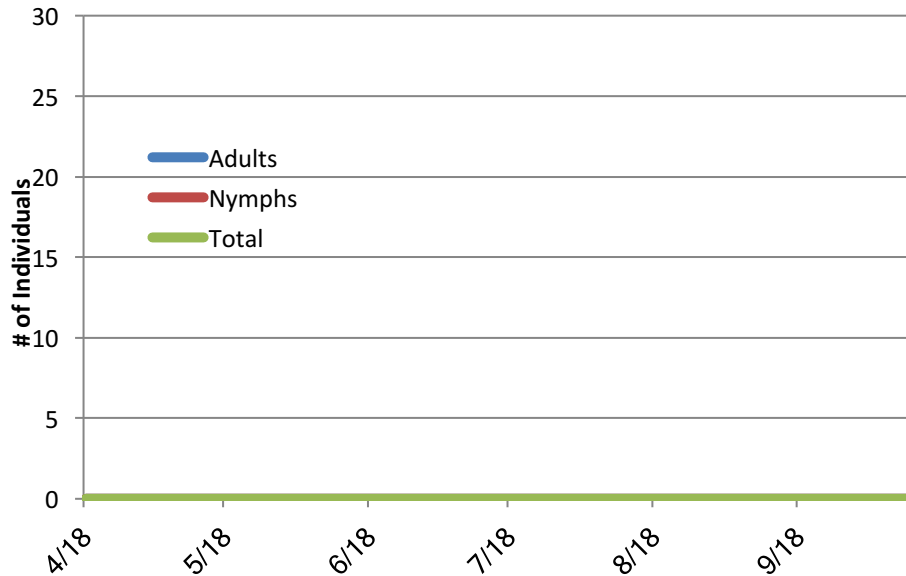
**HVRL BMSB Trapping 2016
Clintondale - Coy North**



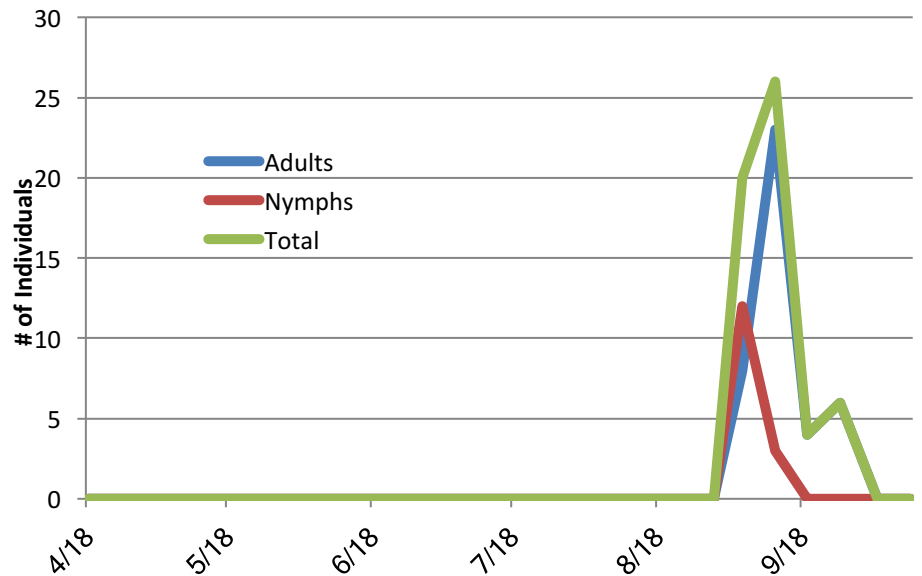
**HVRL BMSB Trapping 2016
Clintondale - Coy South**



