Reaction Of Snap Bean Cultivars And Advanced Breeding Lines To Aphid Transmitted Viruses

Walt Stevenson
Craig Grau
Tom German
University of Wisconsin - Madison

Snap bean variety trial – virus evaluation 2005

Three locations:

- **West Madison Agricultural Research Station**
- **Two commercial fields – Markesan and Oostburg**

Arrangement:

- **2-row plots (UW breeding lines 1-row), 20' long**
- **3 replicates**

Data collected for each trial:

- **Leaf samples for ELISA virus assay - composite sample of 10 leaves/replicate from each trial, analyzed for AMV, CMV PotY.**
- **Two ratings for foliar symptom severity**

	Markesan	West Madison	Oostburg
Planted	7/16/05	7/11/05	7/8/05
Leaf sample 1 collected	8/23	8/24	8/23
Leaf sample 2 collected	9/6	9/7	9/6
Visual rating #1	8/23	8/24	8/23
#2	9/6	9/7	9/6
Number of lines planted	47	43	43

Range of Leaf Mosaic Symptoms

Leaf, Plant and Pod Symptoms

Snap bean variety trial – virus evaluation 2005

Entry Name	Source	In Previous Trials
Hystyle	Harris-Moran	2001 2002 2003 2004
Ulysses (EX 081020670)	Seminis	2003 2004
Alicante	Seminis	
Sea Biscuit (EX 15330724)	Seminis	
Valentino	Seminis	
Yellowstone	Crites-Moscow	2004
Fortune	Crites-Moscow	
Laguna	Crites-Moscow	2004
Shakira	Crites-Moscow	
HMX 4953	Harris-Moran	
HMX 5100	Harris-Moran	
HMX 4954	Harris-Moran	
MV185 Arras	Vilmorin	2001 2002 2003 2004
ORION	Brotherton Seed Co.	2002 2003 2004
BSC835	Brotherton	2004
HS906	Brotherton	2004
BSC864	Brotherton	

Snap bean variety trial – virus evaluation 2005

Entry Name	Source	In Previous Trials
PLS 87	Pure Line Seeds	2002 2003 2004
PLS 75	Pure Line	2002
PLS 99	Pure Line	2002 2003
Igloo	Pure Line	2002 2003
ID8011X	Del Monte	
IDC IX	Del Monte	2004
ID552	Del Monte	
ID802	Del Monte	
Sirio-LP	Syngenta	2002 2003 2004
Redon	Syngenta	2004
Stayton	Syngenta	

Snap bean variety trial – virus evaluation 2005

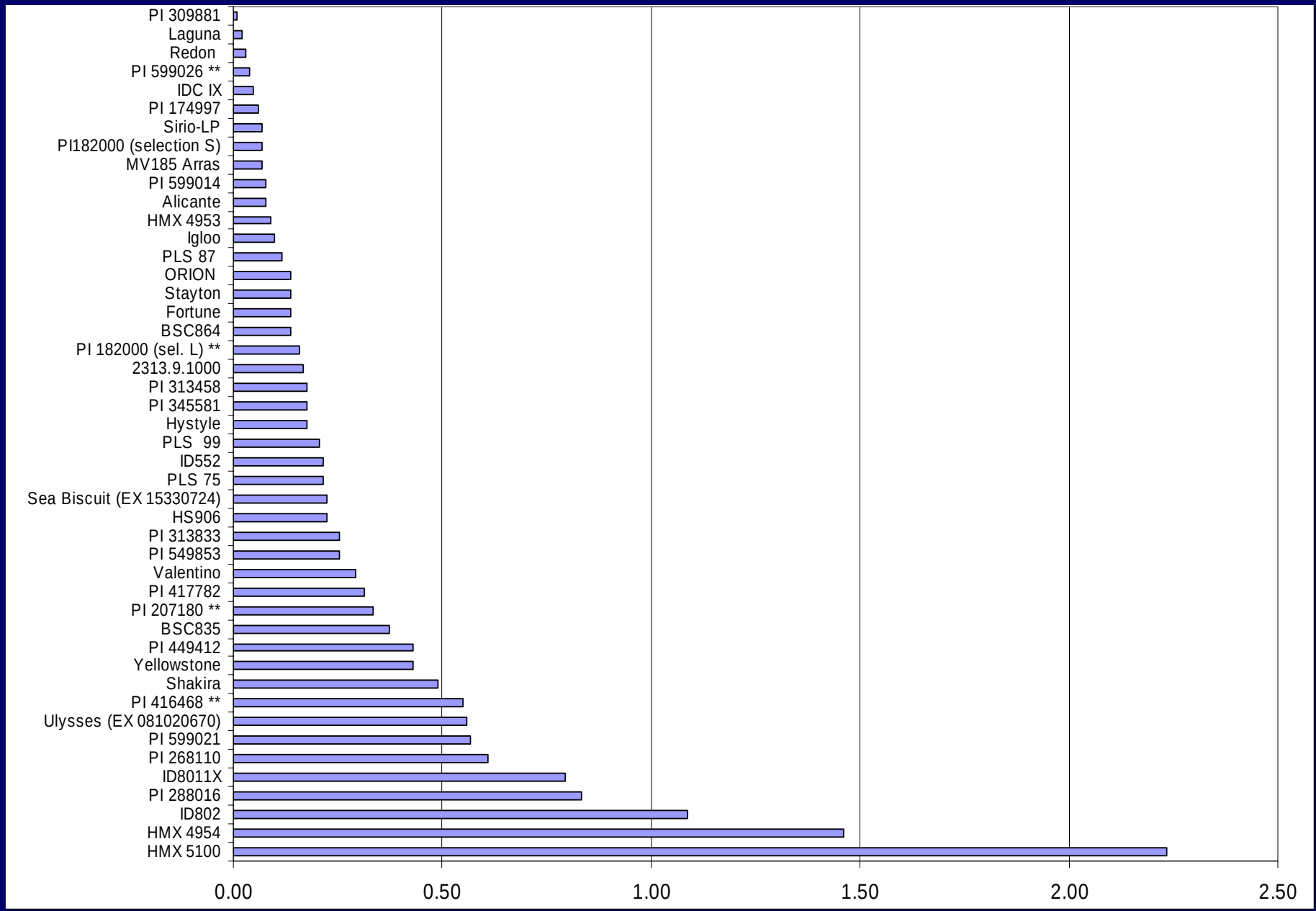
Breeding lines from M. Sass, J. Nienhuis, UW Horticulture Dept.

