

New Sources of Sclerotinia Head Rot Resistance Found in USDA Plant Introductions

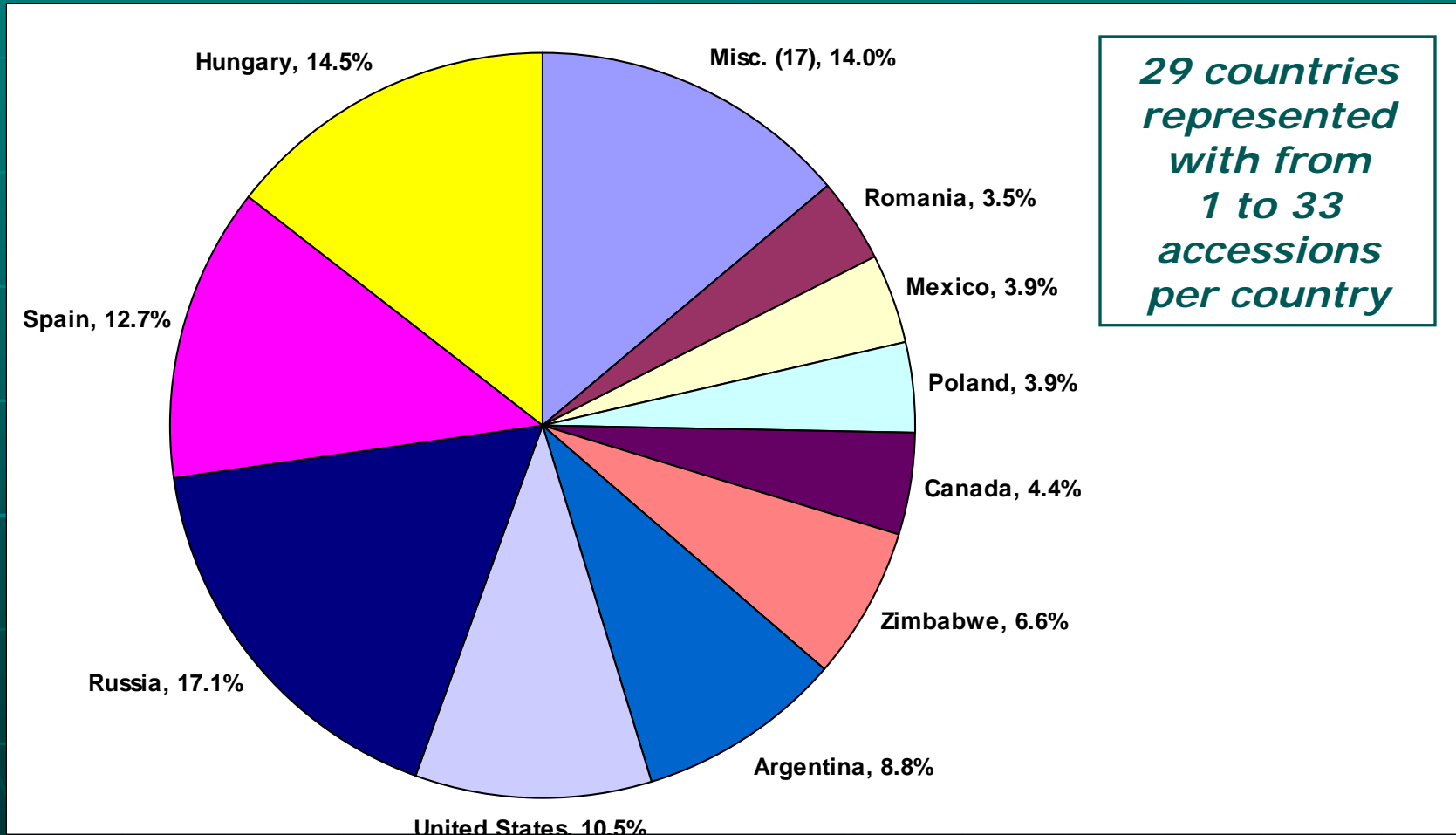


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Objectives-

- *Initially*, to evaluate group of USDA Plant Introductions (once) for stalk rot, to find new sources of resistance.
- *Later* – to evaluate the same group of PIs (~ 250) in multiple environments with artificial inoculations, for resistance to (1) stalk rot, (2) head rot, and (3) Phomopsis stem canker.