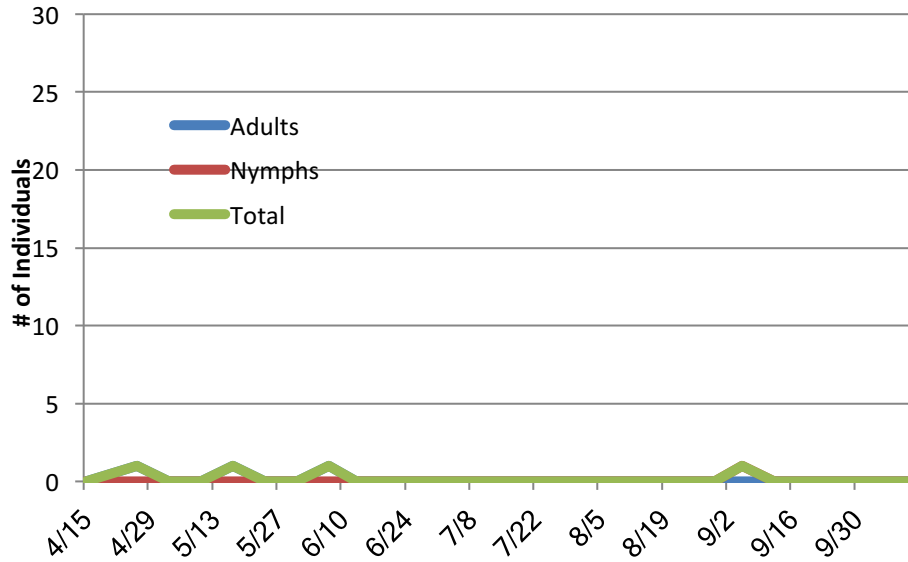
**HVRL BMSB Trapping 2016
Clintondale - Hurds**



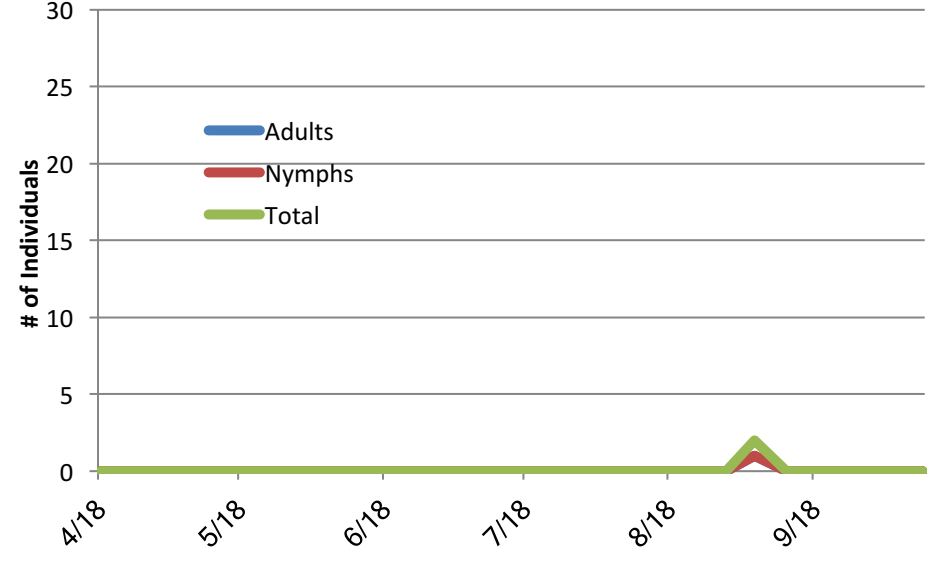
**HVRL BMSB Trapping 2016
Clintondale - MInard**



