In-Furrow and Side-Dress Insecticide Applications in Snap Bean

"Besting Bean Bugs from Below – Reducing Risk and Cost"

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Insecticides for Managing Snap Bean Pests

Recently Labeled in Wisconsin:

- **Radiant SC** (spinetoram)
- **Coragen 1.67 SC** (chlorantraniliprole) – foliar
- **Blackhawk** (spinosad) – foliar
- **Beseige** (chlorantraniliprole + lambda-cyhalothrin)
- **Belt SC** (flubendiamide) – foliar
- **Entrust SC** (spinosad) - foliar

In the Pipeline or in Review:

- **Dermacor X** (chlorantraniliprole) - not supported
- **Voliam Flexi** (chlorantraniliprole + thiamethoxam)
- **Benevia, Verimark** (cyantraniliprole) – 2013/14

Anthranillic Diamide Insecticides

- Active ingredients: rynaxypyr (aka chlorantraniliprole) and cyazypyr (aka cyantraniliprole).
- Class: anthranilic diamide (IRAC MoA Class 28)
- Mode of action: ryanodine receptor modulator
  - Systemic activity
  - Most effective through ingestion
  - Insects stop feeding, become paralyzed and die within 1 to 3 days
  - Applied to soil at planting, drip chemigation and foliar spray (*seed treatment*)
  - Exceptionally long residual control – xylem mobile
  - Active against Lepidopterans, Coleoptera, and Hemiptera

Major Snap Bean Pests in Midwest

Seedcorn Maggot (SCM)

Cruiser

Potato Leafhopper (PLH)

European corn borer (ECB)

Objective

- To evaluate the efficacy of chlorantraniliprole and cyantraniliprole when applied as in furrow and fertilizer pre-mix applications for managing seedcorn maggot, potato leafhopper and European corn borer

Products Evaluated for Managing Insect Pests of Snap Bean in WI, 2011

Product	Active Ingredient	Type*	Rate
1. UTC			
2. Coragen	rynaxypyr	IF	3.5 fl oz/acre
3. Coragen	rynaxypyr	IF	5.0 fl oz/acre
4. Coragen	rynaxypyr	IF	7.0 fl oz/acre
5. Verimark	cyazypyr	IF	10.2 fl oz/acre
6. Coragen	rynaxypyr	LF	3.5 fl oz/acre
7. Coragen	rynaxypyr	LF	5.0 fl oz/acre
8. Coragen	rynaxypyr	LF	7.0 fl oz/acre
9. Verimark	cyazypyr	LF	10.2fl oz/acre
10. Coragen	rynaxypyr	DF	5.0 fl oz/acre
11. Coragen	rynaxypyr	DF	7.0 fl oz/acre
12. Verimark	cyazypyr	DF	10.2 fl oz/acre
13. Coragen	rynaxypyr	LF	3.5 fl oz/acre**
14. Coragen	rynaxypyr	LF	5.0 fl oz/acre**
15. Coragen	rynaxypyr	LF	7.0 fl oz/acre**
16. Verimark	cyazypyr	LF	10.2 fl oz/acre**

*IF = in furrow application; LF = liquid fertilizer; DF = dry fertilizer
**Trts 13-16 pre-mixed 10:1 with H_2O before mixing with fertilizer

Products Evaluated for Managing Insect Pests of Snap Bean in WI, 2012

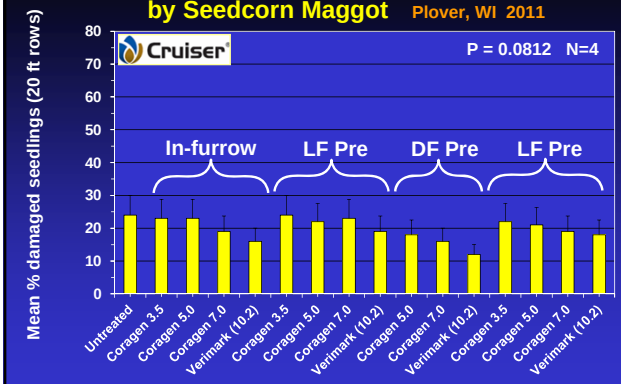
Product	Active Ingredient	Type*	Rate
1. UTC			
2. Coragen 1.67 SC	rynaxypyr	IF	3.5 fl oz/acre
3. Coragen 1.67 SC	rynaxypyr	IF	5.0 fl oz/acre
4. Coragen 1.67 SC	rynaxypyr	IF	7.0 fl oz/acre
5. Verimark 20 SC	cyazypyr	IF	10.2 fl oz/acre
6. Verimark 20SC	cyazypyr	IF	13.5 fl oz/acre
7. Coragen 1.67 SC	rynaxypyr	LF	5.0 fl oz/acre
8. Coragen 1.67 SC	rynaxypyr	LF	7.0 fl oz/acre
9. Verimark 20 SC	cyazypyr	LF	10.2 fl oz/acre
10. Verimark 20 SC	cyazypyr	LF	13.5fl oz/acre
11. Coragen 1.67 SC	rynaxypyr	F	5.0 fl oz/acre
12. Exirel 10SE	cyazypyr	F	13.5 fl oz/acre

