Green Stem Syndrome in Soybean

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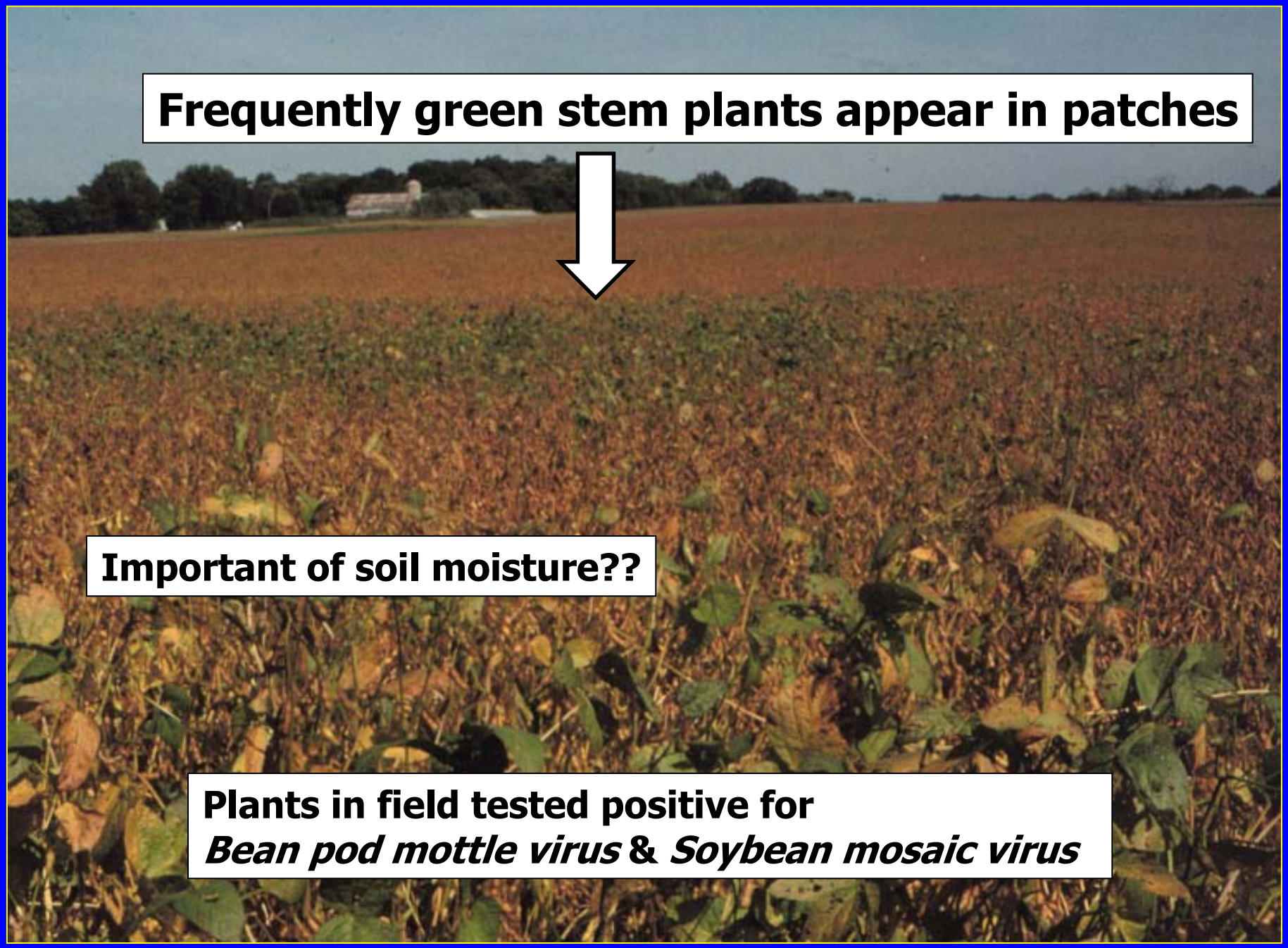