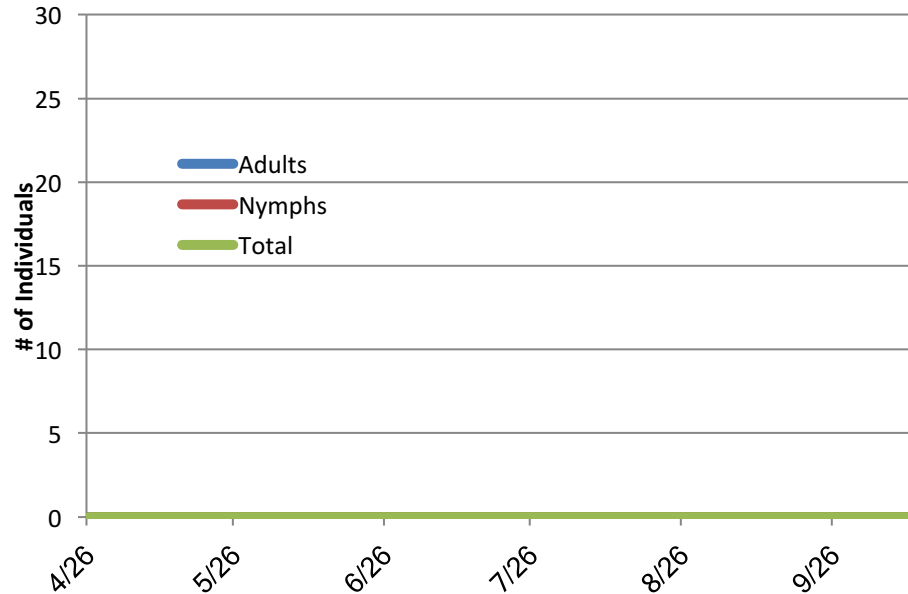
HVRL BMSB Trapping 2016
New Paltz - Dressels West



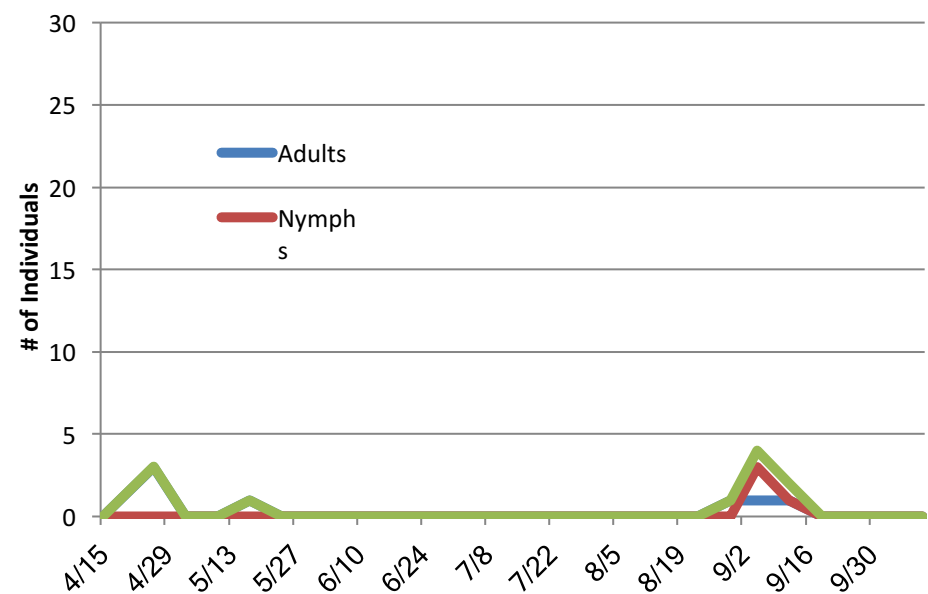
HVRL BMSB Trapping 2016
New Paltz - Dressels East



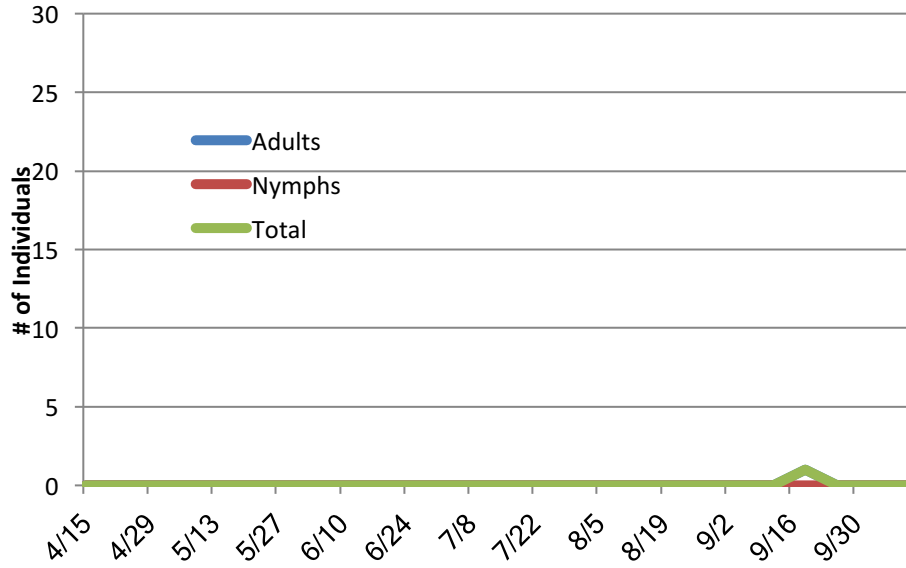
HVRL BMSB Trapping 2016
Walden - Crist Home West