*IF = in furrow application; LF = liquid fertilizer; F = foliar
**Trts 7-10 pre-mixed ,10:1 with H_2O before mixing with fertilizer

Seedcorn Maggot (SCM)

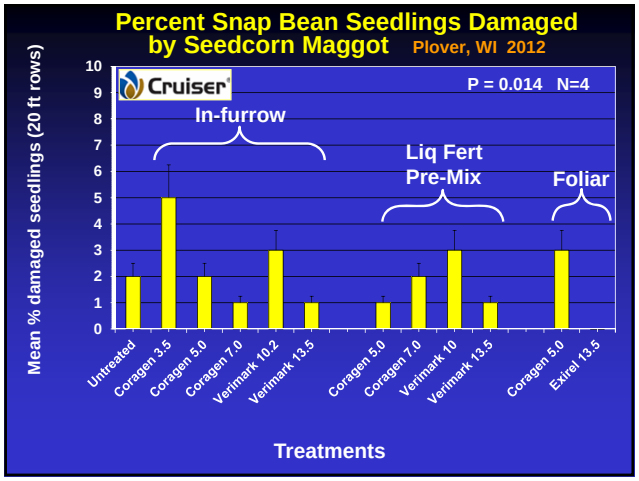
Percent Snap Bean Seedlings Damaged by Seedcorn Maggot

Plover, WI 2011

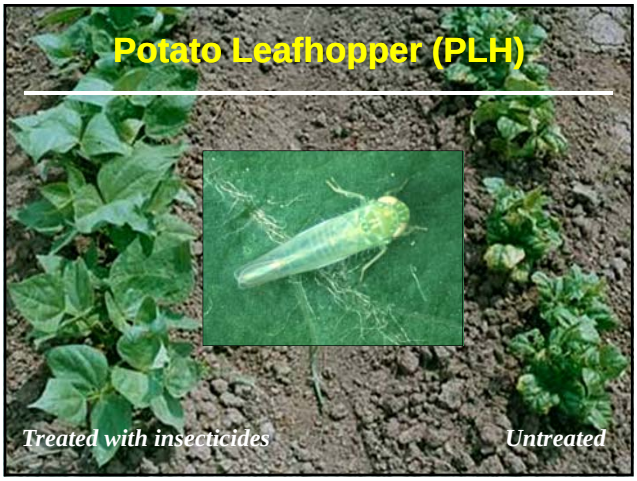


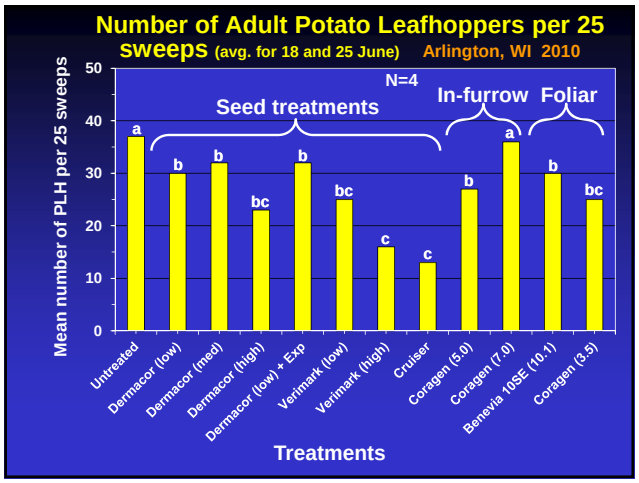
Percent Snap Bean Seedlings Damaged by Seedcorn Maggot

