Understanding virus potential in commercial soybean fields

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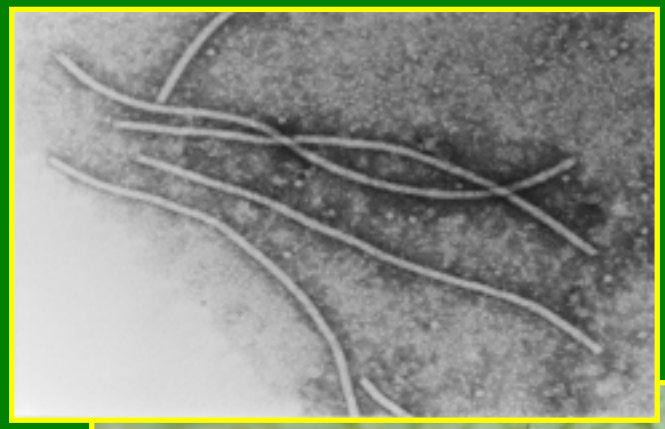
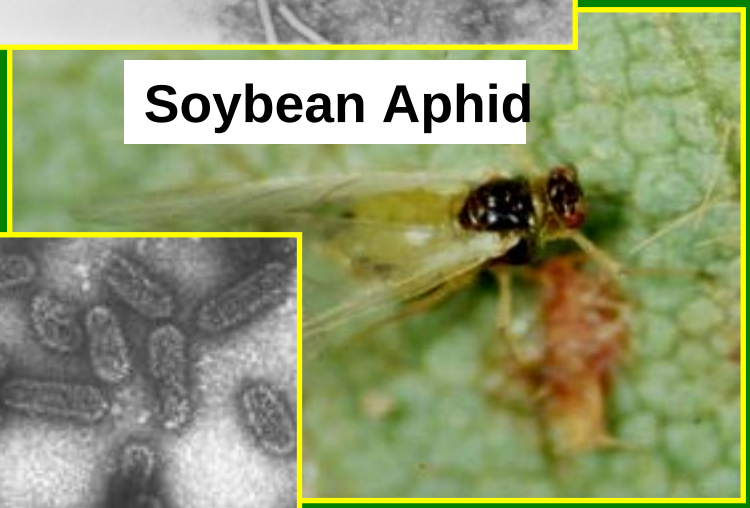
Soybean Insect-Virus Complex

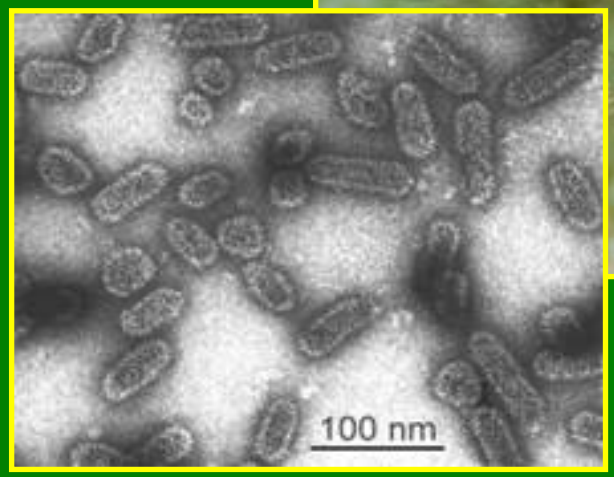
Soybean mosaic virus



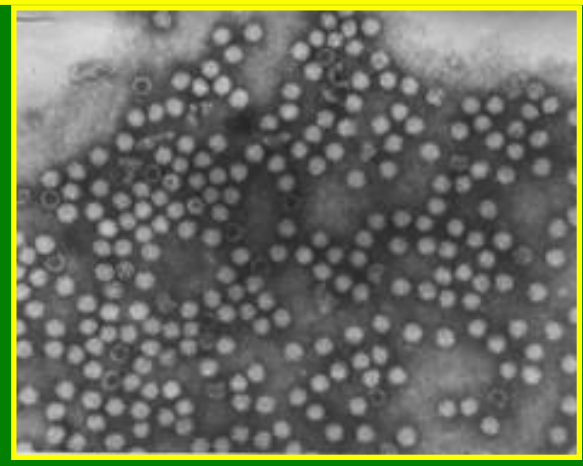
Bean leaf beetle
Marlin Rice: ISU

Soybean Aphid





Alfalfa mosaic virus



Bean pod mottle virus

2005 Growing season summary

- **Overall less rainfall and warmer temperatures than average**

Pests:

- **Soybean aphid populations were present, but did not reach thresholds in all locations**
- **Bean leaf beetle had minimal to no impact**
- **Two spotted spider mites were a problem in drier areas**

Viruses

- **SMV was the most commonly detected virus in research plots**
- **AMV and BPMV were detected very low levels**

Soybean Mosaic Virus

- **Transmitted by 32 species of aphids including soybean aphid**
- **Yield loss**
- **Mottled seed**
- **Susceptibility of commercial varieties?**
- **Resistant public varieties available**

SMV Management

Are most commercial varieties susceptible to SMV?