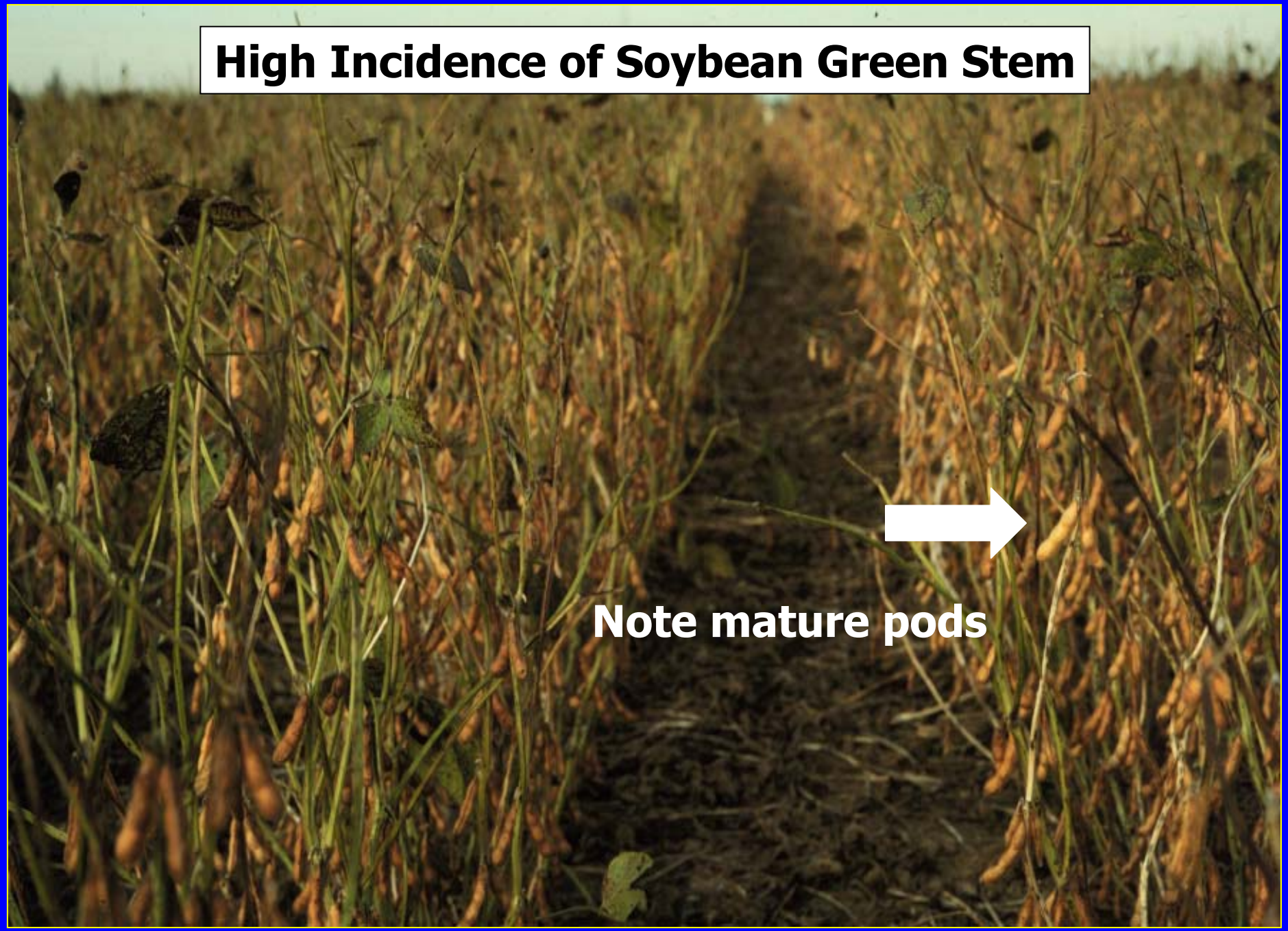
Soybean Green Stem: Several Phases of Green Stem