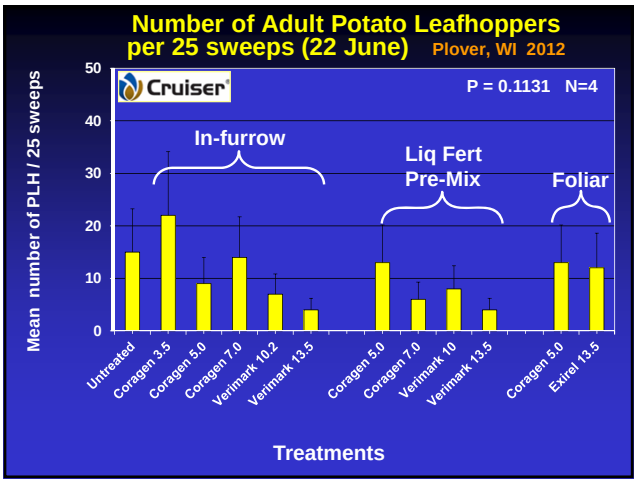
Plover, WI 2012



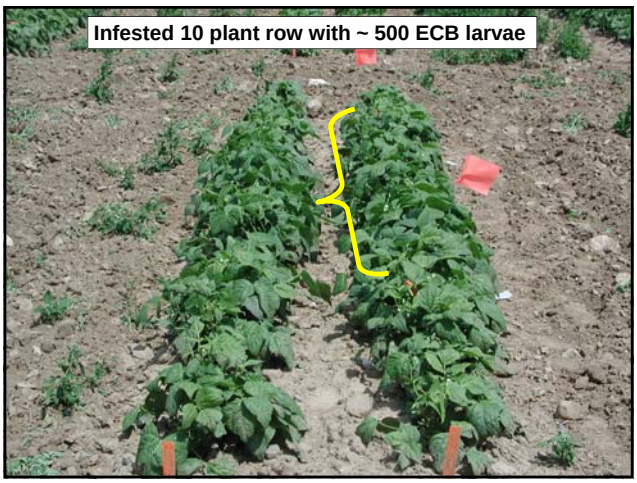
Potato Leafhopper (PLH)

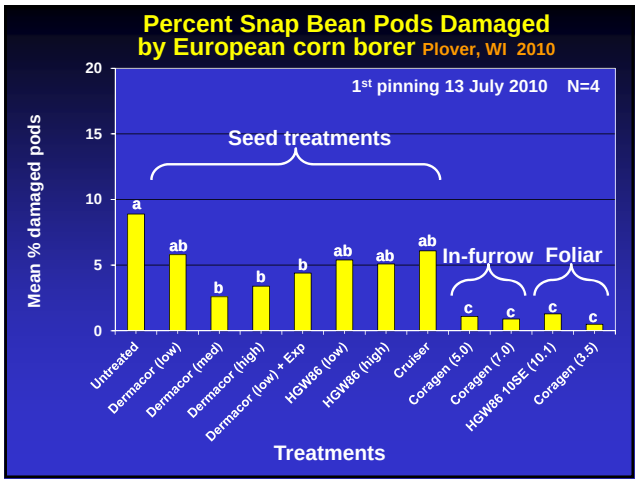


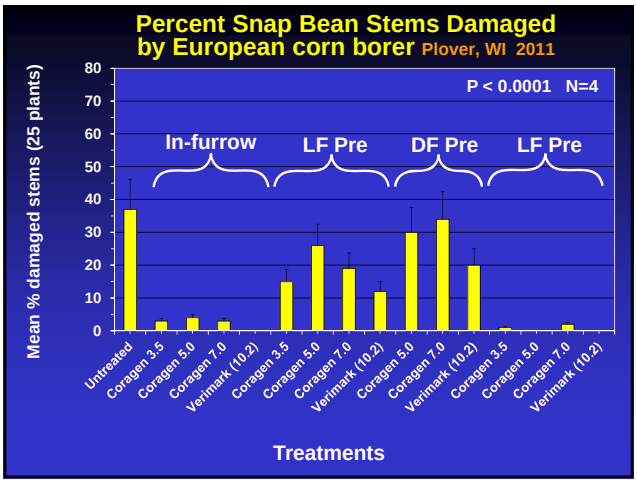

Number of Adult Potato Leafhoppers per 25 sweeps (avg. for 18 and 25 June) Arlington, WI 2010
N=4
Seed treatments
In-furrow
Foliar
Mean number of PLH per 25 sweeps
50
40
30
20
10
0
a
b
b
bc
b
bc
c
c
b
a
b
bc
Untreated
Dermacor (low)
Dermacor (med)
Dermacor (high)
Dermacor (low) + Exp
Verimark (low)
Verimark (high)
Cruiser
Coragen (5.0)
Coragen (7.0)
Benevia 10SE (10.1)
Coragen (3.5)
Treatments

