

# 3.1 & 3.2 Crop Specific IPM Programs (Vegetables)



©2011 Hershberger



## Funding



United States  
Department of  
Agriculture

National Institute  
of Food and  
Agriculture

Specialty Crop Research Initiative  
Grant #2011-01413-30937

## Collaborating Institutions



Cornell University



VirginiaTech



# Integrated Pest Management recommendations for BMSB on Vegetables

- ❑ Not there yet, no real action thresholds.
- ❑ Check field margins next to woodlots for the first sign of invasion.
- ❑ Direct examinations for adults and nymphs, as well as for injured fruit/pods.
- ❑ Treating areas 30-50 ft from field edges next to woodlots may stop invasion (corn and beans).
- ❑ Multiple applications spaced 5-7 days apart may be necessary, if re-invasion occurs.

# Insecticide field efficacy trials on peppers in VA, 2011 & 2012

- Bell peppers ('Aristotle') on plastic mulch at Virginia Tech Kentland Research Farm (Blacksburg, VA)
- Tested over 50 different insecticide treatments
- RCBD small-plot experiments (4 reps)
- Plot = one row (20 ft)
- CO<sub>2</sub> backpack sprayer w/ 3-nozzle drop down boom



Stink bug injury

# Performance of insecticides – all tests

Product	Rate oz/Acre	% mortality in bean dip bioassays*		% control in pepper field tests**		Avg. % control from all four experiments
		Nymphs	Adults	2011	2012	
Scorpion 3.24	7.7	76.7	90.0	85.4	67.0	79.8
Permethrin 3.2EC	8	97.5	98.8	60.6	58.4	78.8
Baythroid XL	2.8	92.5	88.2	52.8	67.8	75.3
Endigo ZC	4.5	75.0	98.7	49.2	78.3	75.3
Bifenture 10DF	12.8	100.0	81.9	56.3	60.3	74.6
Belay	4	75.0	67.5	66.7	78.3	71.9
Lannate LV	40	66.7	75.3	79.8	62.2	71.0
Leverage 360	2.8	97.3	74.5	49.9	60.2	70.5
Hero EC	10.3	91.7	50.0	72.8	66.6	70.3
Brigadier	9.85	76.7	70.0	69.9	62.8	69.9
Venom 70	4	100.0	80.0	46.0	52.8	69.7
MustangMAX	4	100.0	35.0	72.8	69.2	69.2
Acephate 97UP	16	100.0	51.8	70.4	52.8	68.7
Trebon	8	100.0	100.0	36.5	34.9	67.9
Vydate L	48	85.0	47.0	79.7	47.1	64.7
Assail 30 G	4	90.0	32.8	70.4	NA	64.4
Warrior II	2.5	100.0	72.8	38.0	42.5	63.3
Danitol	16	93.3	42.5	60.3	55.6	62.9
Actara 50 WG	5.5	66.7	81.0	60.3	42.5	62.6
Lambda-cy	3.84	86.0	32.3	62.0	NA	60.1
Asana XL	9	35.0	27.5	76.4	NA	46.3
Boleaf 50SG	2.8	28.5	17.5	27.2	71.8	36.3

\* Mortality refers to the percentage of dead + moribund individuals after 72 hrs of exposure.

\*\* Based on reduction in stink bug injury to pepper fruit from three harvests.

# Chemical control of BMSB in vegetables

- Several pyrethroids and neonicotinoids as well as products containing both active ingredients provide effective (>60%) control of BMSB on vegetables
- The only other efficacious insecticides on vegetables are the OP/carbamates:  
    acephate, methomyl, and oxamyl
- Though also effective, endosulfan will no longer be registered on vegetables in the future and should not be considered.
- All of the aforementioned insecticides are disruptive to natural enemies and can undermine IPM programs