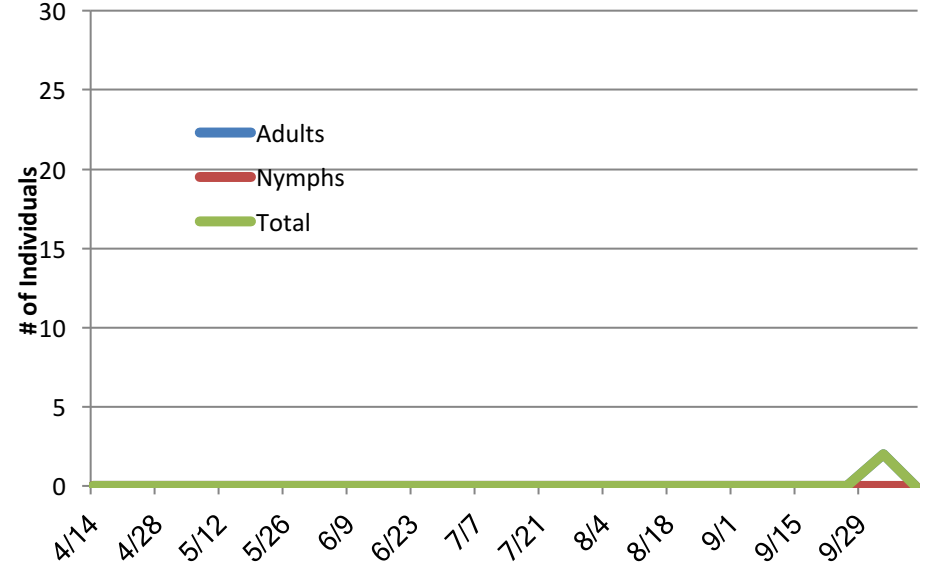
HVRL BMSB Trapping 2016
Walden - Crist Home East