Origin of 250 PIs used in study



Head Rot Testing

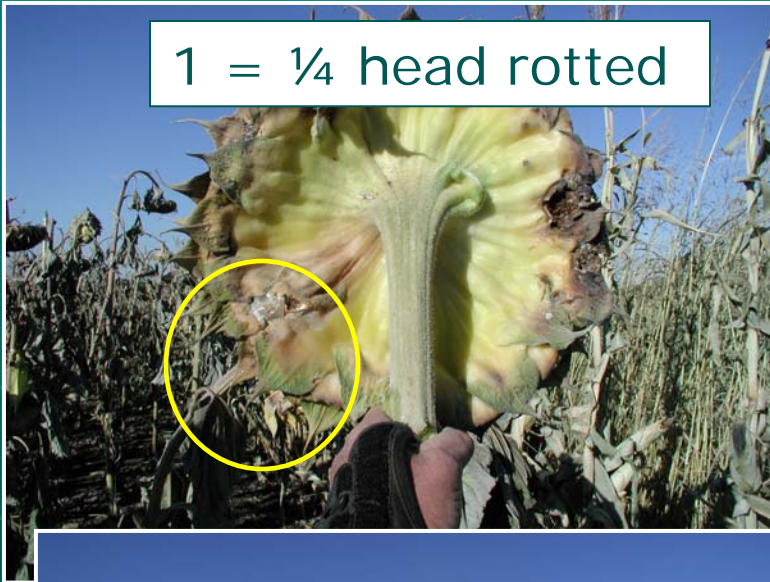
- All field trials done under mist irrigation with artificial inoculations using ascospores.
- Trials conducted at Staples and Sabin, MN in 2011 and 2012, for a total of three datasets (6 reps of single row plots).

Head Rot Testing

- Ascospores produced in lab by *Nikolay Balbyshev* (retired, 2012).
- Each row inoculated once on 10-12 heads at optimal stage (25% bloom). Remaining heads removed.
- PIs with late flowering (> 85 days) excluded from trial.

Head Rot Rating (1-5 scale)

