Virus Causing Losses on Processing Beans in the Midwest

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Description of Field Situation in 2000-01

- Problematic fields in Wisconsin, Michigan and New York
- High incidence of plants with virus-like symptoms
- Randomly distributed symptoms in the field
- Many fields exhibiting these symptoms were destroyed prior to harvest

Key Symptoms Observed

- Leaf mottling and mosaic
- Internal pod discoloration
- Pod necrosis
- Yield loss

Rugosity at
Cambria, WI


Leaf rugosity
at Belgium, WI


Pod necrosis at
Belgium, WI

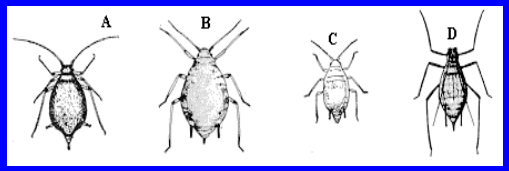
Deformed pods from Cambria, WI

Virus Assays Conducted

- Soybean mosaic virus (SMV)
- Alfalfa mosaic virus (AMV)
- Clover yellow vein virus (CYVV)
- Cucumber mosaic virus (CMV)
- Bean yellow mosaic (BYMV)
- Tobacco streak virus (TSV)
- Bean common mosaic virus (BCMV)
- Bean pod mottle virus (BPMV)

Snap Bean Virus Inoculum Sources and Insect Transmission

Aphid



AMV, BCMV, CMV

CYVV, BYMV

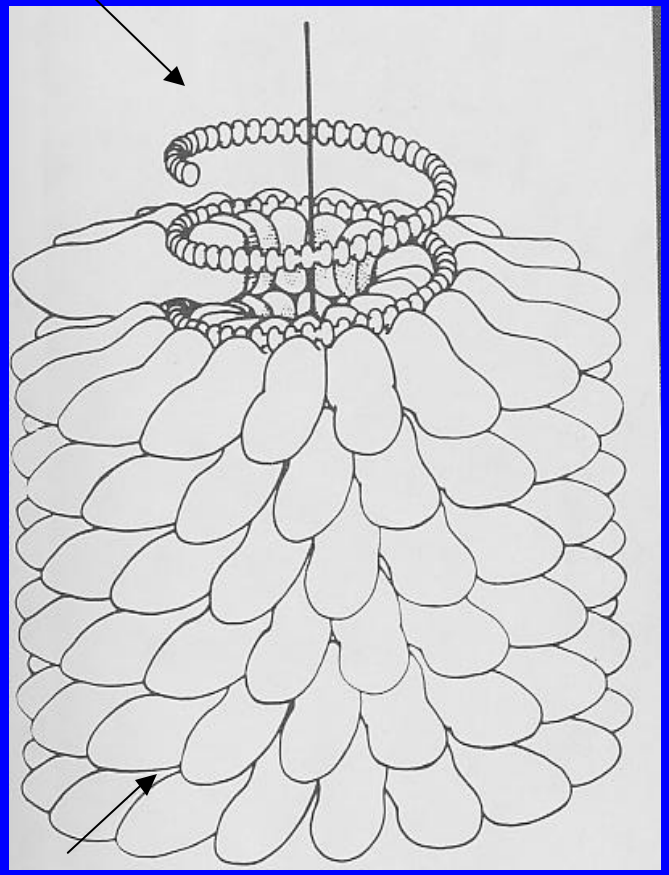
Other Legumes

AMV, CYVV BYMV, TSV

Seed

AMV, BCMV, TSV

What are viruses



- Infectious biochemical molecules
- Obligate parasites
- Most virus consist of a coat protein and nucleic acid
- Nucleic acid may be DNA or RNA, and single- or double stranded

Methods to Identify Viruses

Transmission	Transmit infectious agent
Host range	Specificity for diagnosis
ELISA	Serological assay Protein based assay
RT-PCR	Nucleic acid based assay
Electron microscopy	View virus particles