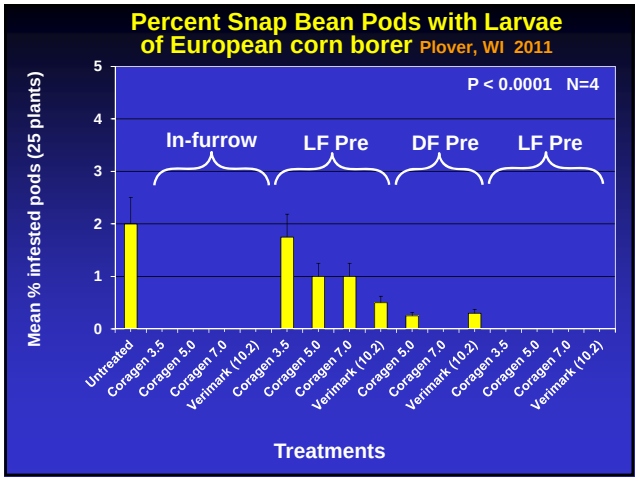

Number of Adult Potato Leafhoppers per 25 sweeps (22 June) Plover, WI 2012
Cruiser
P = 0.1131 N=4
In-furrow
Liq Fert Pre-Mix
Foliar
Mean number of PLH / 25 sweeps
50
40
30
20
10
0
Untreated
Coragen 3.5
Coragen 5.0
Coragen 7.0
Verimark 10.2
Verimark 13.5
Coragen 5.0
Coragen 7.0
Verimark 10
Verimark 13.5
Coragen 5.0
Exirel 13.5
Treatments

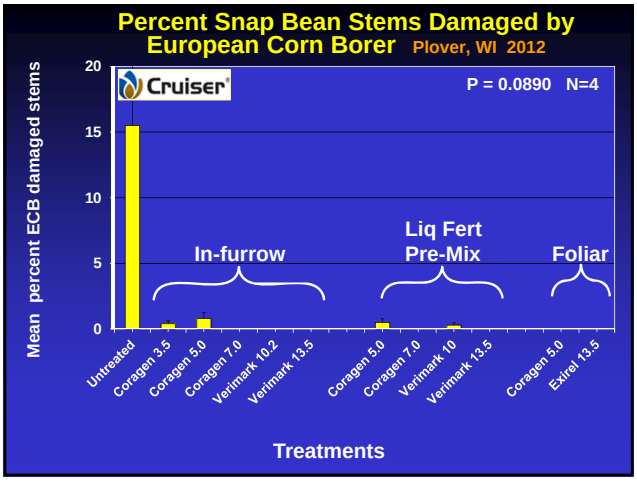

European Corn Borer (ECB)


Infested 10 plant row with ~ 500 ECB larvae

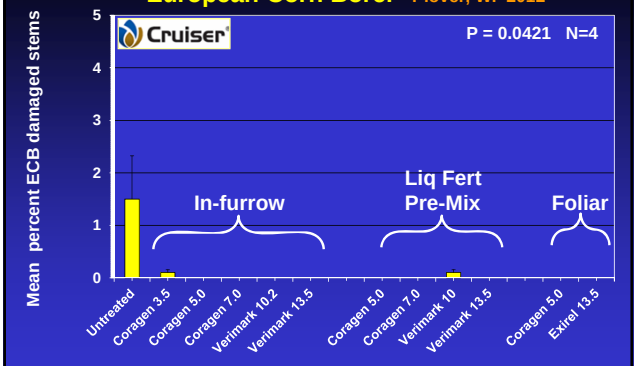

Percent Snap Bean Pods Damaged by European corn borer Plover, WI 2010
1st pinning 13 July 2010 N=4
Mean % damaged pods
Seed treatments
In-furrow
Foliar
a
ab
b
b
b
ab
ab
ab
c
c
c
c
Untreated
Dermacor (low)
Dermacor (med)
Dermacor (high)
Dermacor (low) + Exp
HGW86 (low)
HGW86 (high)
Cruiser
Coragen (5.0)
Coragen (7.0)
HGW86 10SE (10.1)
Coragen (3.5)
Treatments