1 = 1/4 head rotted



3

3 = 3/4 head rotted



4

4 = entire head rotted



5

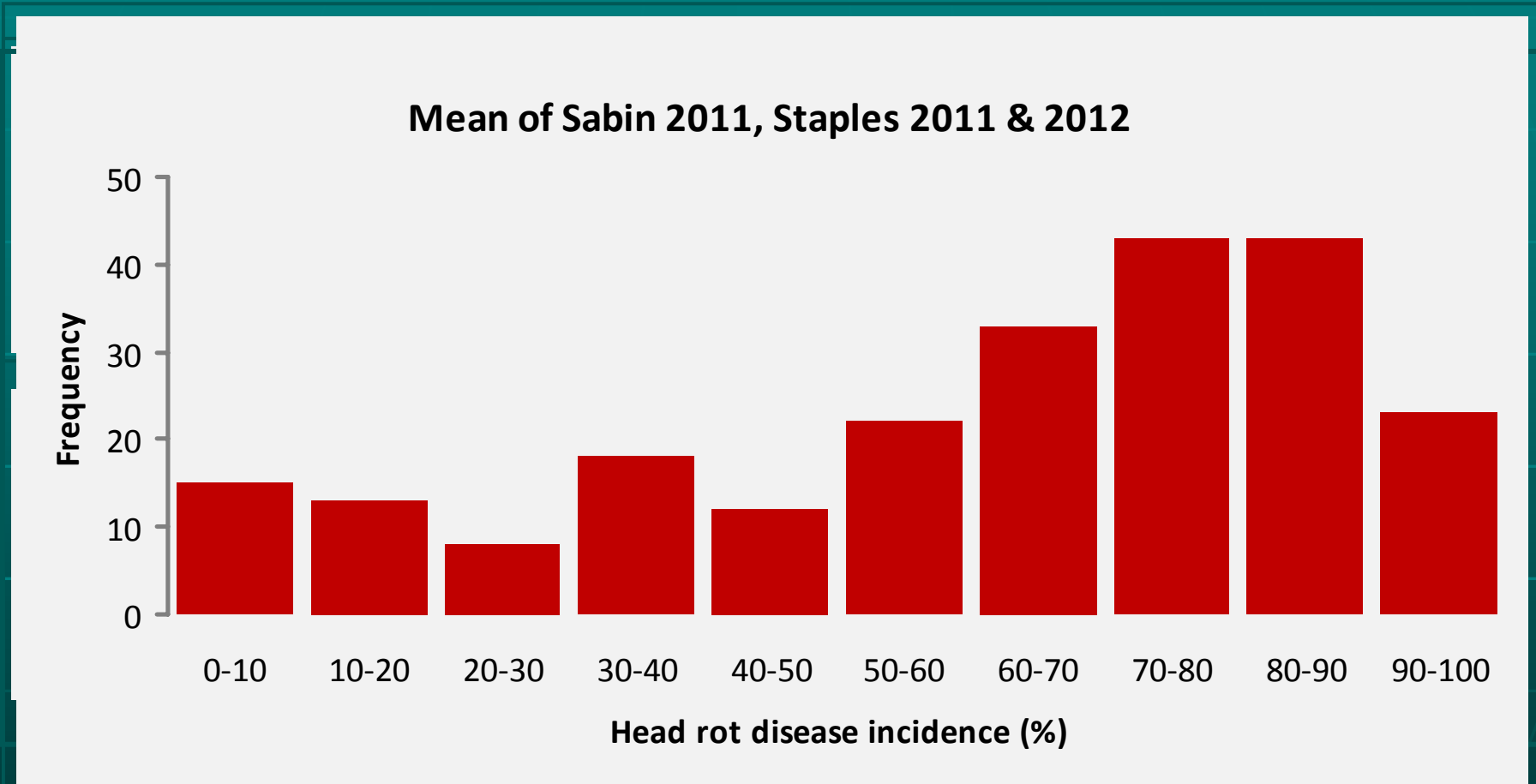
5 = head gone



Head Rot Rating

- Ratings done in early to mid-October, when susceptible check has maximum disease, and all accessions have had 4+ weeks after inoculation.
