Bean Pod Mottle Virus in Wisconsin -where do we stand?

Eileen Cullen, UW Entomology Dept.

Krista Lambrecht, WI DATCP

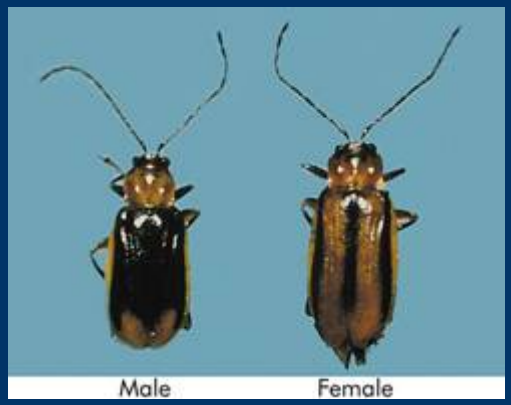
Anette Phibbs, WI DATCP

Bean leaf beetles & others in Wisconsin Soybeans

Black triangle behind head region
Bean leaf beetle always has this

Northern corn rootworm

12-spotted lady beetle



Western corn rootworm

1. Bean leaf beetle (yellow)
2. Bean leaf beetle (red)
3. Bean leaf beetle (no spots)

Southern corn rootworm

Treatment Thresholds, for defoliation only, vary according to crop value & treatment cost. (No BPMV Thresholds Currently Determined).

Seedling Stage: Are coytledons being lost? Regrowth suppressed due to bean leaf feeding?

Cotyledons OK

Regrowth OK

UWEX Publ. A3646
Pest Management in Wisconsin Field Crops
http://cecommerce.uwex.edu/pdfs/A3646.PDF

See pp. 110 – 111 in above document for Overwintered BLB defoliation threshold tables

VC – V2 Soybeans
2 to 10 beetles **per plant**
(Iowa State University)

16 beetles / **row foot** at VC stage
39 beetles / **row foot** at V2 stage
(Univ. of Illinois) (Univ. of Nebraska)

UWEX Publ. A3646

Pest Management in Wisconsin Field Crops

http://cecommerce.uwex.edu/pdfs/A3646.PDF

See pp. 110 – 111 in above document for 2nd Generation BLB defoliation threshold tables

Pre-bloom: 30% Defoliation

Bloom to Pod-fill: 15% Defoliaton

3.5 to 11.8 beetles / row foot

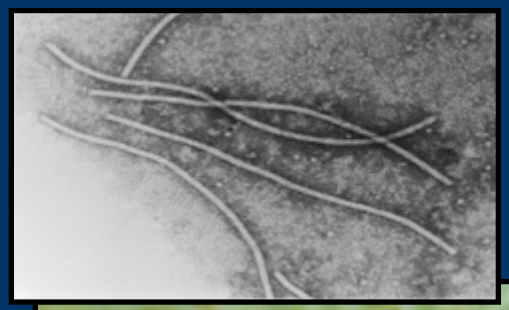
Watch for pod clipping

Bean leaf beetle -*Bean pod mottle virus* complex in soybean

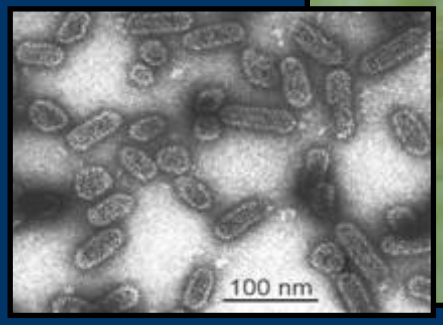
Pod and seed images courtesy of Syngenta & NK Brand Seeds