Entry Name		In Previous Trials
PI 309881	2313.9.1000	2004

PI 417782	PI 174997	no
PI 288016	PI 549853	
PI182000 (selection S)	PI 599021	
PI 345581	PI 599014	
PI 449412	PI 207180	
PI 313458	PI 599026	
PI 268110	PI 416468	
PI 313833	PI 182000 (selection L)	

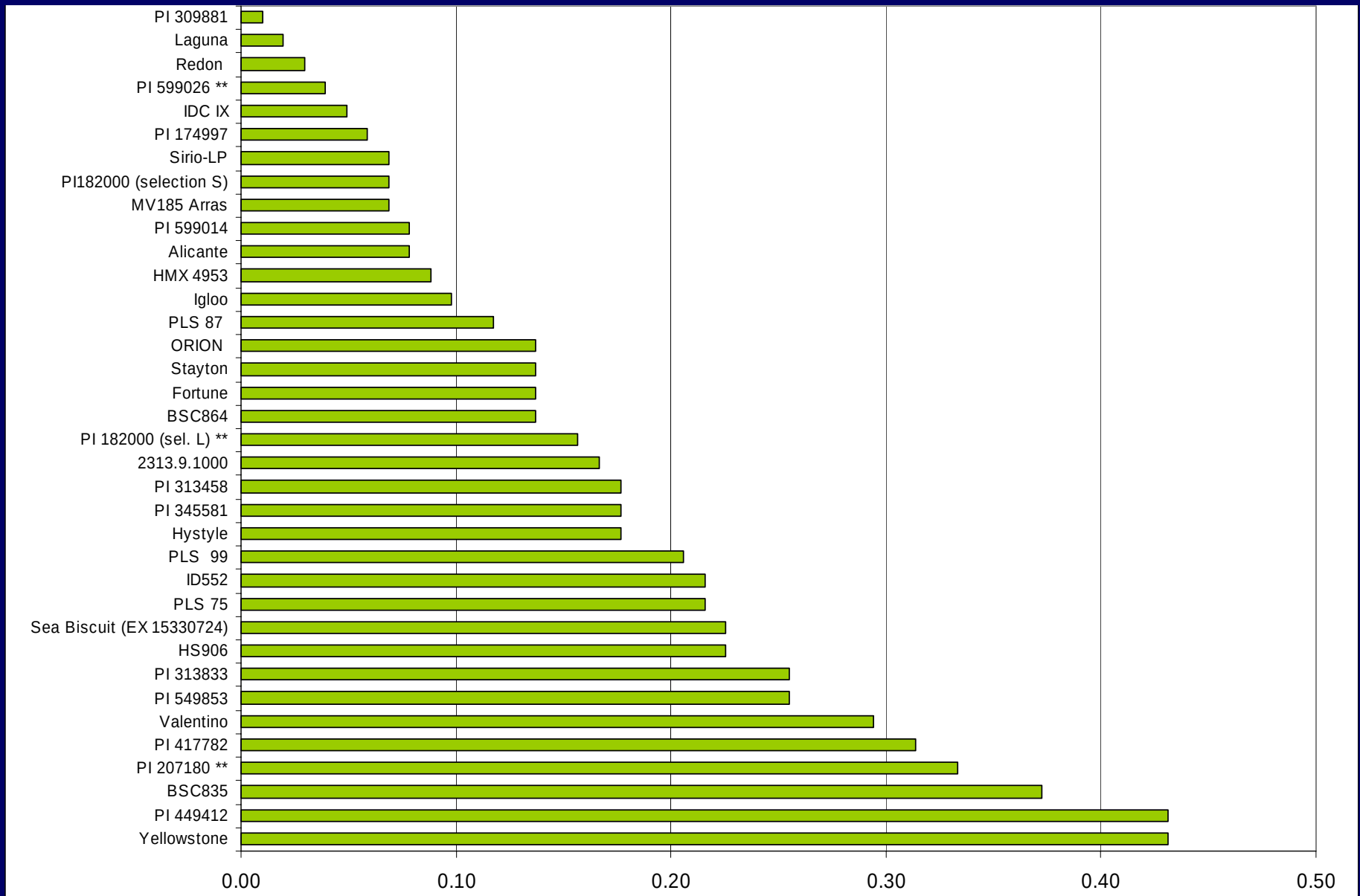
Snap bean variety trial – virus evaluation 2005, foliar symptoms