Virus free seed

Aphid control to manage SMV

1. Avoidance by early planting
2. Insecticide application is inconsistent
3. Aphid resistant varieties?

Research questions

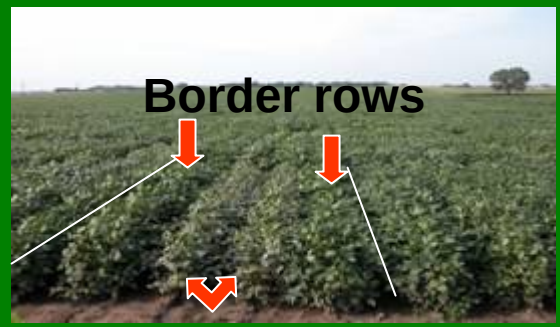
I. Do commercial soybean varieties respond differently (yield and virus incidence) to insecticide applied for soybean aphid control?

II. Are commercial soybean varieties available that are resistant to soybean aphids and SMV?

III. What is the level of SMV seed transmission among commercial soybean varieties and do varieties differ significantly?

Experimental design

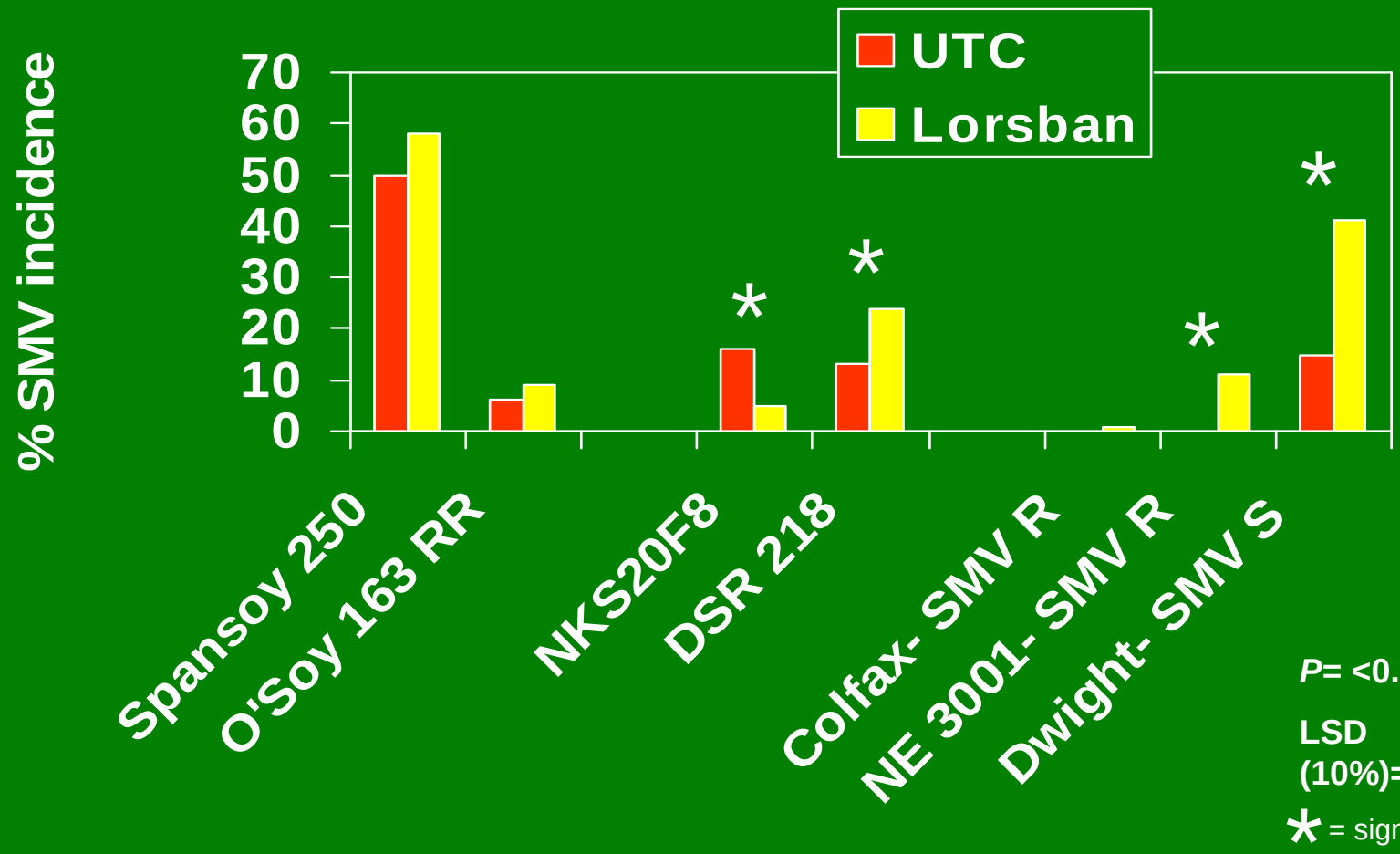
- **Location: West Madison Agriculture Research Station, Wisconsin**
- **Completely randomized block split plot design: insecticide and no insecticide, 4 replications**
- **28 soybean varieties:**
  - **19 commercial**
  - **5 food grade**
  - **4 public checks**
- **Single Lorsban 4E application at R1 (aphid threshold of 250 per plant found)**
- **Plots were 4 rows x 16 feet; center two rows were the entry and borders were planted with SMV infected seed**