- Percent of rotted heads recorded, as well as # of heads in each severity category.
- Nearly all heads are in the '4' or '5' category.

Head Rot – 250 PIs



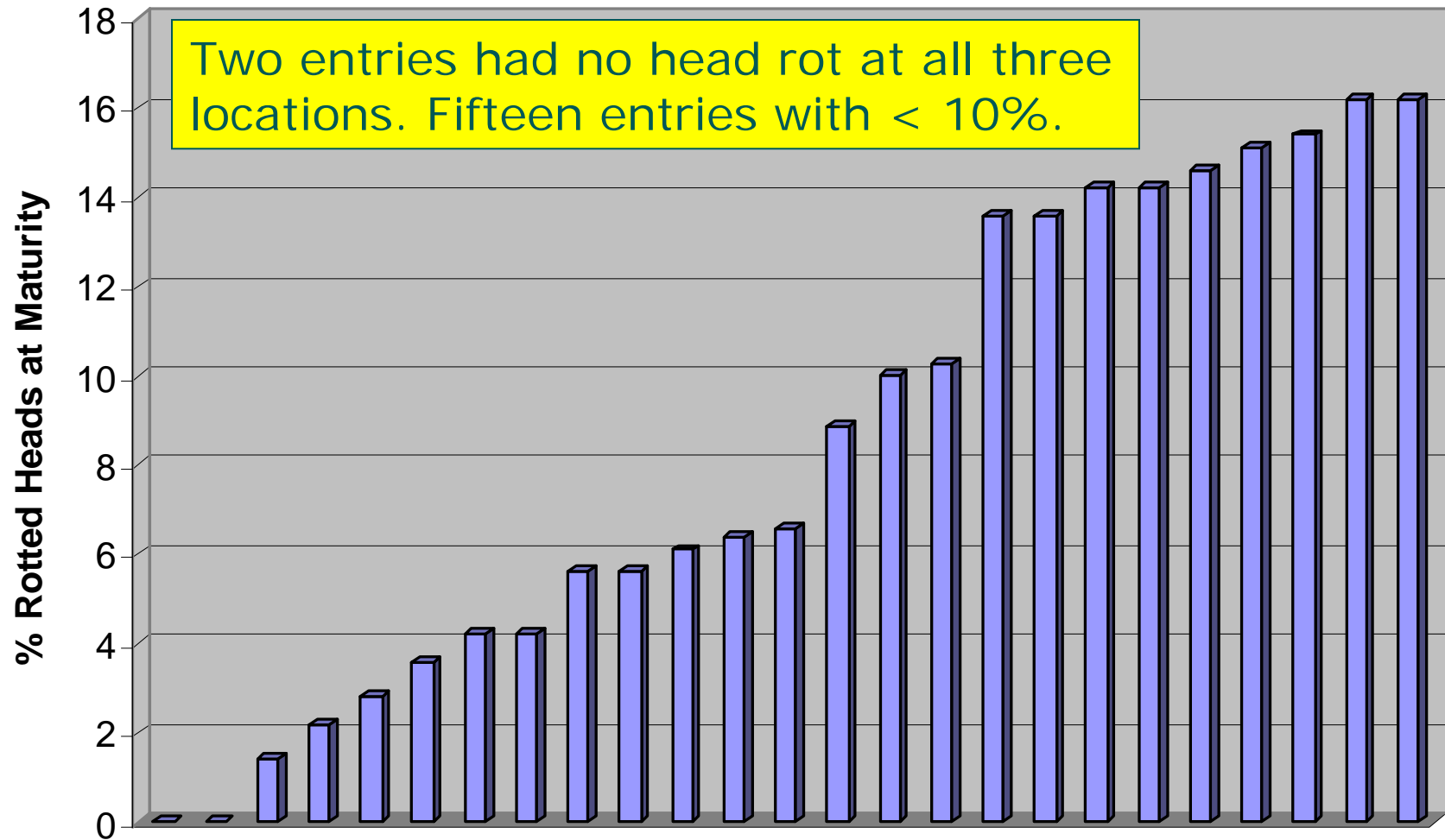
Three locations: Range 0 to 100% head rot, average 61% across 230 entries (late flowering ones removed)