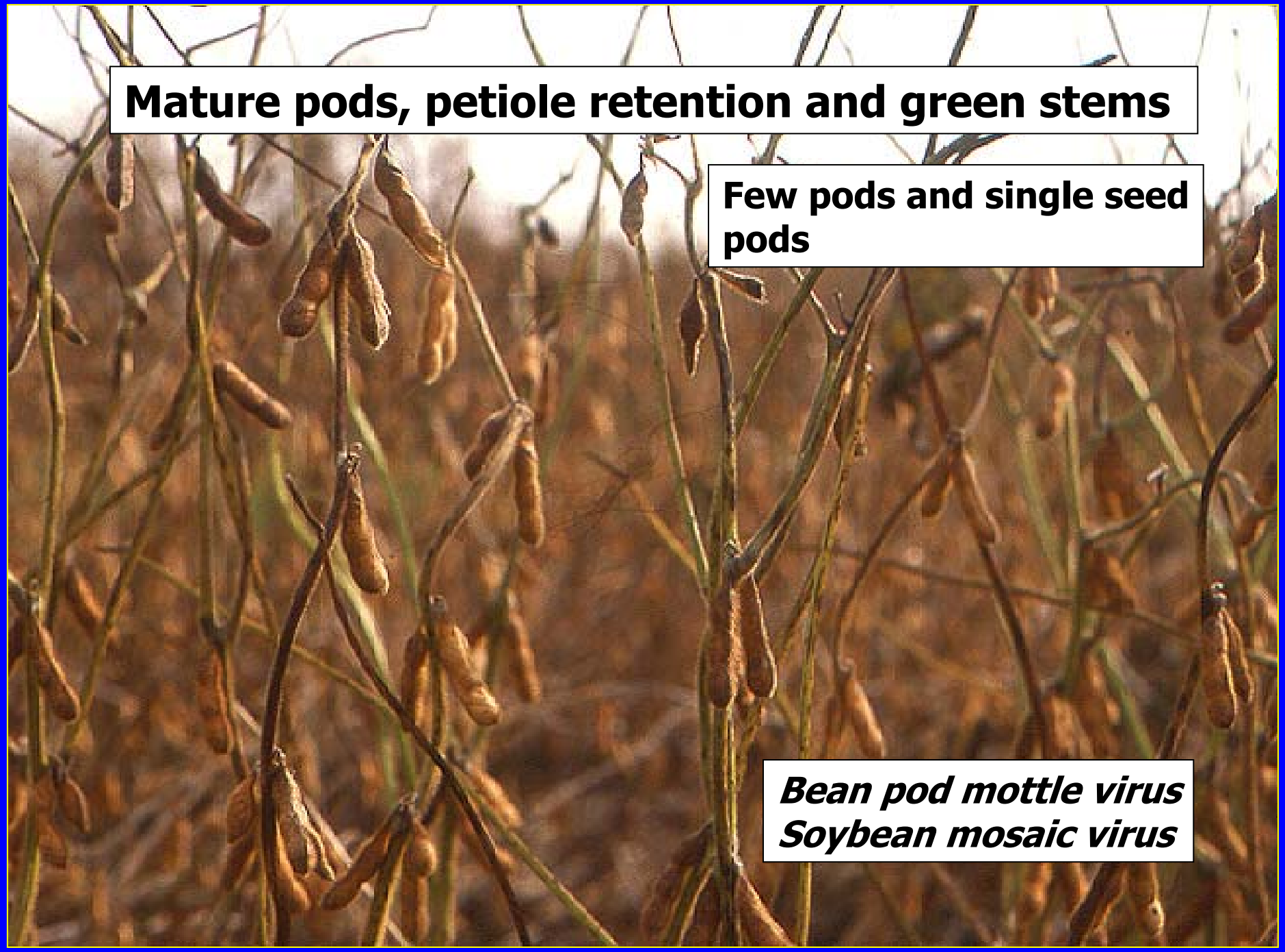
- **Mature pods on green stems**
  - **no leaves but retain petioles**
  - **no leaves and petioles**
- **Few to no pods**
  - **retain leaves at upper nodes and have immature green pods in clusters at upper part of the plant**
  - **retain leaves at upper nodes, but have few to no pods**