Percent Snap Bean Stems Damaged by European corn borer Plover, WI 2011
P < 0.0001 N=4
Mean % damaged stems (25 plants)
In-furrow
LF Pre
DF Pre
LF Pre
Untreated
Coragen 3.5
Coragen 5.0
Coragen 7.0
Verimark (10.2)
Coragen 3.5
Coragen 5.0
Coragen 7.0
Verimark (10.2)
Coragen 5.0
Coragen 7.0
Verimark (10.2)
Coragen 3.5
Coragen 5.0
Coragen 7.0
Verimark (10.2)
Treatments


Percent Snap Bean Pods with Larvae of European corn borer Plover, WI 2011
P < 0.0001 N=4
Mean % infested pods (25 plants)
In-furrow
LF Pre
DF Pre
LF Pre
Untreated
Coragen 3.5
Coragen 5.0
Coragen 7.0
Verimark (10.2)
Coragen 3.5
Coragen 5.0
Coragen 7.0
Verimark (10.2)
Coragen 5.0
Coragen 7.0
Verimark (10.2)
Coragen 3.5
Coragen 5.0
Coragen 7.0
Verimark (10.2)
Treatments


Percent Snap Bean Stems Damaged by European Corn Borer Plover, WI 2012
Cruiser
P = 0.0890 N=4
Mean percent ECB damaged stems
In-furrow
Liq Fert Pre-Mix
Foliar
Untreated
Coragen 3.5
Coragen 5.0
Coragen 7.0
Verimark 10.2
Verimark 13.5
Coragen 5.0
Coragen 7.0
Verimark 10
Verimark 13.5
Coragen 5.0
Exirel 13.5
Treatments

Percent Snap Bean Stems with Larvae of European Corn Borer Plover, WI 2012



2012 Field Trial 'Pickle Pete'

2012 Del Monte Field Trial Products Evaluated for Managing Insect Pests

Product	Appl. Type*	Mean PLH (25 sweeps)	Mean % Damaged Pods	Mean % Damaged Stems	Mean Yield (tons/acre)
1. Coragen 1.67 SC	SD	2.0 ± 0.3 ab	0.0	0.0	5.88
2. Coragen 1.67 SC	IF	2.4 ± 0.4 b	0.0	0.0	5.43
3. UTC	--	5.1 ± 0.3 a	0.0	1.7 ± 0.2	4.26
4. Coragen 1.67 SC	F	0.4 ± 0.2 b	0.0	0.0	5.23
5. Brigade 2SC	F	0.3 ± 0.15 b	0.0	0.0	4.9

*SD=side dress, IF = in furrow, F = foliar application
**Trts 1 & 2 pre-mixed ,10:1 with H_2O before mixing with fertilizer

Del Monte Quality

DUPONT

Advantages of Novel Application Technologies

- Reduced risk to environment and farm workers
  - Drift to non-target areas is eliminated
  - Farm workers do not come into contact with residues on exterior of plant
  - Beneficial organisms not directly exposed
- Longer residual activity
  - Not subject to loss from rain and UV light
  - Not subject to plant growth dilution effects
- More cost-effective

Summary

- Rynaxypyr and cyazypyr appear to have activity some activity against seedcorn maggot, but limited effects on potato leafhopper.
- Rynaxypyr and cyazypyr were effective against ECB when applied as a in- furrow and as a liquid fertilizer pre-mix applications.
- 2013, broadcast dry fertilizer treatments and refinement of foliar uses