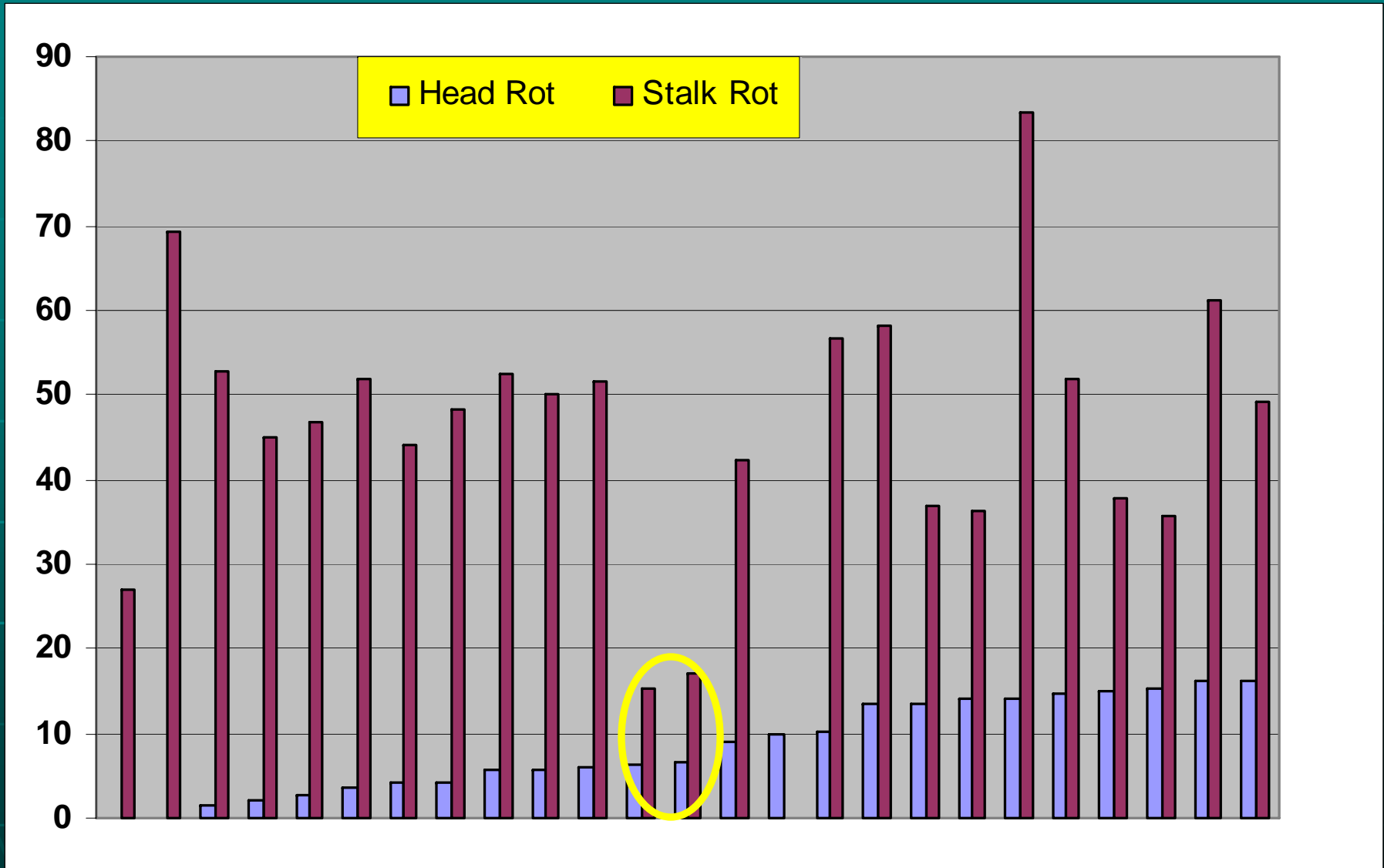
Comparison of 4 Head Rot Trials

	Plot Mean (all accessions)	HA 89 check
Sabin 2011	66% head rot	96%
Sabin 2012*	31%	23%
Staples 2011	61%	90%
Staples 2012	56%	42%