Number of plants/ft with virus symptoms of any kind (Markesan, 5 Sep)



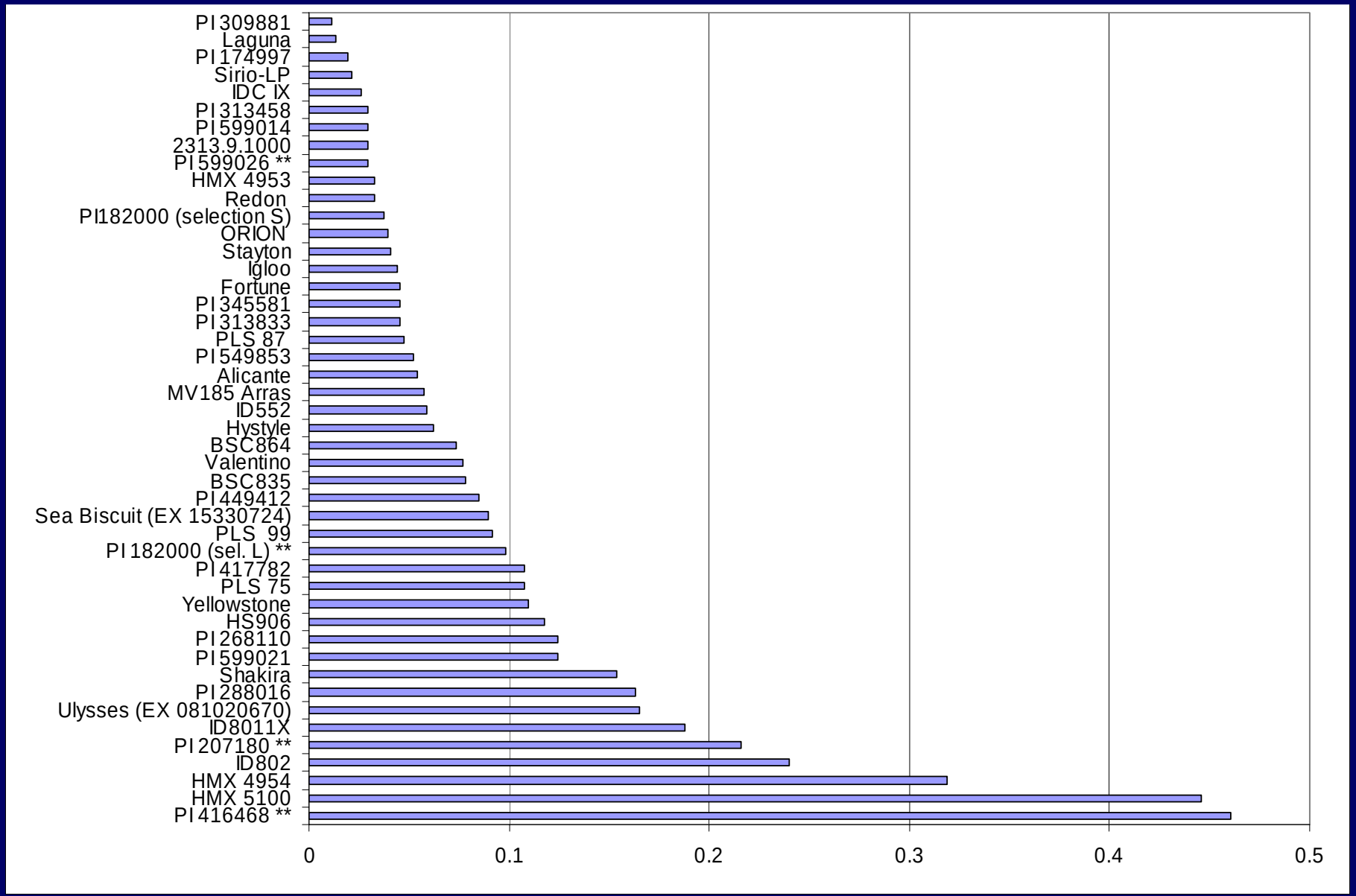
Snap bean variety trial – virus evaluation 2005, foliar symptoms