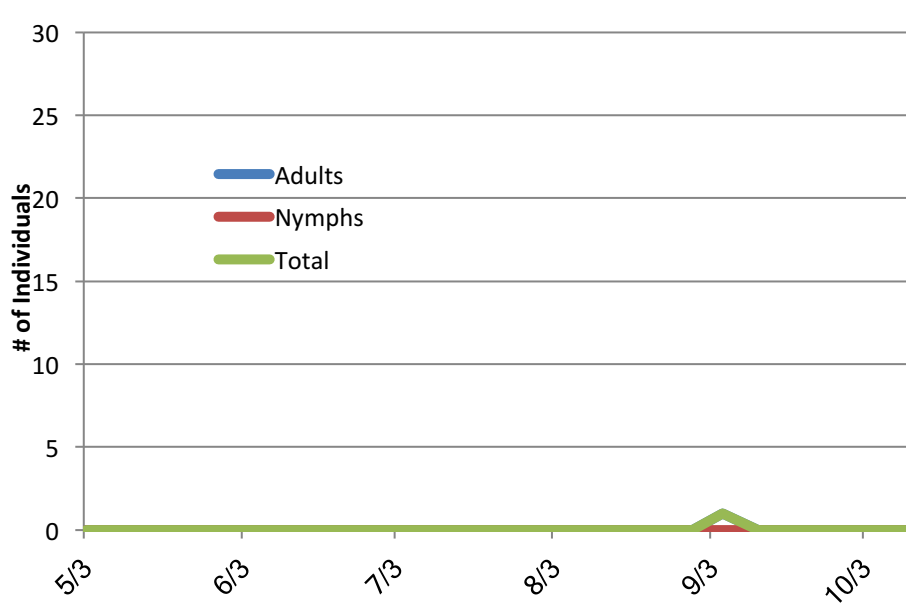
HVRL BMSB Trapping 2016 Milton, NY



HVRL BMSB Trapping 2016 Campbell Hall, NY



HVRL BMSB Trapping 2016 East Poughkeepsie, NY



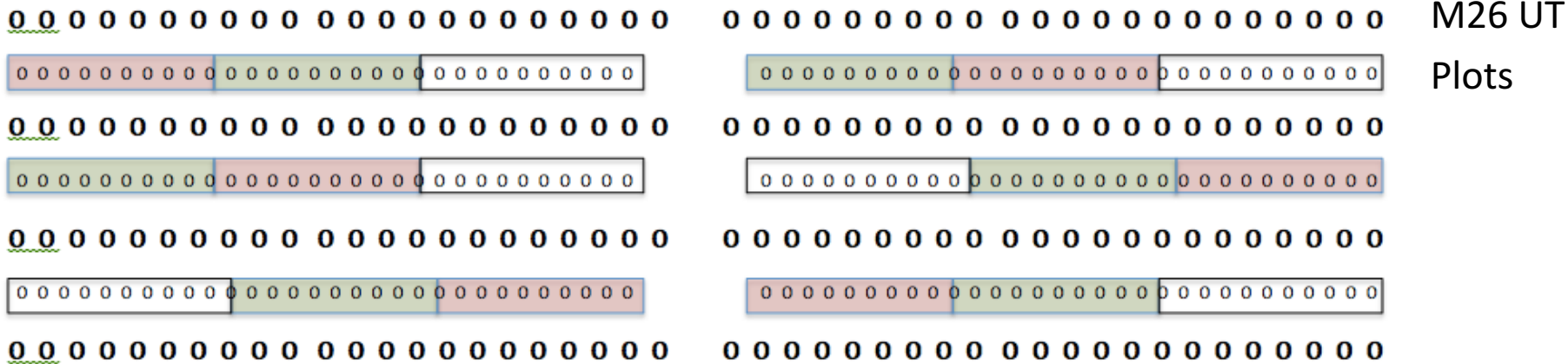
Using 'Confined Field Population' of BMSB as Indicators of Insecticide Efficacy



- Seven year old Red Delicious fruit trees on variety dwarfing rootstock strains were used in a complete block design.

Block consisted of 3 rows between 4 untreated rows of M26 apple varieties

- 10 trees per plot; 6 center trees used for study
- 3 fruit per BMSB life stage per replicate
- 6 replicates



Using 'Confined Field Population' of BMSB as Indicators of Insecticide Efficacy



- Closer SC @ 5.75 fl.oz./A and Bifenthrin EC at 12.8 fl.oz. on 2nd August applied dilute using handgun \geq 250psi @ 75 GPA.
- Placement of BMSB **3rd instar nymphs** and **adults** @ 24hr, 48hr and 72hr post application onto **shaded side** of fruit, **north side** of each tree.
- Over top of each insect was placed a 1 oz. screened cup.
- Insects were removed after 7d with container perimeter circled using black marker to isolate BMSB feeding site.

Using 'Confined Field Population' of BMSB as Indicators of Insecticide Efficacy



- Fruit were harvest on August 14th
- Fruit assessed for :
 - Feeding sites
 - Discoloration & depression (dimples)
 - Peeled to observe corking
 - % damage
- BMSB nymphs and adult observations:
 - longevity



Using 'Confined Field Population' of BMSB as Indicators of Insecticide Efficacy



Company: Dart

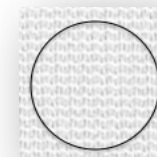
Stock Number: 100PC

Description: 1 oz.