Soybean Insect-Virus Complex

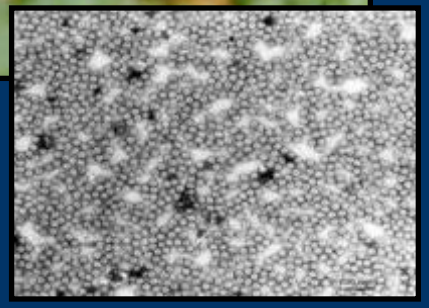
Soybean mosaic virus



Soybean Aphid



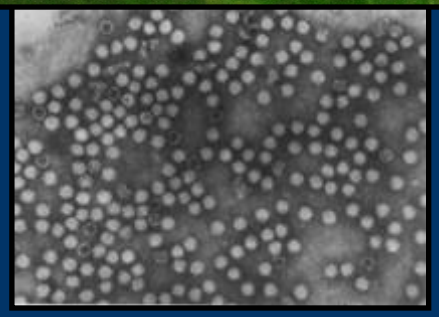
Alfalfa mosaic virus



Cucumber mosaic virus

Soybean Insect-Virus Complex

Bean leaf beetle



Bean pod mottle virus

BPMV spread by BLB

Seed to seedling
Transmission rate ~ 1%

Early infection, VC – V2,
greatest risk of yield loss.

Spotlight on Overwintered bean leaf beetle population

Overwintered Bean Leaf Beetle Population

Stan Malcom

Showy Tick Trefoil

Desmodium canadense

A source of BPMV outside soybean fields

Adults overwinter in leaf debris near soybean fields

Feed on wild legumes, clover, alfalfa in spring

Quickly move into early planted soybean (< May 15th)
Continue feeding. Deposit eggs of 1st generation.

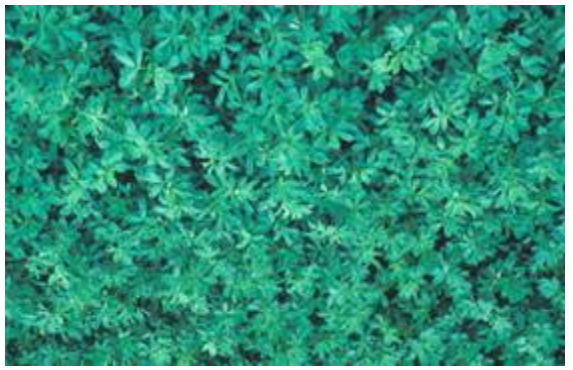
WI Department of Agriculture, Trade and Consumer Protection (WI DATCP) 2004 BLB/BPMV Survey

Data courtesy of Anette Phipps and Krista Lambrecht, WI DATCP

BPMV tests used enzyme-linked immunosorbant assays (ELISA)