Lines with incidence of virus symptoms < 0.5 plant/ft (Markesan, 5 Sep)



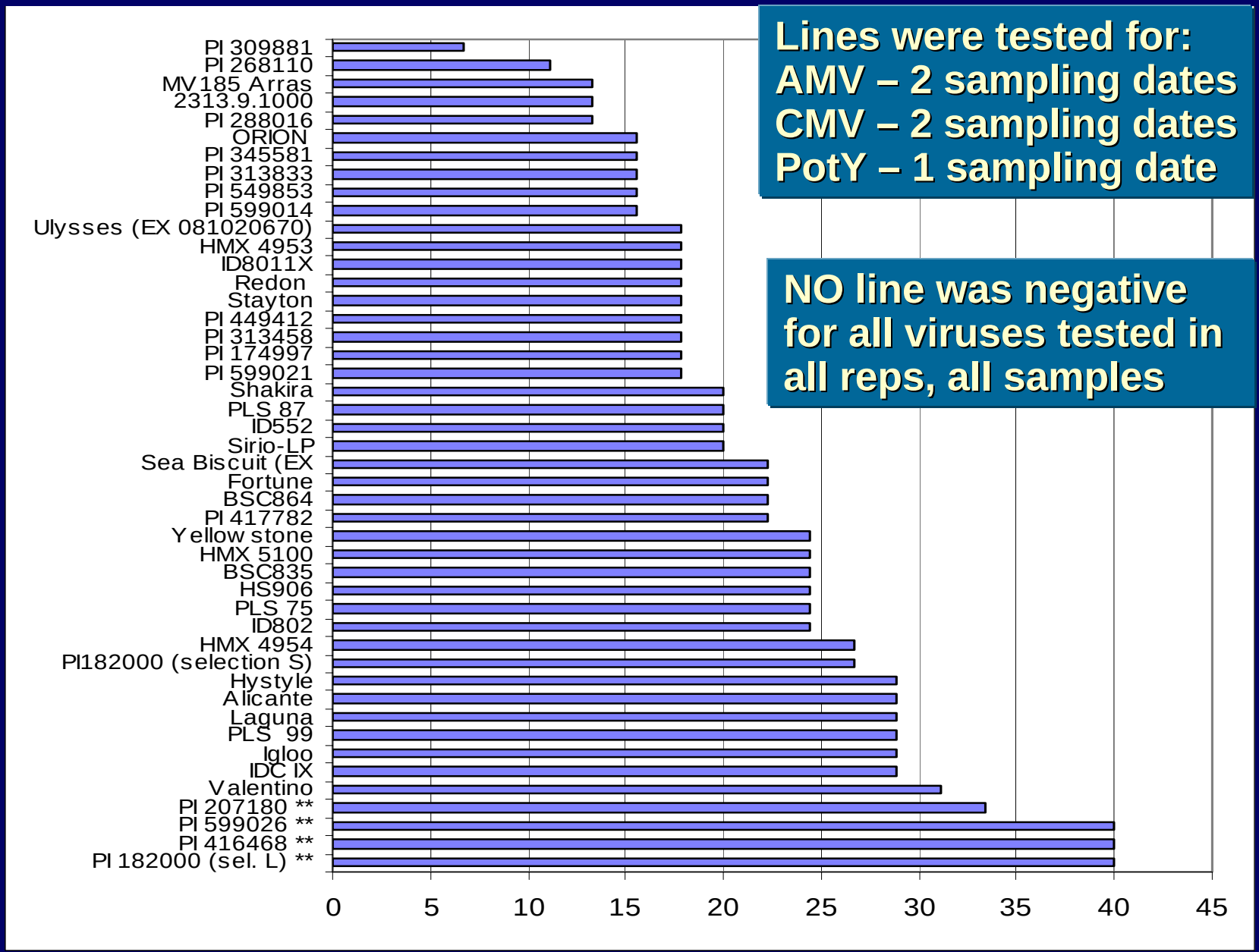
Snap bean variety trial – virus evaluation 2005, foliar symptoms