Diameter of Top (in): 1.7

Diameter of Base (in): 1.2

Height (in): 1.3



$\frac{3}{4}$ " spade bit to bore cup base

Hot glue PAK 'no-see-um insect net' to base



BMSB Feeding and Mortality Comparison on Closer and Bifenthrin Treated Apple.



Harvest Field Means

Trmt	Hr. Post Application	Life Stage	# Feeding Sites	# / fruit Green Dimples	Corking	% Clean
Closer	24h	adult & nymph	0.2	0.3	0.3	71.4
Bifenthrin	24h	adult & nymph	0.2	0.5	0.3	60.0
UTC	24h	adult & nymph	1.4	1.2	1.4	26.7
Closer	48h	adult & nymph	0.4	0.1	0.4	71.4
Bifenthrin	48h	adult & nymph	0.3	0.9	0.4	61.5
UTC	48h	adult & nymph	1.4	1.9	2.1	20.0
Closer	72h	adult & nymph	0.4	0.4	0.6	53.8
Bifenthrin	72h	adult & nymph	0.0	0.6	0.1	64.3
UTC	72h	adult & nymph	1.1	1.4	1.9	23.1

BMSB Feeding and Mortality Comparison on Closer and Bifenthrin Treated Apple.



Stage	Hr.post Appl.	Trmt	# Feeding Sites	Green Dimples	Corking	Clean
BMSB Adult	24hr	Closer	0.0a	0.3a	0.0a	0.1a
		Bifenthrin	0.3a	0.6a	0.4a	0.5ab
		UTC	1.6b	0.9a	1.6b	0.9b
		P-Value	0.0079	0.6411	0.0109	0.024
	48hr	Closer	0.3a	0.0a	0.7a	0.1a
		Bifenthrin	0.7a	0.3a	0.7a	0.7ab
		UTC	0.9a	1.4b	1.1a	0.7b
		P-Value	0.6113	0.0018	0.7383	0.0641
	72hr	Closer	0.0a	0.4a	0.3a	0.3a
		Bifenthrin	0.9a	0.4a	1.1a	0.4a
		UTC	1.1a	0.8a	1.8a	0.6a
		P-Value	0.3548	0.499	0.3131	0.4854

Fisher's Protected LSD

Significance level: .05

BMSB Feeding and Mortality Comparison on Closer and Bifenthrin Treated Apple.



Stage	Hr.post Appl.	Treatment	# Feeding Sites	Green Dimples	Corking	Clean
BMSB Nymphs 3 rd Instar	24hr	Closer	0.1 a	0.3 a	0.1 a	0.4 a
		Bifenthrin	0.4 a	0.3 a	0.6 a	0.6 a
		UTC	1.1 a	1.4 a	1.1 a	0.7 a
		P-Value	0.149	0.3699	0.1649	0.4526
	48hr	Closer	0.0 a	0.3 a	0.1 a	0.3 a
		Bifenthrin	0.3 a	1.4 a	0.3 a	0.6 a
		UTC	1.8 b	2.0 a	2.8 b	0.7 a
		P-Value	0.0267	0.3394	0.007	0.2
	72hr	Closer	0.0 a	0.4 a	0.3 a	0.3 a
		Bifenthrin	0.9 a	0.4 a	1.1 a	0.4 a
		UTC	1.1 a	0.8 a	1.8 a	0.6 a
		P-Value	0.3548	0.499	0.3131	0.4854
Fisher's Protected LSD						
Significance level: .05						



BMSB Feeding and Mortality Comparison on Closer and Bifenthrin Treated Apple.