WI DATCP Spring Survey - ALFALFA
Overwintered bean leaf beetle & BPMV

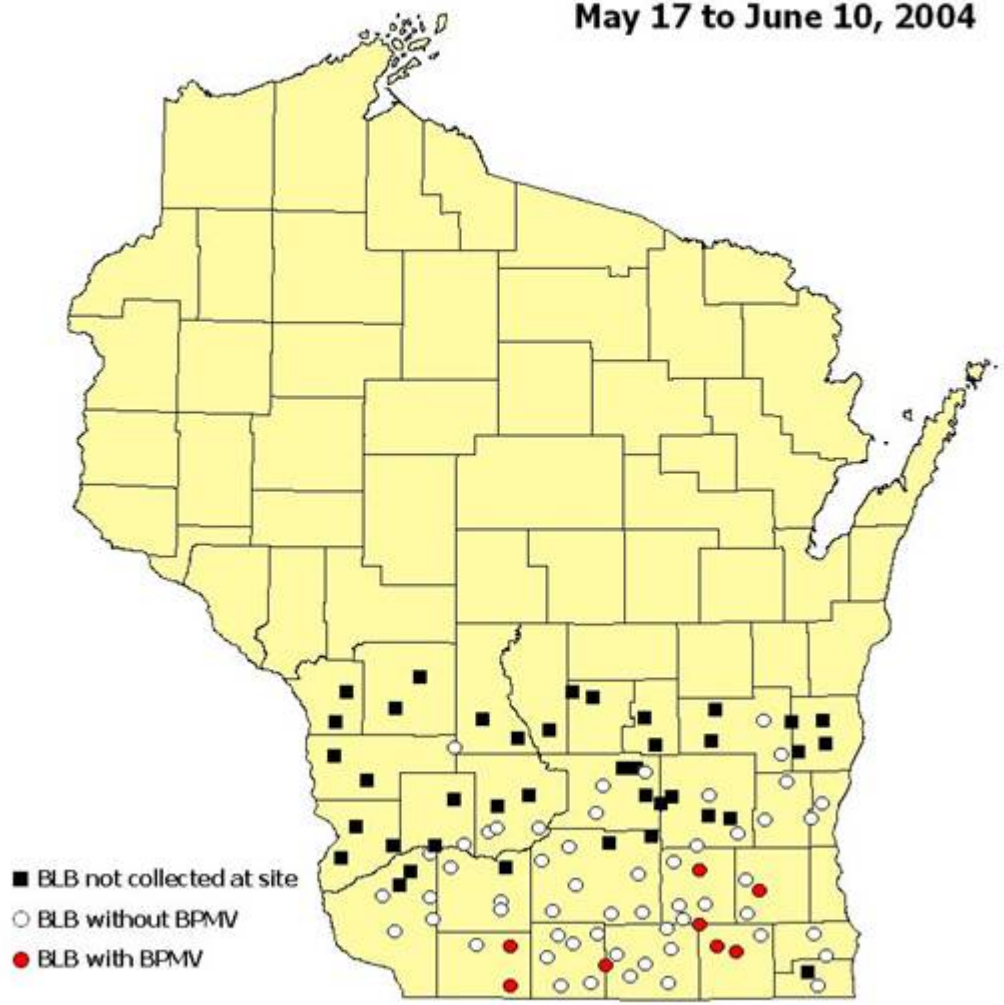
- 28 contiguous counties, southern 1/3 WI
- 102 alfalfa fields, sweep net sampled to collect OW bean leaf beetles
- May 17 – June 10, 2004



- Beetles returned to lab, tested for BPMV by Enzyme-Linked Immunosorbent Assay (ELISA)

2004 Spring Survey for Overwintered BLB & BPMV in Alfalfa

May 17 to June 10, 2004



Wisconsin Department of Agriculture, Trade and Consumer Protection

Bean Leaf Beetle/*BPMV* Trial

Rock County Farm, UW Entomology 2004

Southern WI location, BLB potential

Evaluate insecticide efficacy in response to beetle defoliation thresholds

Investigating interaction between BLB # 's and BPMV incidence

30-inch row spacing
Plots: 4 rows wide x 25 feet long
Planting Date: May 3rd, 2004
Variety: NK S19-V2

CO2 Backpack Sprayer
25 p.s.i.
14.5 gal. per acre
6 nozzles, 10 ft. boom
TeeJet ER 8003

Eileen Cullen – UW Extension, Entomology

Overwintered Bean Leaf Beetle BPMV impact on early planted soybeans in 2004?

BLB Population high enough to transmit?

Can a low BLB Population effectively transmit?

Would DATCP's BPMV+ spring beetles translate to early season soybean infection?

If BPMV is detected in our plots, what was the contribution from the overwintered BLB population?

First Generation Bean Leaf Beetle BPMV impact on soybeans in 2004?

First Generation BLB peaks near late vegetative to early reproductive stages – Mid-July