# Trial # 1 – Bell Peppers , Blacksburg, VA

## (4 weekly sprays)

Treatment	Rate / acre	% stink bug damage			% control (dmg reduction)	Mean no. green peach aphids / 20 leaves
		8-Aug	19-Aug	30-Aug		
Untr. Control		32.0	26.7	28.8		10.3
Acephate 97UP	16 oz	7.5	11.3	7.5	70.4	0.0
Assail 30G	4 oz	8.0	6.7	11.3	70.4	1.5
Bifenture 2EC	6.4 fl. oz	13.8	5.0	12.5	64.8	765.5
Lambda-Cy 1EC	3.84 fl. oz	12.5	10.0	11.3	62.0	850.8
Perm-up 3.2EC	8 fl. oz	8.8	7.5	18.8	60.6	539.0



# Trial # 2 – Bell Peppers, Blacksburg, VA (4 weekly sprays)

Treatment	Rate / acre	% stink bug fruit damage, VA			% control (dmg reduction)	Mean no. green peach aphids / 20 leaves
		8-Aug	19-Aug	30-Aug		
Untr. Control		31.3 a	26.3	21.3		6.0
Belay 2.13SC	4 fl. oz	10.0 b	3.8	12.5	66.7	0.5
Danitol 2.4SC	10.67 fl. oz	10.0 b	10.0	11.3	60.3	120.0
Actara 25WG	5.5 oz	12.5 b	7.5	11.3	60.3	2.5
Endigo ZC	5.5 fl. oz	17.5 ab	8.8	13.8	49.2	1.3
Venom 70SG	4 oz	17.5 ab	13.8	11.3	46.0	2.5
Warrior II	1.92 fl. oz	31.3 a	11.3	6.3	38.0	498.5
Trebon 280 g/l	8 fl. oz	21.3 ab	11.3	17.5	36.5	100.0