Number of plants/ft with virus symptoms of any kind (avg. of all reps, all sites)

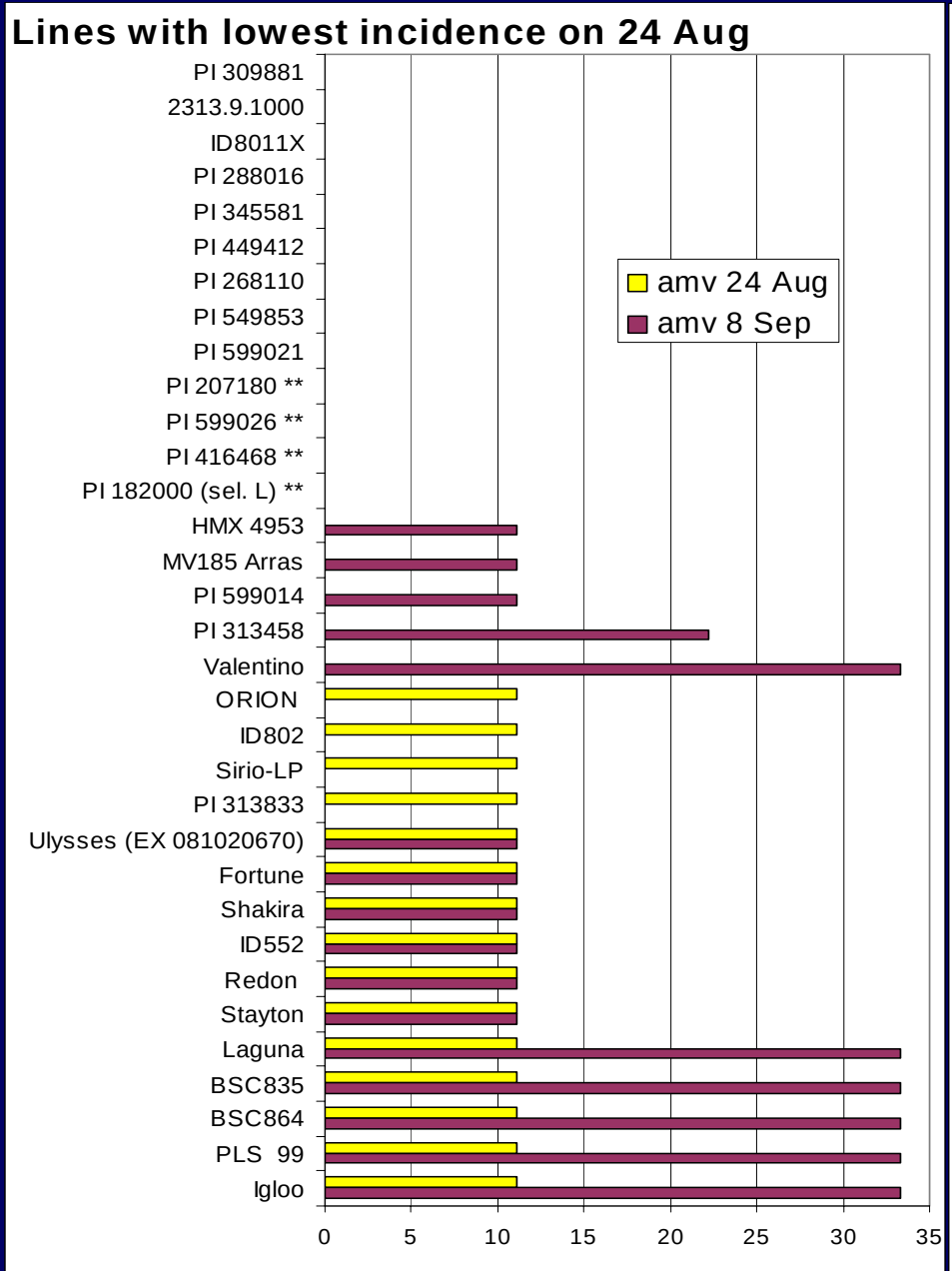