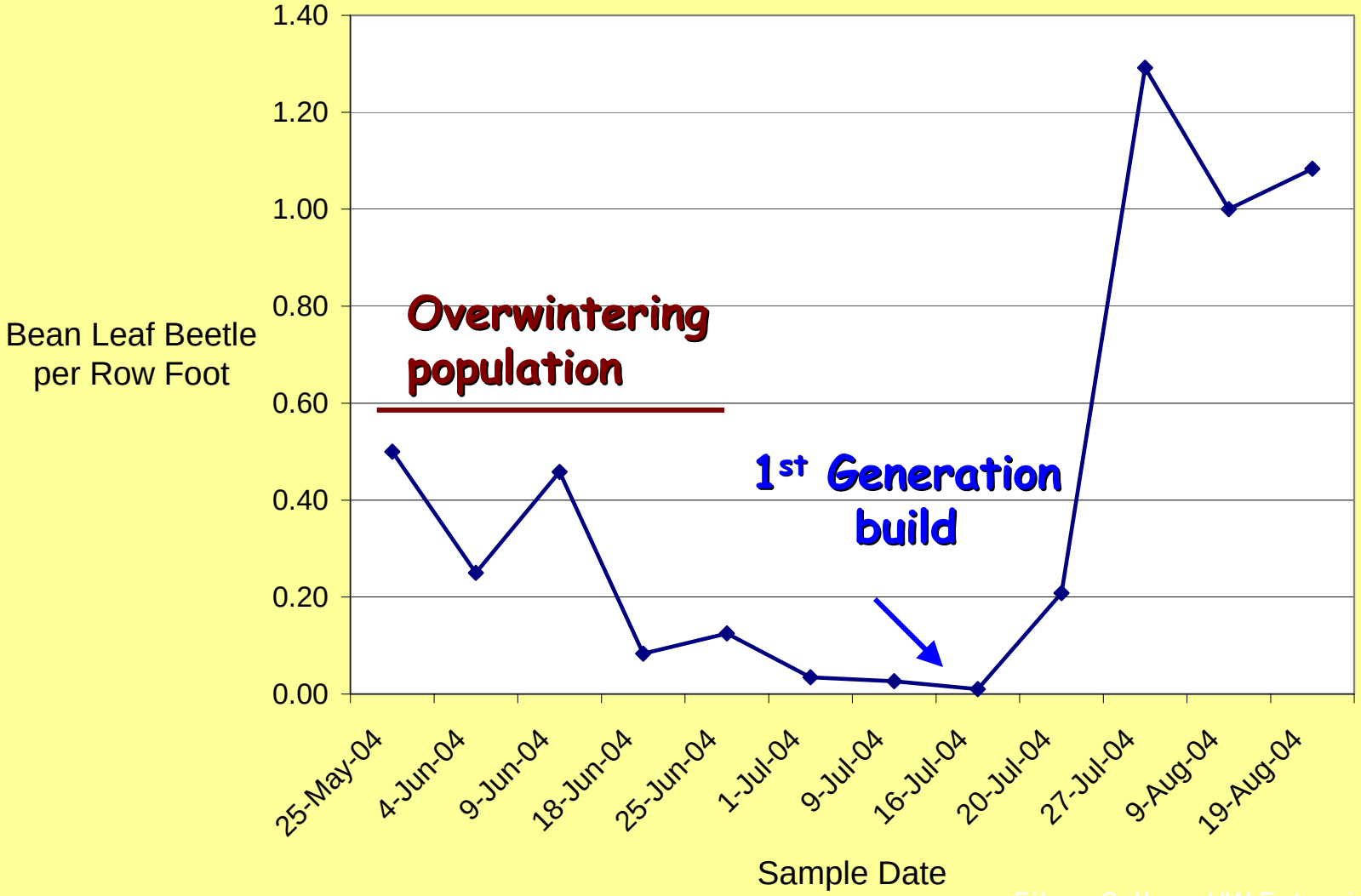
ISU Photo

If BPMV is detected in our plots, what was the contribution from 1st Generation BLB population?

Bean Leaf Beetle Population, Untreated

Rock County Farm, UW Entomology 2004

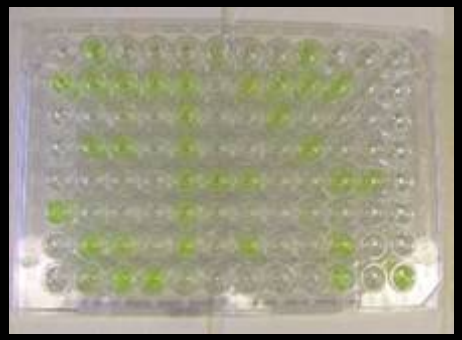
BLB per Row Ft – Defoliation Thresholds Not Met



Enzyme Linked ImmunoSorbent Assay (ELISA)

1. Add BPMV antibody to coat the wells in the ELISA plate.

2. Load plant sap from soybean leaves into coated plates.



Another chemical is added that will react with the enzyme attached to the antibody. If BPMV is present in plant sap, Antibody will attach to it and a color reaction results.