* Staples 2012 data not used in overall analyses

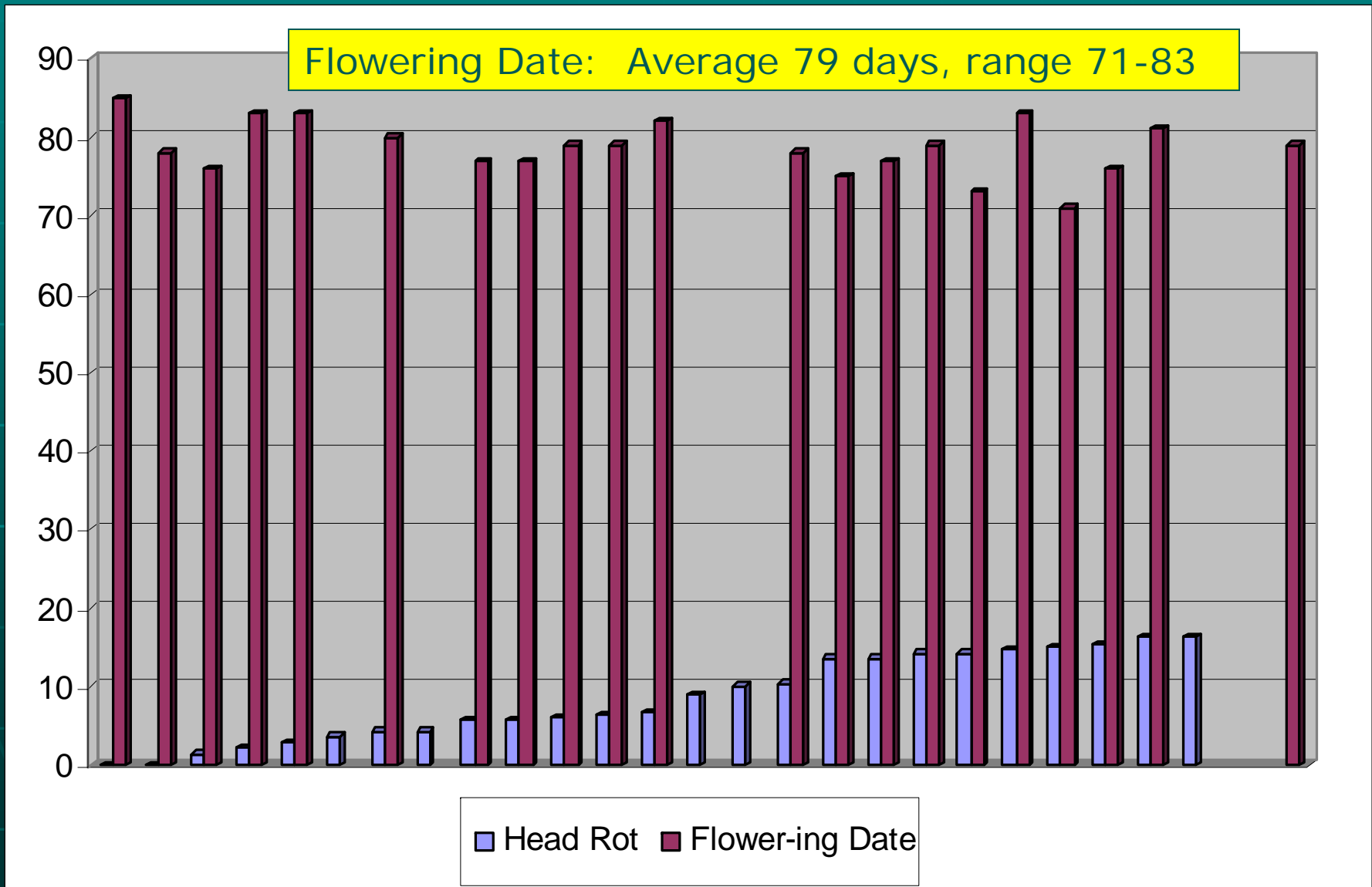
Top 25 Pis for Head Rot Resistance



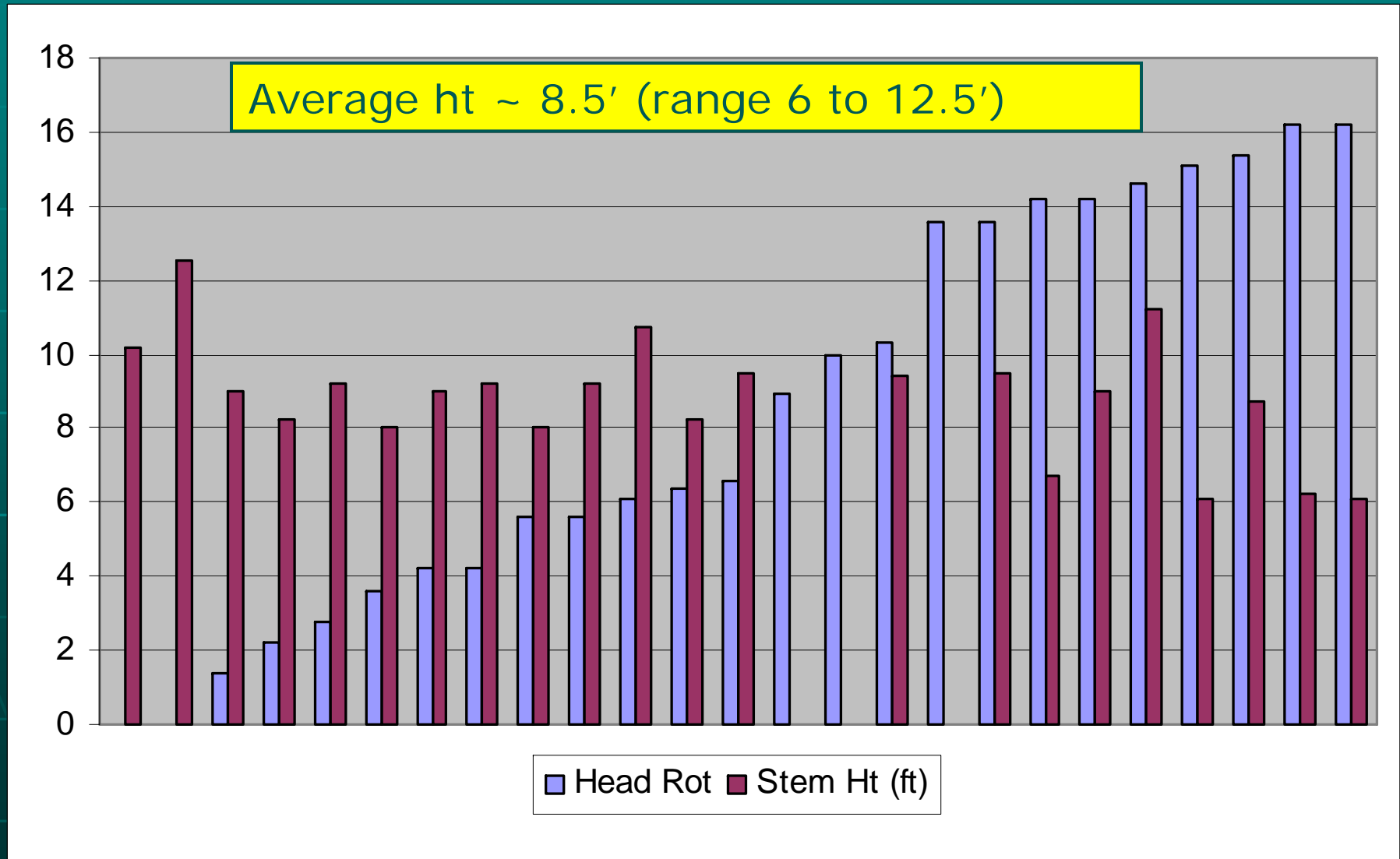


Two entries had good levels of resistance to both head rot & stalk rot – PI 531366 from Poland & PI 650810 from Paraguay