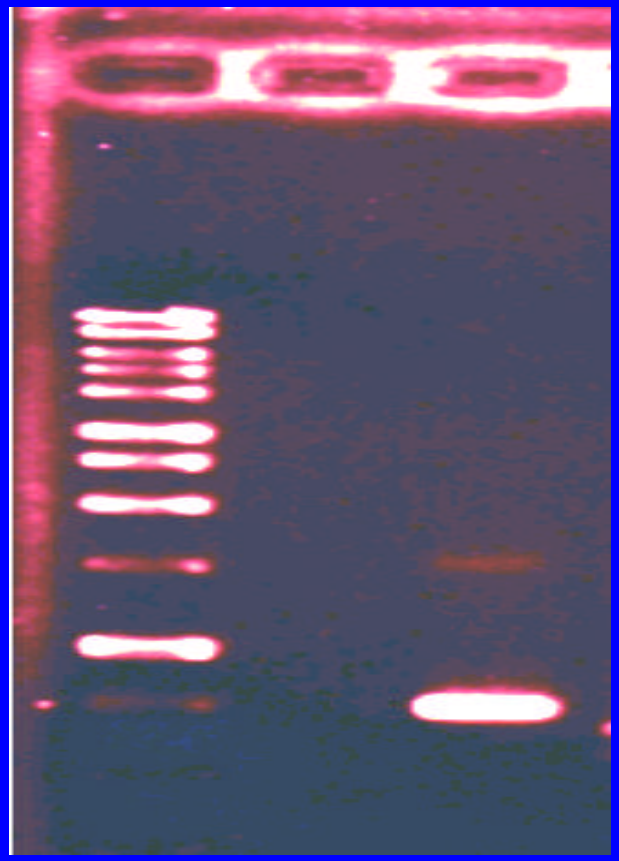
Viruses Detected in Symptomatic Snap Beans from Wisconsin and New York in 2001

Location	% ELISA positive samples				
	CMV	AMV	TSV	POTY	CYMV
Wisconsin	78	83	40	11	12
New York	100	40	17	40	20