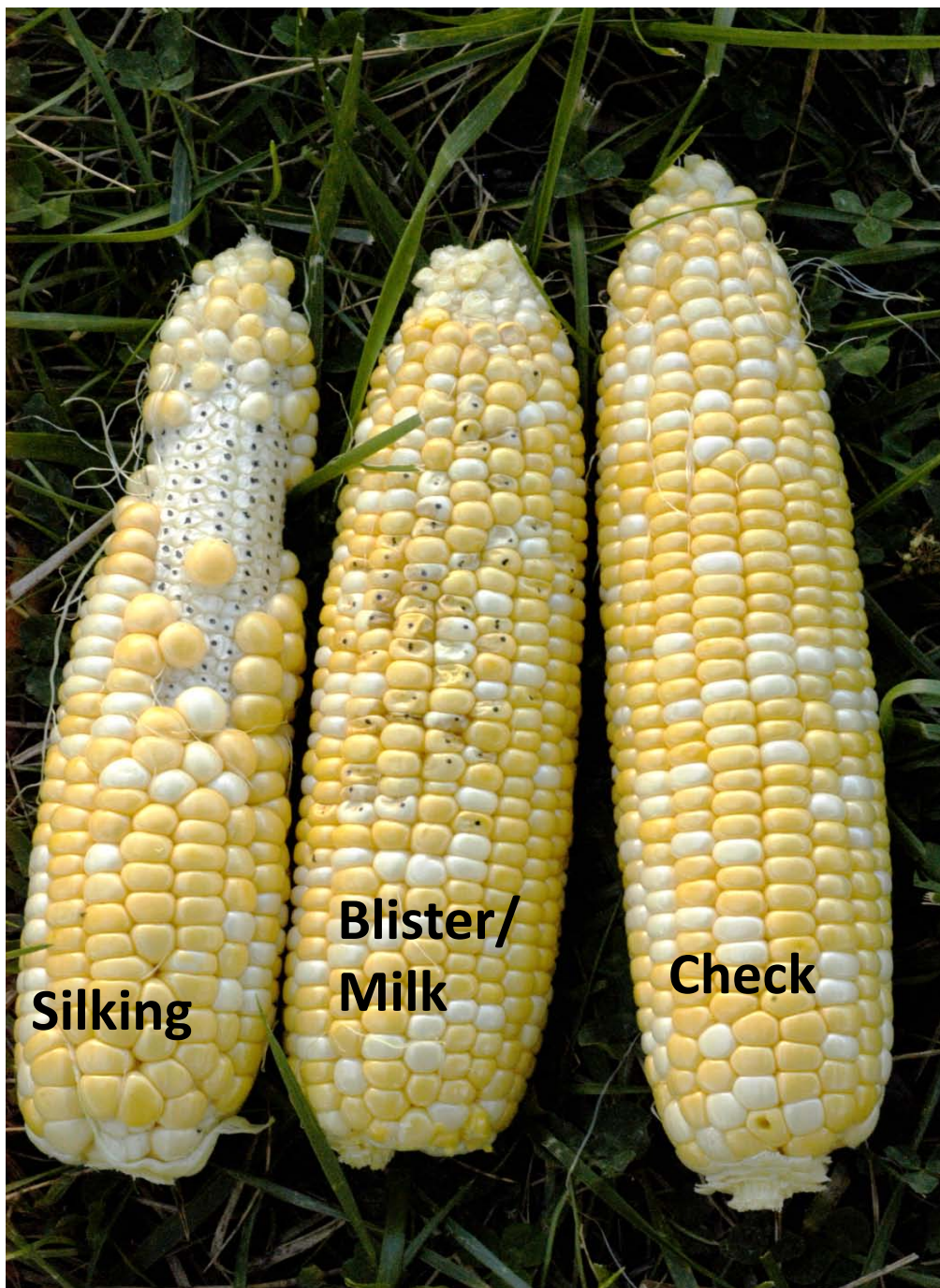


# Sweet corn

- BMSB potential risk from late June – Sept. Corn in northern VA was attacked in late June in 2012
- Most commercial growers typically spray pyrethroids on a regular basis anyway for corn earworm control
- Growers relying on Bt transgenic corn solely will need to inspect fields







## Conclusions

- Infestations occurring prior to pollination may result in incomplete kernel fill
- BMSB must be managed from ear shank emergence to harvest

# Neonicotinoid insecticides applied via drip irrigation or drench treatment



# Neonic soil drench – Peppers, Blacksburg, VA 2012

All soil treatments were applied on 25 Jun and again on 24 Jul.

Treatment	Rate / acre	% stink bug damage		
		7-Aug	17-Aug	27-Aug
UTC		11.3	23.8 a	40.0 a
Admire Pro (Soil)	10.5 fl. oz	1.3	21.3 a	15.0 b
Belay (Soil)	12.0 fl oz	6.3	10.0 ab	6.3 bc
Venom 70SG (soil)	6.0 oz	6.3	0.0 b	3.8 bc
Platinum 75SG (soil)	3.67 oz	6.3	10.0 ab	10.0 bc
Belay (Soil) + Danitol (3 sprays)	12 fl. oz + 16 fl. oz	6.3	2.5 b	0.0 c
P-Value from ANOVA		ns	0.0345	0.0002