Automatic plate reader quantifies the reaction in each well. Gives + or – BPMV readings.

Photos courtesy of C. Grau Lab, UW Madison

BPMV Screening after OW Population

Zero to Low BPMV Incidence

Foliar samples tested using enzyme-linked immunosorbant assays (ELISA).

Rock County Farm, UW Entomology 2004

Treatment	# BPMV positive leaves (n=80 leaves per trt.)	% BPMV Positive
Asana 6.4 oz.	4/80 leaves	0.05
Mustang Max 4.0 oz.	0/80 leaves	0.00
Baythroid 1.6 oz.	4/80 leaves	0.05
Baythroid 1.0 oz.	0/80 leaves	0.00
Warrior 3.2 oz.	3/80 leaves	0.04
Gaucho 62.5g	0/80 leaves	0.00
Untreated	0/80 leaves	0.00

Eileen Cullen – UW Extension, Entomology

BPMV Screening after OW + 1st Gen

Zero to Very Low BPMV Incidence

Foliar samples tested using enzyme-linked immunosorbant assays (ELISA).

Rock County Farm, UW Entomology 2004

Treatment	# BPMV positive leaves (n=80 leaves per trt.)	% BPMV Positive
Asana 6.4 oz.	1/80	0.01
Mustang Max 4.0 oz.	0/60	0.00
Baythroid 1.6 oz.	1/80	0.01
Baythroid 1.0 oz.	0/80	0.00
Warrior 3.2 oz.	0/60	0.00
Gaucho 62.5g	2/80	0.02
Asana 6.4 oz. (V2), Asana 6.4 oz. (1st Gen)	0/80	0.00
Baythroid 1.0 oz. (V2), Baythroid 1.6 oz (1st Gen)	1/80	0.01
Gaucho 62.5g, Baythroid 1.6 oz. (1st Gen)	0/60	0.00
Untreated	0/80	0.00

BLB/*BPMV* Trial Yields

No Treatment Difference 2004

No Apparent Defoliation or BPMV Effects

Rock County Farm, UW Entomology 2004

Treatment	Yield (bu/A)
Asana 6.4 oz.	60.4 ab
Mustang Max 4.0 oz.	58.9 ab
Baythroid 1.6 oz.	58.3 ab
Baythroid 1.0 oz.	58.7 ab
Warrior 3.2 oz.	57.7 b
Gaucho 62.5g	58.2 ab
Untreated	60.2 ab