Know Your Stink Bug's

Identifying the Brown Marmorated Stink Bug

Look for these unique identifying features…

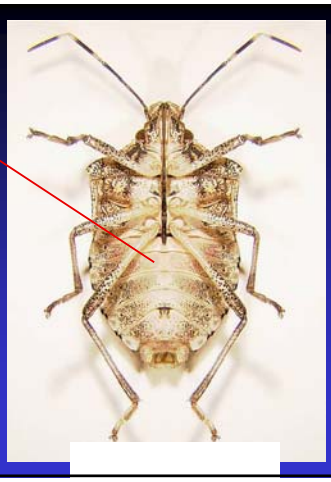
white banding

red eyes & ocelli

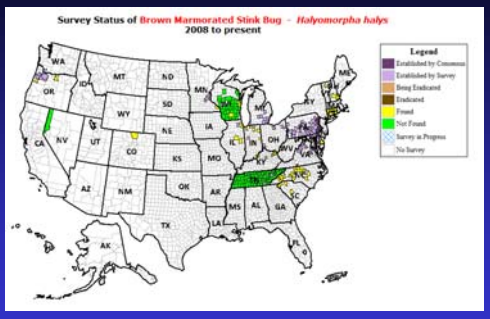
black and white banding

Ventral side - light colored; may have black or gray markings

Legs – brown with faint white bands



Current BMSB Distribution in the United States



Stages of Invasion by Alien Species

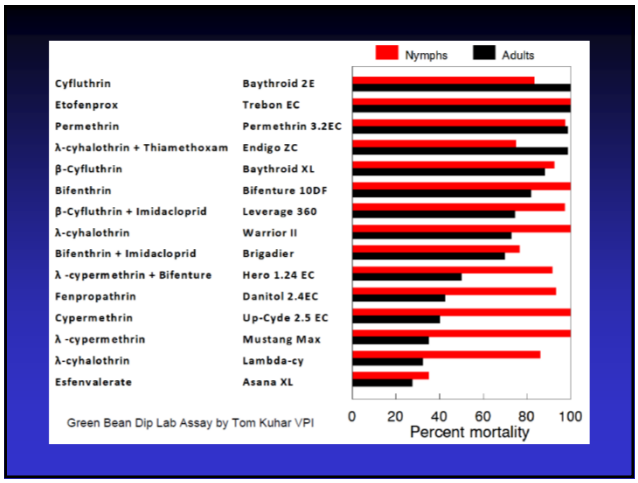
Arrival → Establishment → Integration → Spread

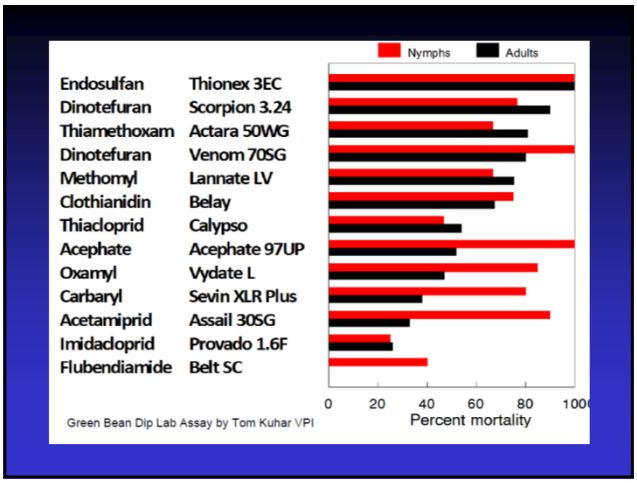
Factors Contributing to BMSB Abundance

- Wide host range
  - >300 plants are hosts
  - Allows for populations to buildup in many non-managed habitats (woods) or field crops with few insecticide sprays (i.e., soybean)
- Absence of effective natural enemies
  - % parasitism in US by native *Trissolcus spp.* <5%
  - % parasitism in China 50-80%
- Highly mobile and "nervous" insect

Management recommendations for BMSB

- ❑ Check field margins next to woodlots for the first sign of invasion.
- ❑ Direct examinations for adults and nymphs, as well as for injured fruit.
- ❑ No treatment thresholds for fruit or vegetable crops.
- ❑ Treating areas 30-50 ft from field edges next to woodlots may stop invasion.
- ❑ Multiple applications spaced 5-7 days apart may be necessary, if re-invasion occurs.





If you see (suspect) a Brown Marmorated Stink Bug…

- **Contact your County Extension Educator at http://www.csrees.usda.gov/Extension**
- **Stinkbugs that are suspected to be the BMSB should be sent for positive identification. Stinkbug samples from Wisconsin will be processed for free at UW; please send stinkbug samples to:**

  Attn: BMSB Reports
  Phil Pelleterri and Pest Diagnostic Clinic
  Department of Entomology, Rm. 240
  1630 Linden Drive,
  University of Wisconsin
  Madison, WI 53706

- **DO NOT ship live insects. Please place dead insects in a leak-proof, crush-proof container (e.g., plastic medicine bottle or film canister).**
- **Additional details regarding submitting insect specimens are available at:** http://www.entomology.wisc.edu/diaglab/entodiag.html#submit

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