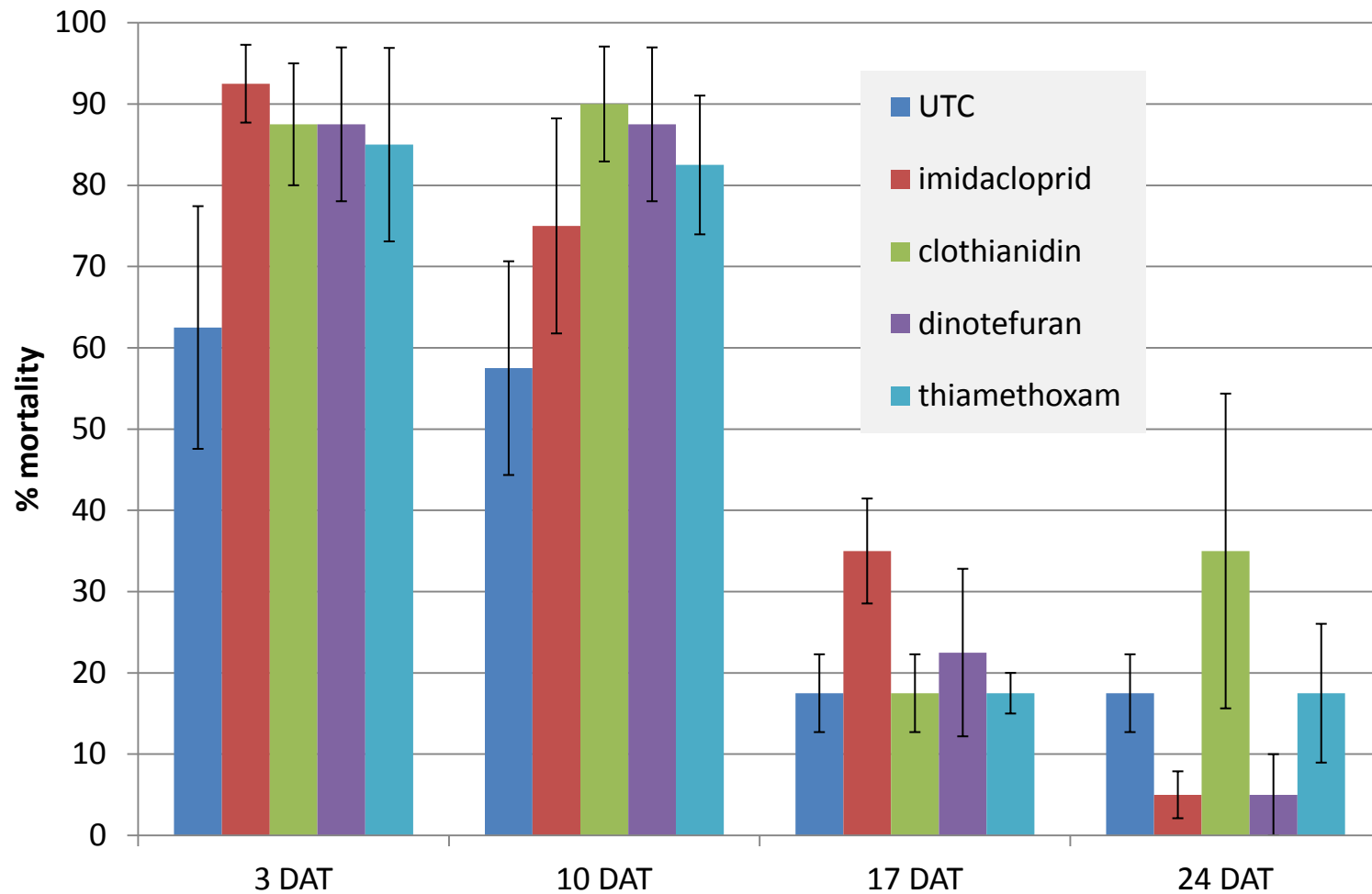
# Neonic soil drench – Tomatoes, Mills River, NC 2012

All neonic soil treatments were applied on 2 Jul at fruit set. Coragen was also applied to plots on 1 or dates as needed for lepidopteran pests.