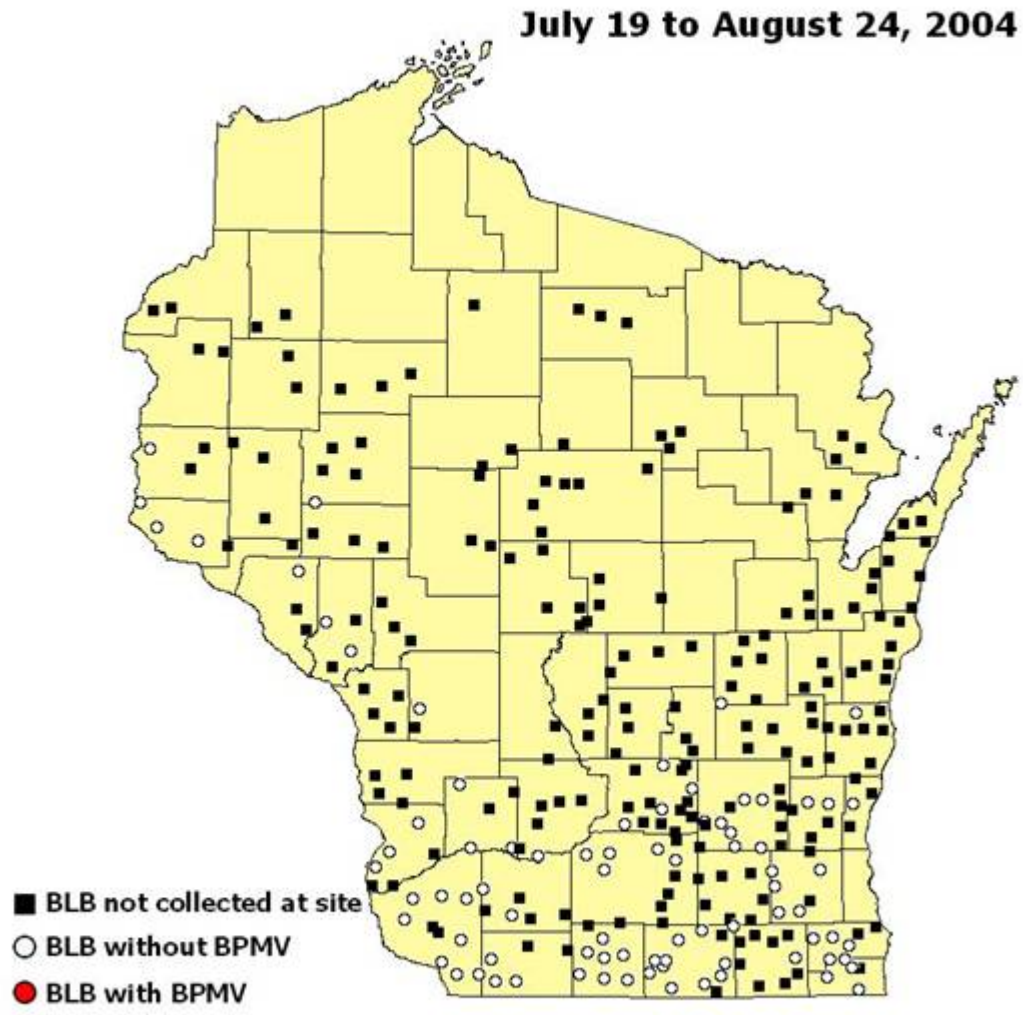
LSD = 4.3; P = 0.7483

WI DATCP Summer Survey - SOYBEANS
BPMV in beetles & BPMV in soybeans

- 293 soybean fields surveyed throughout WI
- July 19 – August 24, 2004
- Bean leaf beetles collected & returned to lab. Tested for BPMV by ELISA.