Lorsban application did not increase soybean yield, but did reduce aphid populations

		Yield		Aphid population	
		UTC	Lorsban	UTC	Lorsban
		bu/a		per plant	
AG 2403		72.3	62.9	152	22
AG 2703		56.6	59.7	111	31
Pioneer 92M72		56.7	54.7	146	20
Pioneer 92B38		67.4	67.6	116	27
Colfax	SMV R	73.5	62.6	146	38
NE 3001	SMV R	64.1	74.5	159	32
Dwight	SMV S	57.8	62.7	283	37
P-value		P=27.8		P=8.2	
LSD (10%)		NS		20	

Lorsban interacted with varieties differently, impacting SMV incidence



P= <0.1

LSD (10%)=11.5

* = significant

Commercial varieties differ in reaction to SMV

- **Varieties had a range of 8 to 54% SMV incidence in plots (*P*=<0.1)**
- **Virus symptom severity ranged from 12 to 77% (*P*=<0.1)**
- **Seed mottling incidence ranged from 2 to 53% (*P*=<0.1)**

SMV causes yield loss in susceptible varieties

Entry		2004 Yield	2004 SMV incidence	2005 Yield	2005 SMV incidence
		bu/a	%	bu/a	%
Colfax	SMV R	49.7	1	68.0	1
NE 3001	SMV R	51.6	1	69.3	6
Dwight	SMV S	53.0	0	60.2	28
LSD (10%)		4.6	NS	6	5

Yield, SMV incidence and seed mottling for selected varieties-West Madison, 2005

Entry	Yield	SMV incidence	Seed mottling
	bu/a	%	% incidence
Spansoy 250	66.0	54	36
O'Soy 163 RR	65.5	8	2
NKS 24-K4	69.3	11	31
A2247	66.2	31	4
Dwight	60.2	28	40
NE3001	69.3	6	2
Colfax	68.0	1	1
LSD (10%)	6	7	13

Seed mottling is not predictive of SMV resistance

Yield, SMV incidence and seed mottling for selected varieties-West Madison, 2005

Entry	Yield	SMV incidence	Seed mottling
	bu/a	%	% incidence
A2247	66.2	31	4
IA 2017	57.1	23	50
IA 2065	72.9	8	4
IA 2068	62.7	13	26
Vinton 81	56.7	27	38
LSD (10%)	6	7	13

Food grade soybeans may be rejected or discounted if seed mottling exceeds 10%

Conclusions

- **Most commercial varieties do not have acceptable SMV resistance**
- **Lorsban application did not result in lower SMV incidence in all varieties**
- **Low incidence of SMV in commercial soybean field is likely linked to low seed transmission**
- **Level of seed transmission among commercial varieties is being evaluated**

Information on Soybean Plant Health

- **2005 Wisconsin Soybean Variety Test Results; UWEX A 3654**
- **Pest Management in Wisconsin Field Crops 2005; UWEX A3646**
- **Soybean Plant Health Website**
  - **www.plantpath.wisc.edu/soyhealth**
- **Plant Health Initiative; North Central Soybean Research Program http://www.ncrsp.com/planthealth**

Research Funding

- Wisconsin Soybean Marketing Board
- North Central Soybean Research Program
- USDA North Central IPM Program
- College of Agriculture & Life Sciences UW-Madison