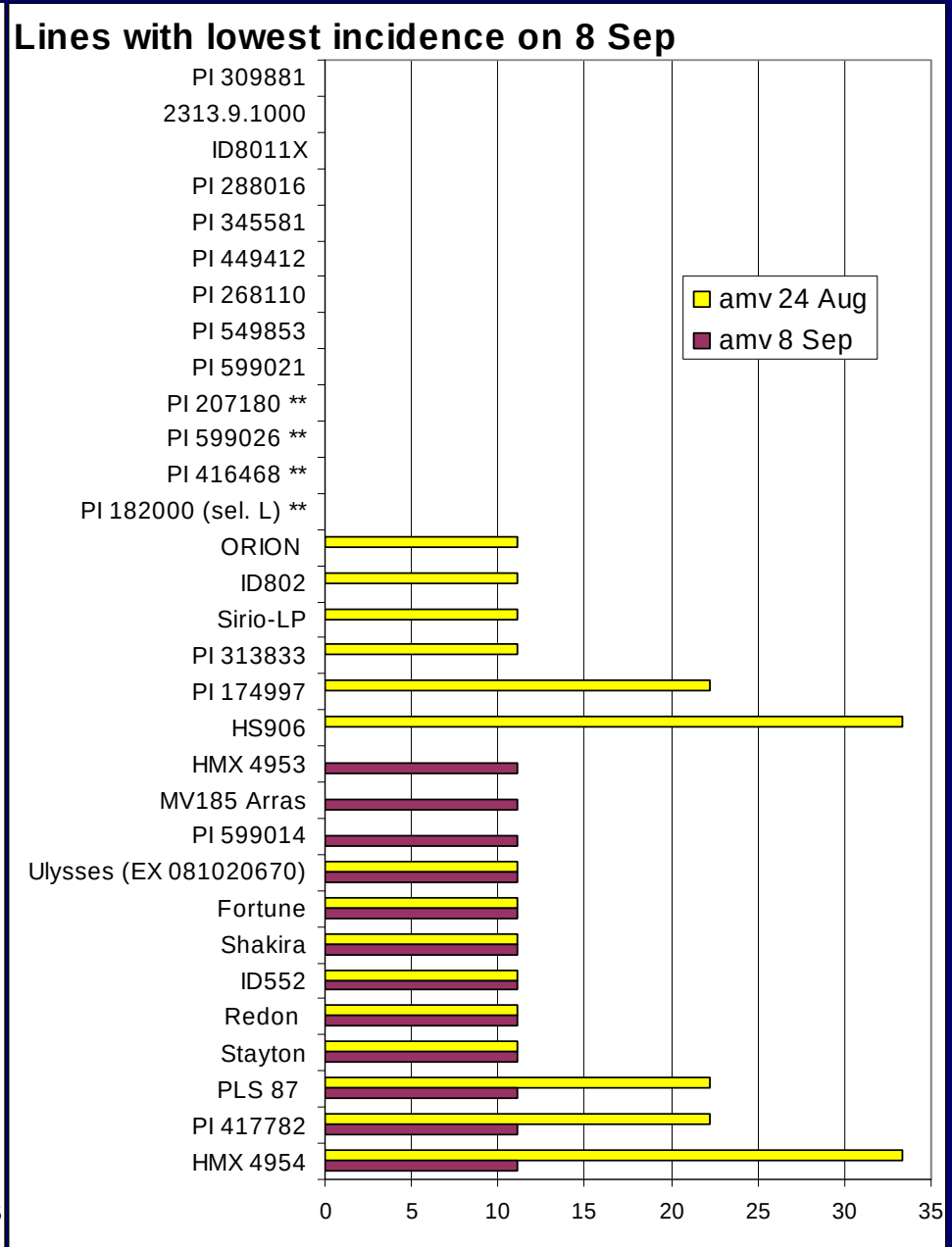
Snap bean variety trial – virus evaluation 2005, ELISA assay

