

Greg Hess. *Understanding Resistance to Necrotic Viruses in CSU Potato Germplasm with Genetic Markers and Virus Detection by MALDI-MS Biotyping*

Resistance to Potato Virus Y (PVY) has been conferred through at least three known land-race *Solanum* sources: *stoloniferum* (Ry_{sto}), *adigina* (Ry_{adg}), *chacoense* (Ry_{chc}), and potentially others. To study PVY resistance in the Colorado Potato Breeding and Selection Program, multiple advanced breeding lines and a single population segregating for an unknown PVY resistance marker were initially screened by ELISA for PVY infection. These breeding lines were used in follow-up inoculation and leaf tissue screenings. Initially, 115 lines thought to have PVY resistance, and a 272-progeny population was evaluated and the population numbers were reduced by a second and third ELISA exclusion down to 106 lines and 209 progeny. Of the 106 lines remaining, only three are known to include resistant lineage for either the Ry_{sto} or Ry_{adg} genetic marker. However, four more lines known to have PVY resistance (Fortress, Inca Gold, Masquerade, & Midnight Moon), tested negative for either Ry_{sto} or Ry_{adg} genetic markers via PCR analysis, suggesting there is another form of PVY resistance in the Colorado Potato Breeding and Selection Program.

The overall objectives of this research are to:

- I. Determine the progenitor marker source of and confirm PVY resistance in CSU cultivars, advanced breeding lines, and a segregating population with (1) genomic screening, (2) a greenhouse inoculation study and (3) a field trial inoculation study.
- II. Investigate virus dynamics and detection in potato with MALDI-TOF-MS by (1) determining if MALDI-TOF-MS spectra profile differences can detect PVY & PMTV, (2) determining a MALDI-TOF-MS spectra profile for detection of necrotic viruses (PVY, PVYn/ntn, PMTV) and/or PVY multi-strain infected plant tissue from the previous objective, for comparison to tandem ELISA and PCR testing in multiple potato cultivars and storage conditions, and (3) determining MALDI-TOF-MS spectra profile differences between PVY strains.