Green stem plants along edge of field adjacent to alfalfa/red clover field: 1950

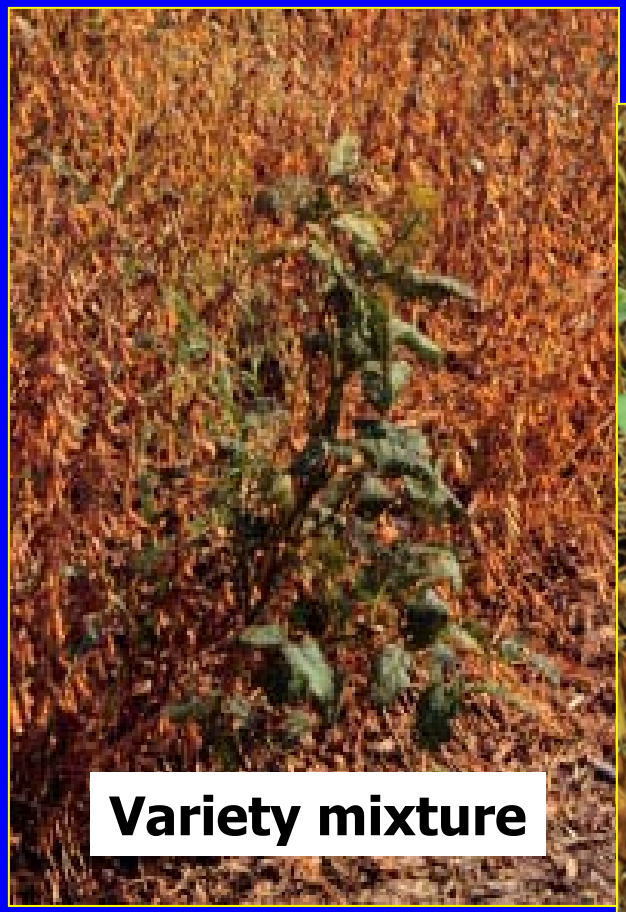

Green stem plants distributed throughout field


Frequently green stem plants appear in patches
Important of soil moisture??
Plants in field tested positive for
Bean pod mottle virus & *Soybean mosaic virus*


High Incidence of Soybean Green Stem
Note mature pods


Mature pods, petiole retention and green stems
Few pods and single seed pods
Bean pod mottle virus
Soybean mosaic virus

Common Phases of Green Stem



Problems Associated with Green Stem Soybeans

- Harvest difficulties
- Green plant debris mixed with seed
- Green stem plants yield less
  - 30% less yield than normal plants
- More likely to have mottled seed

Soybean Green Stem is Triggered by Stress Factors

- Soybean viruses & phytoplasma
- ALS inhibitor herbicides
- Fluctuating soil moisture - post flower
- Different stress factors trigger different phases of green stem

Green Stem Regulated by Genetics of Soybean Variety

- Soybean varieties differ in expression of green stem trait
- Website at University of Illinois
- http://www.VIPSoybeans.org/

Soybean Genetics and Green Stem:

1) **Low green stem no matter stress factors**
2) **Range from low to high depending on stress factors**

Soybean Genetics and Green Stem

Evaluation of Bell and Colfax (parents) and 21 progeny lines at Rock Co. and West Madison Research Station:
Rock Co. – Bean leaf beetle & BPMV
West Madison – Soybean aphid & SMV and AMV

Progeny Performance
Low Green Stem at both sites: 11 lines
High green stem at both sites: 10 lines
High green stem at Rock and low green stem at West Madison: 2 lines

Green Stem (GS), Insects, Viruses and Insecticides

	2001			2002		
Insecticide	Yield	Virus	GS	Yield	Virus	GS
	Bu/a	%	%	Bu/a	%	%
None	43	98	0	48	54	40
Warrior	43	98	0	54	33	22
LSD (p=0.10)	ns	ns	ns	4	14	12

High incidence of soybean aphid in 2001; moderate in 2002

Bean Leaf Beetle

Bean Pod Mottle Virus

Most consistent pathological cause of green stem in soybean

The Soybean Aphid

Soybean Mosaic Virus

Inconsistent cause of soybean green stem

Soybean dwarf virus

Detected in Wisconsin in 2003

From Yamazaki, Hiroyuki
http://www.agri.pref.hokkaido.jp/tokachi/soy/doc/project03_SDV.htm

Soybean dwarf virus **has been associated with green stem plants**

Summary

- Green stem occurs throughout the Midwest
- Incidence varies by year and location
- Mottled seed often associated with green stem
- Several stress factors are associated with green stem
  - *Bean pod mottle virus*
  - *Soybean mosaic virus*
  - *Soybean dwarf virus*
- Control of insects and viruses may reduce green stem
- Soybean varieties vary in expression of green stem

Information on Soybean Plant Health

- **Soybean Plant Health Initiative; North Central Soybean Research Program**
  http://www.ncrsp.com/planthealth

- **Soybean Plant Health Website; University of Wisconsin-Madison**
  http://www.plantpath.wisc.edu/soyhealth

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