RT-PCR Results for CMV

ELISA CMV negative

ELISA CMV positive



750 bp

Snap Bean Variety Trial
West Madison Research Station
Summer 2001

Summary of Snap Bean Variety Trial- Field

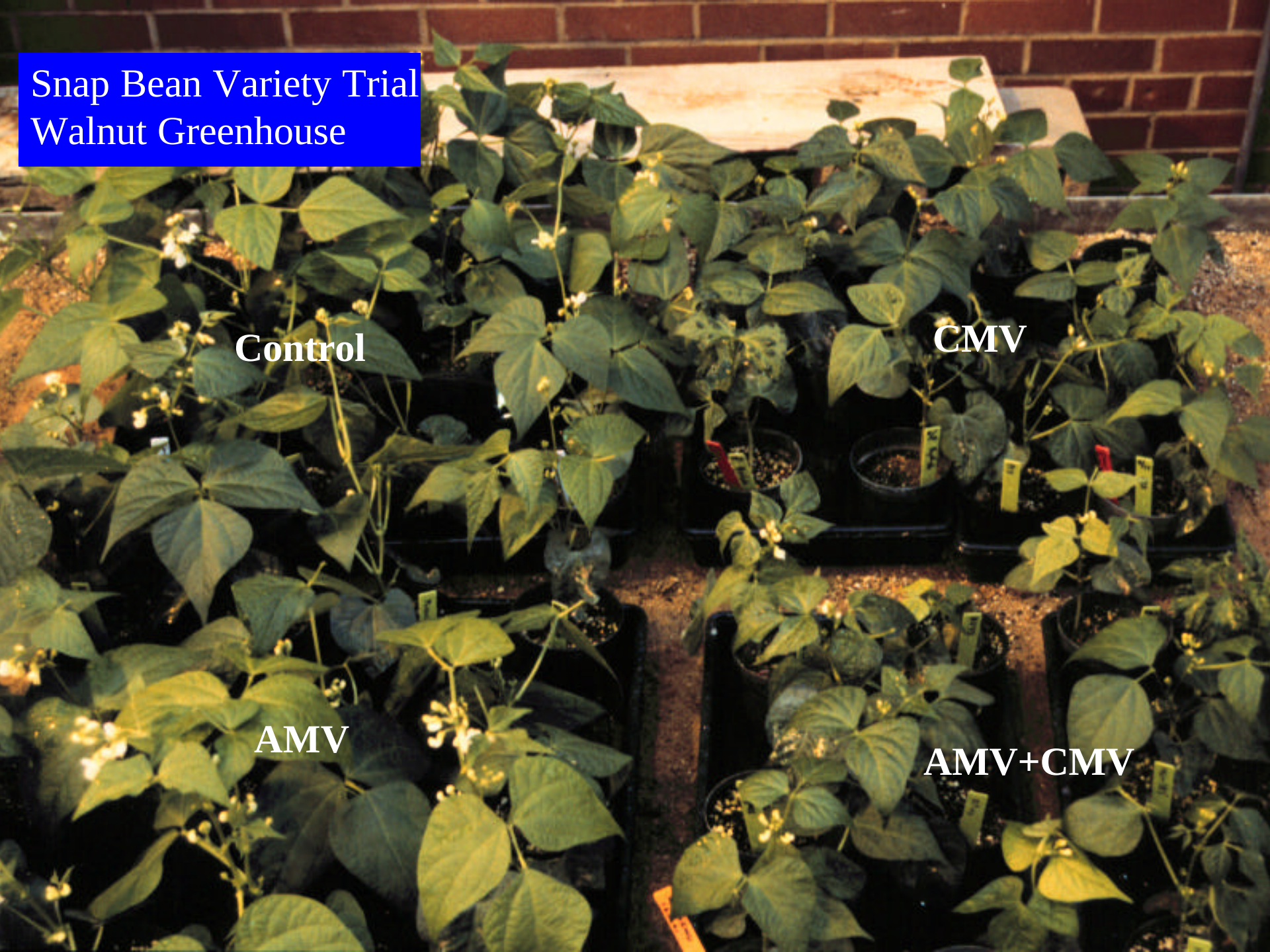
No. Varieties/Symptom Category

Disease severity (%)	No. varieties
< 25	5
> 25	43
< 30	7
> 30	41
< 10	11
> 10	37

Summary of Snap Bean Variety Trial

Virus Field Evaluation

Variety	Foliar symptoms (%)	External pod necrosis (%)	Internal pod necrosis (%)
Pix	5	30	0
MV-185	9	35	10
Minuette	27	30	5
B373	33	90	10
Hystyle	54	80	15
Opus	64	85	20


Snap Bean Variety Trial
Walnut Greenhouse
Control
CMV
AMV
AMV+CMV

Summary of Snap Bean Variety Trial-Greenhouse
Disease Evaluation

Variety	Foliar symptoms	
	CMV	AMV
Pix	No symptoms	No symptoms
MV-185	No symptoms	No symptoms
Minuette	Blisters and green vein banding	No symptoms
B373	Blisters	No symptoms
Hystyle	Blisters	No symptoms
Opus	Green vein banding	No symptoms

Pi

x

MV-185

Field

Greenhouse

Variety '**Opus**'

Field

Greenhouse

Variety '**Hystyle**'

Field

Greenhouse

Conclusions

- Cucumber mosaic virus (CMV) and alfalfa mosaic virus (AMV) were most prevalent viruses in snap bean samples.
- CMV appears to be the prime candidate responsible for the deterioration of snap bean.
- AMV alone does not have a significant effect on snap bean productivity.
- An aphid transmitted complex of viruses is present and merits further investigation.

Proposed Further Research

- Evaluate snap bean cultivars and germplasm for reaction to AMV and CMV.
- Determine viral seed transmission.
- Determine if viruses are a component of the Disease X symptoms in snap bean.
- Determine epidemiology of virus complex in snap bean.

Acknowledgments

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