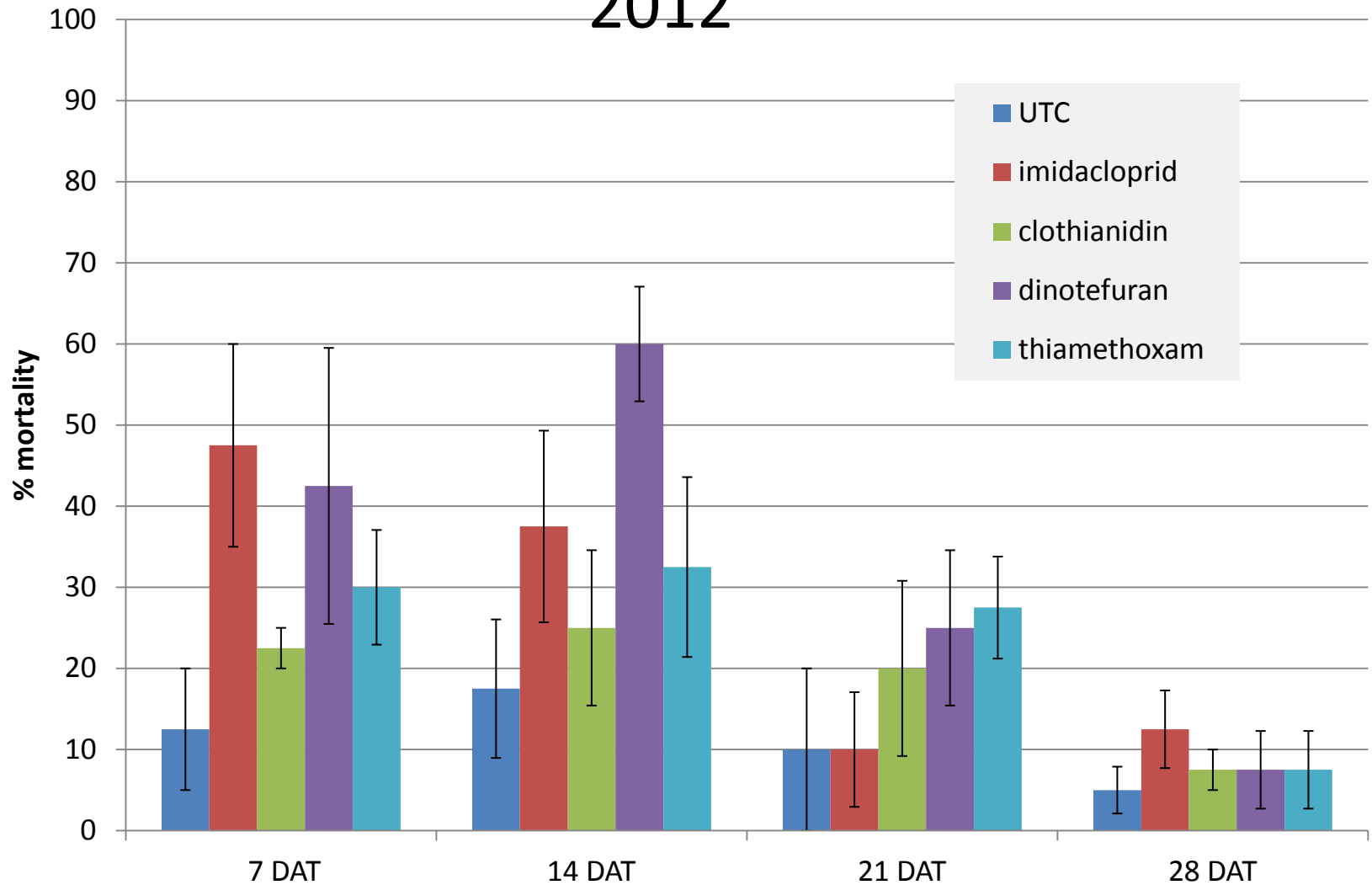
		% tomato fruit with stink bug injury				
Treatment	Rate/A	8/8	8/22	9/6	9/20	9/28
Admire Pro 4.6SC	10.5 oz	1.4ab	4.3a	4.6a	13.0a	13.1a
Platinum 75SG	3.67 oz	0a	9.4a	7.3a	12.9a	17.1a
Scorpion 35SL	10.5 oz	0a	2.1a	9.1a	4.2a	12.6a
Belay 2.13SC	12.0 oz	1.6b	7.3a	11.2a	21.2a	13.9a
Control	—	3.7c	15.4a	13.8a	19.7a	5.6a



# % mortality of BMSB nymphs caged on peppers treated with soil-applied neonics, Blacksburg, VA 2012



# % mortality of BMSB nymphs caged on peppers treated with soil-applied neonics, Blacksburg, VA 2012





# Expected Outcomes

- **We will develop sound crop-specific IPM programs for sweet corn, fruiting vegetables, and beans.**