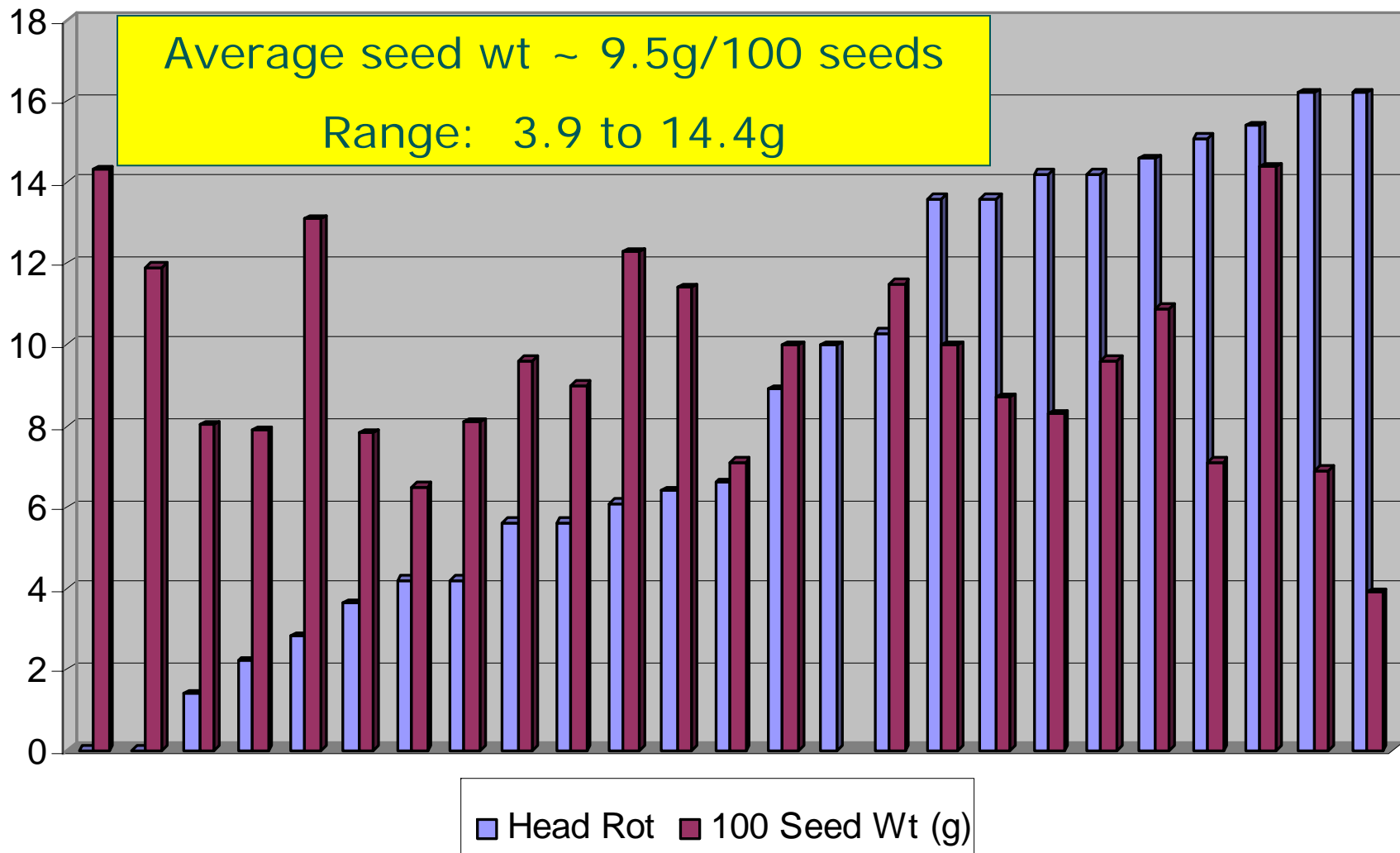
Head rot ratings vs agronomic characteristics