% of reps (3 sites/3 reps per site) with positive reaction for any virus

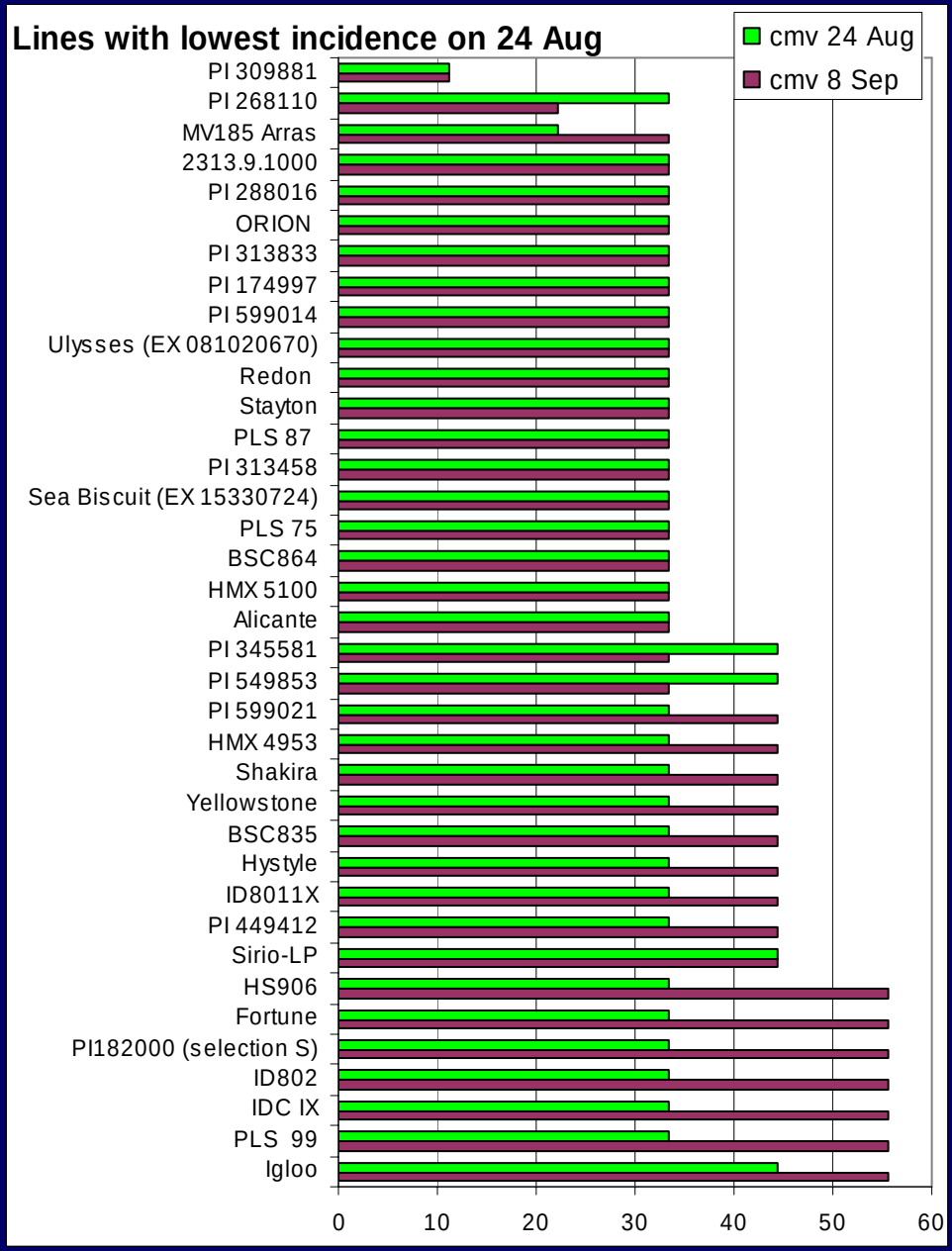


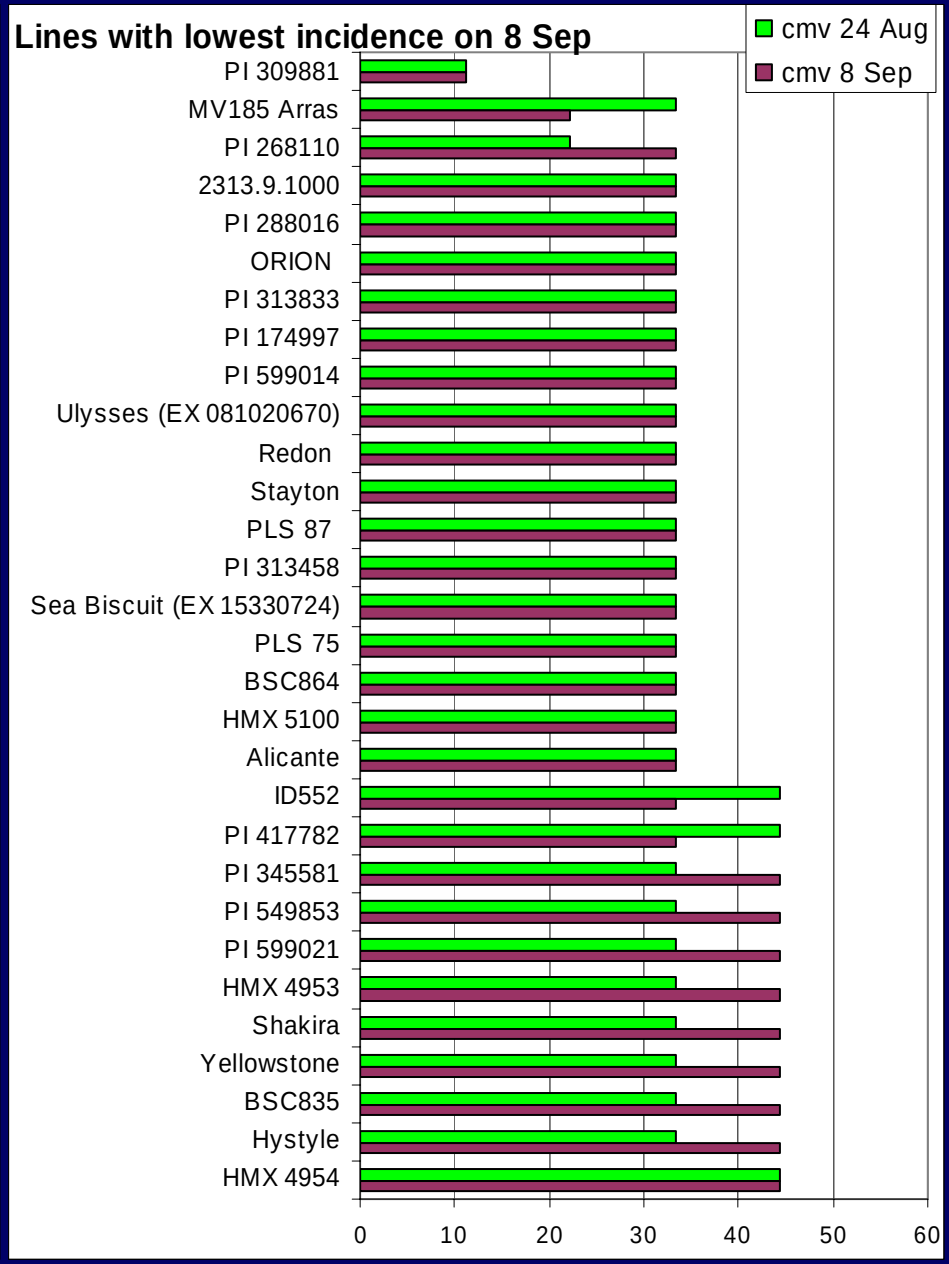
Snap bean variety trial – virus evaluation 2005, detection of AMV in leaf samples (24 Aug and 8 Sep, ELISA)





Snap bean variety trial – virus evaluation 2005, detection of CMV in leaf samples (24 Aug and 8 Sep, ELISA)





Snap bean variety trial – virus evaluation 2005, detection of PotY in leaf samples 24 Aug (ELISA)

Lines with NO positive reaction for PotY

2313.9.1000	PI 174997	PLS 75
BSC835	PI 182000 (sel. L)	PLS 87
BSC864	PI 207180	Redon
Fortune	PI 268110	Sea Biscuit (EX 15330724)
HMX 4953	PI 288016	Shakira
HMX 4954	PI 313458	Sirio-LP
HMX 5100	PI 313833	Stayton
HS906	PI 345581	Ulysses (EX 081020670)
Hystyle	PI 416468	Valentino
ID552	PI 417782	Yellowstone
ID8011X	PI 449412	
IDC IX	PI 549853	
Igloo	PI 599014	
Laguna	PI 599026	
MV185 Arras	PI182000 (sel. S)	
ORION	PLS 99	

Lines with a positive reaction for PotY (one plot at one location)

Alicante
ID802
PI 309881
PI 599021

What Have We Learned?

- Aphid transmitted virus complex is likely here to stay
- Severity of virus-related losses seems to mirror population levels and timing of soybean aphid
- Three viruses primarily associated with symptomatic plants – CMV, AMV and CYVV – alone or in combination, but there may be others yet unidentified
- Several cultivars and breeding lines have emerged as less susceptible than standard cultivars (e.g. Fortune, Laguna, MV185 Arras, Igloo, Sirio-LP, Redon)
- These sources of resistance should be helpful to breeders in development of new cultivars with greatly improved virus resistance

What Have We Learned?

- **Other observations**
  - **Insecticides applied to processing beans (seed or foliage) have little, if any, impact on virus incidence or severity**
  - **Treating soybeans for aphid control may be helping to keep aphid populations low and reduce the risk of virus transmission to snap beans**
  - **For mid to late season plantings, locating virus susceptible cultivars in areas not prone to virus problems may help to reduce production risk**
  - **Losses to virus complex seem to have peaked in 2001-2003, while losses in 2004 and 2005 are modest by comparison**
  - **Thinking about virus management as part of overall production plan makes good sense!**
  - **Having varieties with higher levels of resistance to aphid transmitted viruses is an important aspect of virus management and risk reduction.**
  - **Funding from MWFPA has played a critical role in helping to find better disease management tools.**


Questions??