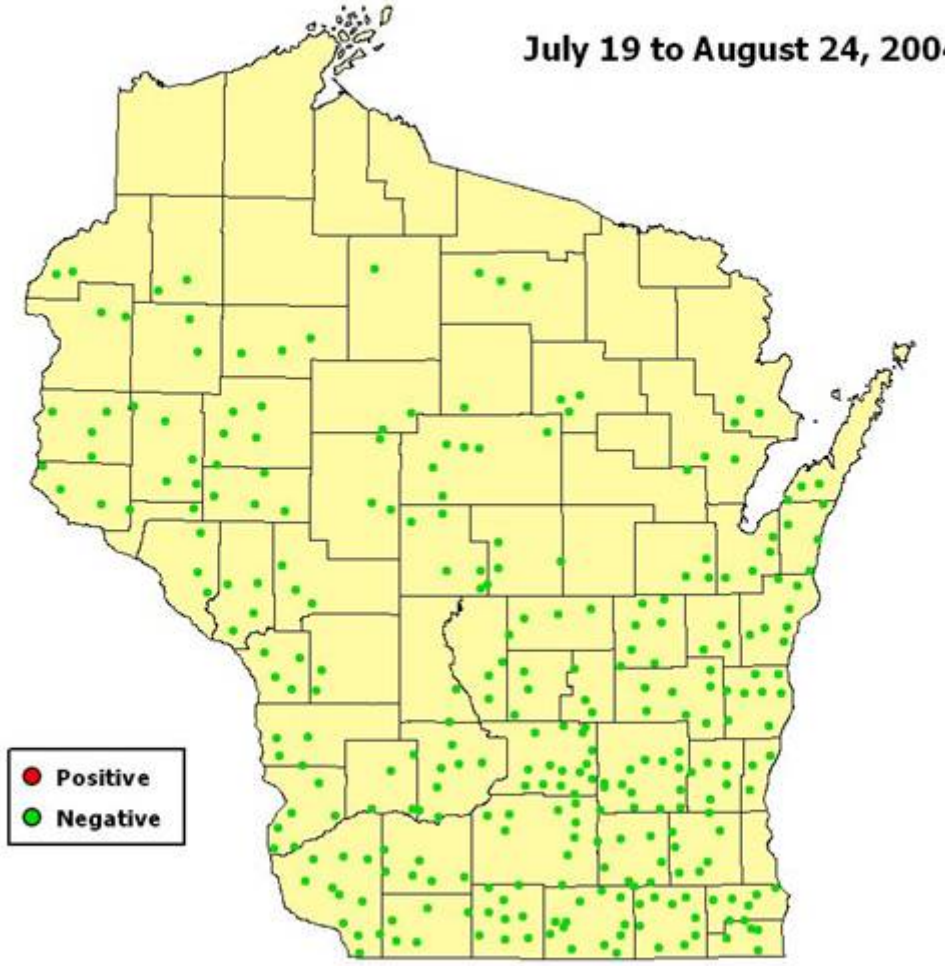
- Trifoliate leaves collected from 40 plants in each of 293 fields. Leaves tested for BPMV by ELISA.

2004 Summer Survey for BLB & BPMV



Wisconsin Department of Agriculture, Trade and Consumer Protection

2004 Survey for Bean Pod Mottle Virus in Soybeans



Wisconsin Department of Agriculture, Trade and Consumer Protection

BLB/BPMV Summary 2004

Defoliation Observed May 25th, 2004

Insecticide treatment not cost effective for BLB or BPMV in 2004 UW Entomology Trial at Rock County Farm.

Defoliation thresholds NOT reached

BPMV incidence in WI soybeans has dropped since 2002 occurrence

2004 , foliar samples 0 % BPMV
UW Entomology, WI DATCP

2004, beetle samples 0% BPMV
WI DATCP

Eileen Cullen – UW Extension, Entomology

BPMV Management Guidelines

BPMV symptoms noted in previous years?
Foliar abnormalities? (green/yellow blotchy)
Stained Seed at 2003 or 2004 harvests?, Green Stem?

Early planted (<May 15) field BLB activity?
VC – V2 soybean critical BPMV transmission stages
Foliar and seed treatment insecticides registered

BPMV levels low to negative in 2003-2004.
"Insurance" treatment not warranted in cash grain
Food grade & seed production market sensitivity
BLB & BPMV levels did not justify treatment costs.

Supplemental Label Registration Dec. 2004
Cruiser® 5FS Seed Treatment
Potatoes and Soybeans

For Soybeans

a.i. thiamethoxam

Rate 1.28 fl oz per 100 lbs. of seed
(50 g a.i. / 100 Kg seed)

"to provide EARLY SEASON PROTECTION of seedlings against injury by aphids, bean leaf beetle, Mexican bean beetle, pea leaf weevil, pea weevil, plant leaf hopper, seed corn maggot, thrips and wireworm"

Eileen Cullen – UW Extension, Entomology

Bottom line:

- ✓ Seed treatments provide early-season protection
- ✓ Seed treatments may fit well in production areas w/ early-season insect problems (for ex. BLB)

- ✓ Seed treatments ALONE may not be enough under high, or late season, SBA pressure
- ✓ In fields lacking early-season pests, a well-timed foliar spray is the recommended practice for optimal yield protection

UW Extension

Soybean Virus-Insect Team

Plant Pathology
- –Craig Grau
- –Nancy Koval

WI DATCP
- -Krista Lambrecht
- -Anette Phibbs

Entomology
- – Eileen Cullen
- – Tom German
- – Claudio Gratton

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