Head rot ratings vs agronomic characteristics



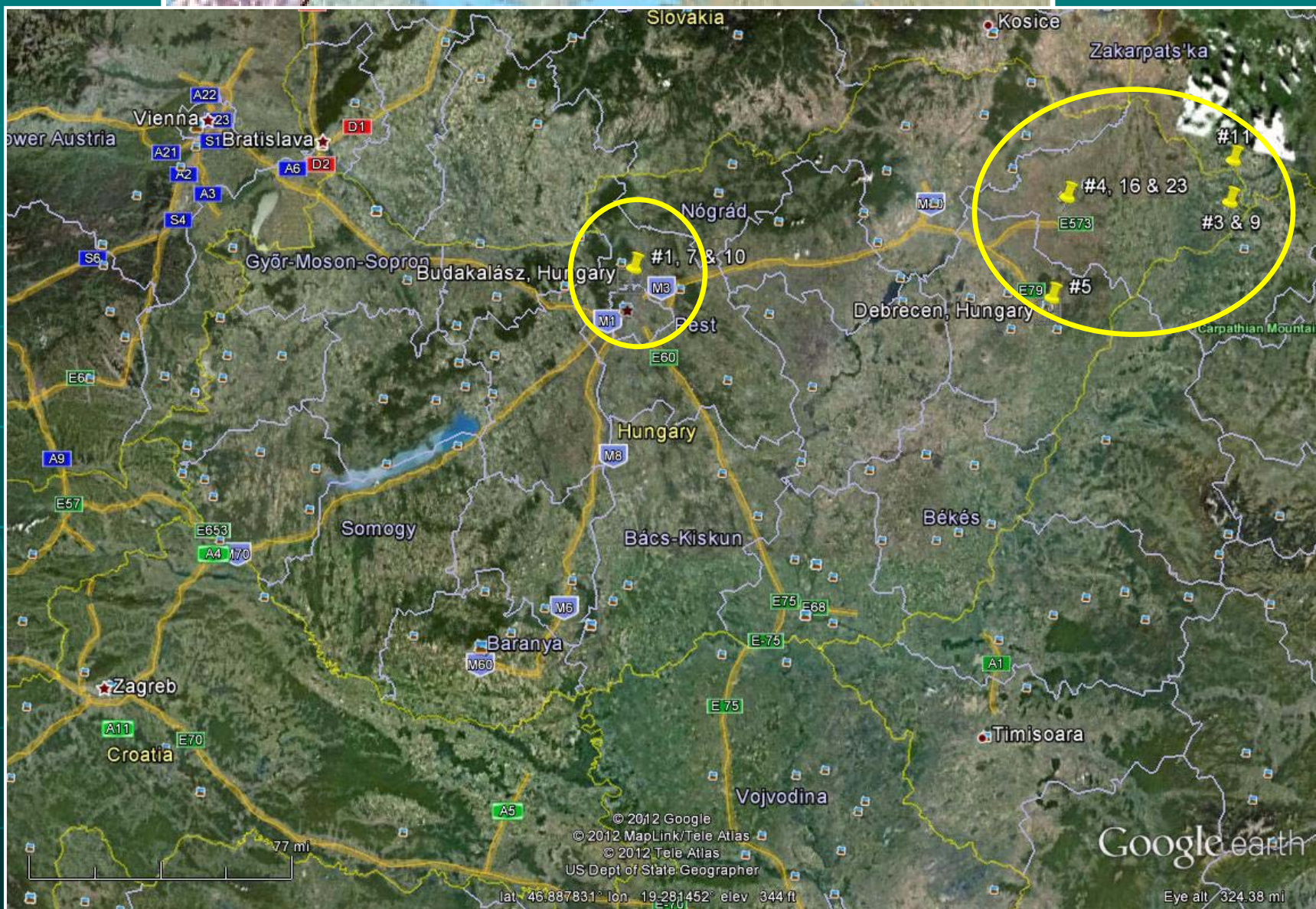
Head rot ratings vs agronomic characteristics



Origin of Head Rot Resistant PIs

- Seven of top ten from Hungary, along with entries from Argentina, China and Spain.
- Ten of top 25 from Hungary
- Hungarian entries made up 14.5% of accessions, but 40% of top 25.
- One USDA inbred (RHA 453), but not included in stalk rot trial.
- One ornamental variety (Taiyo).

Origin of Hungarian Land Races with Head Rot Resistance



Conclusions

- Two year tests at three locations with artificial inoculations identifies germplasm with good levels of head rot resistance – but
- Resistance often in tall material (6-12'), later flowering (70-85 days), and large seeded (useful for confection breeders)
- Two PIs had high levels of resistance to both head rot and stalk rot.

Acknowledgements

- Thanks to:
 - *Laura Marek* (USDA PI station- Ames) for seed orders over several year
 - *Nikolay Balbyshev* (NDSU, retired) for many years of inoculum production
 - *Megan Ramsett*, plus all techs in Sunflower Unit for support at all field trials
 - *Central Lakes College* (Staples) and *Bayer Crop Science* (Sabin) for plot land and help with irrigated head rot trials.