Hr.post Appl.	Treatment	Stage	# Feeding Sites	Green Dimples	Corking	Clean
24hr	Closer	Adults	0.00 a	0.29 a	0.00 a	0.86 b
		Nymphs	0.43 ab	0.29 a	0.57 abc	0.57 ab
	Bifenthrin	Adults	0.25 ab	0.63 a	0.38 ab	0.50 ab
		Nymphs	0.14 ab	0.29 a	0.14 a	0.71 b
	UTC	Adults	1.57 c	0.86 a	1.57 c	0.14 a
		Nymphs	1.13 bc	1.38 a	1.13 bc	0.38 ab
	Type III Sums of Squares	Treatment	0.0018	0.2691	0.0036	0.0367
		Stage	0.8825	0.892	0.8998	0.7135
Treatment*Stage		0.4503	0.7175	0.3165	0.2728	
48hr	Closer	Adults	0.71 ab	0.00 a	0.71 a	0.71 b
		Nymphs	0.00 a	0.29 ab	0.14 a	0.71 b
	Bifenthrin	Adults	0.33 a	0.33 ab	0.67 a	0.67 ab
		Nymphs	0.29 a	1.43 ab	0.29 a	0.57 ab
	UTC	Adults	0.86 ab	1.43 ab	1.14 a	0.14 a
		Nymphs	1.75 b	2.00 b	2.75 b	0.25 ab
	Type III Sums of Squares	Treatment	0.036	0.052	0.0098	0.0142
		Stage	0.8999	0.2159	0.6246	0.9788
Treatment*Stage		0.1629	0.8177	0.0897	0.8566	
72hr	Closer	Adults	0.00 a	0.33 a	0.17 ab	0.50 ab
		Nymphs	0.86 a	0.43 a	1.14 ab	0.57 ab
	Bifenthrin	Adults	0.00 a	0.71 a	0.00 a	0.86 b
		Nymphs	0.00 a	0.43 a	0.29 ab	0.43 ab
	UTC	Adults	1.20 a	2.80 a	2.40 b	0.20 a
		Nymphs	1.13 a	0.75 b	1.75 ab	0.25 a
	Type III Sums of Squares	Treatment	0.0819	0.021	0.0364	0.0932
		Stage	0.5314	0.0788	0.7361	0.5159
Treatment*Stage		0.5984	0.0985	0.5574	0.3331	

Fisher's Protected LSD
Significance level: .05

Comparison of a Late Season BMSB Feeding and Mortality Of Closer and Bifenthrin Treated Apple.



Adult Mortality

Day after Exposure	Treatment	Alive (%)	Dead (%)
2	Closer	76.2 a	23.8 a
	Bifenthrin	16.7 a	83.3 a
	UTC	70.4 a	29.6 a
P-Value		0.0947	0.0947
10	Closer	38.1 a	61.9 a
	Bifenthrin	0.0 a	100.0 a
	UTC	51.9 a	48.1 a
P-Value		0.0895	
14	Closer	76.2 a	23.8 a
	Bifenthrin	16.7 a	83.3 a
	UTC	70.4 a	29.6 a
P-Value		0.3787	

Fisher's Protected LSD

Significance level: .05

Comparison of a Late Season BMSB Feeding and Mortality Of Closer and Bifenthrin Treated Apple.



Day after Exposure	Treatment	Alive (%)	Dead (%)
2	Closer	86.3 b	13.7 a
	Bifenthrin	44.3 a	55.7 b
	UTC	90.5 b	9.5 a
	P-Value	0.0086	
10	Closer	28.0 a	72.0 a
	Bifenthrin	8.9 a	91.1 a
	UTC	39.9 a	60.1 a
	P-Value	0.3023	
15	Closer	18.5 a	81.5 a
	Bifenthrin	4.7 a	95.2 a
	UTC	35.7 a	64.3 a
	P-Value	0.2239	
21	Closer	18.5 a	81.5 a
	Bifenthrin	4.8 a	95.2 a
	UTC	26.8 a	73.2 a
	P-Value	0.2756	

Fisher's Protected LSD
Significance level: .05

Conclusion



- Sulfoxaflor (Group 4C), is a sulfoximine insecticide with a distinct mode of action, acting as an agonist at insect nicotinic acetylcholine receptors (nAChRs) and functions in a manner distinct from other insecticides in Group 4.
- During late season infestations of BMSB, Closer SC applications made prior to the 7 DTH label constraint have been shown to reduce feeding to apple.
- For growers, Sulfoxaflor may provide an option to reduce late season feeding near harvest.