Pest Resistance

Trait	At present	Next 5 years
PVY	*Extreme resistance (Ry_{adg}) already present in many chip clones; clones are screened with DNA marker in FY3	*Move PVY-resistance from chips to reds and russets by crossing and selection with marker *Use Japanese clones with Ry_{chc} to stack resistance; DNA marker is already available
Late Blight	*We have a few chip clones with the R8 gene, which is effective against US-8 *In 2018 we created DNA marker for R8 *We have a few russets with same resistance as Defender & Palisade *Crossing with K41 to introduce RB gene into current germplasm	*Increase frequency of R8 gene in chip germplasm through marker-assisted selection *Move R8 into russet background through crossing *Develop and apply DNA marker for Palisade resistance *Stack late blight resistance genes through crossing and marker-assisted selection
Golden nematode	*H1 gene for resistance to pathotype 1 is present in many chip clones; clones are screened with DNA marker in FY3	
G. pallida nematode	*Crossing with two resistant clones from Europe	*Use published DNA markers to select for resistance
Common scab	*There are no validated R genes *Collaborating with Felix Navarro to screen clones beginning FY3	*Identify new sources of resistance *Use genomic prediction model
Verticillium wilt	*There are no validated R genes *Select based on natural disease pressure at Hancock and Rhinelander (in fumigated fields) *Few clones per year evaluated in disease nursery by Jansky group	*Screen clones earlier in the selection process (FY4?) in dedicated disease nursery

Agronomics & End-Use Quality

Trait	At present	Next 5 years
Yield & size distribution	*Hancock Ag-Ray used to calculate total yield, size fractions, and tubers per plant starting FY3	*Use genomic prediction model
Maturity	*Vine maturity rating in early August *Early trial (vine kill 90 DAP) to measure tuber bulking starting FY4 *Skin set scored visually on grader	*Use aerial imaging to characterize canopy development over entire season *Use genomic prediction model
Water & N use efficiency		*Use aerial imaging to characterize
Hollow heart	*Measure in 20 tubers starting FY3	
Tuber Dormancy	*Measured starting FY3	*Develop DNA markers
Blackspot bruise	*Collaborating with Hancock SRF to measure in FY4 russets	*Extend to FY4 chips
Tuber appearance	*Scored visually on grader	*Investigate genetics of netting/russeting, develop markers *Develop germplasm with “second skin” = pigmented phelloderm *Measure changes in red skin color during storage
Lenticels		*Develop flooding stress test to measure lenticel size
Specific gravity	*Underwater weight measured in bulk sample	*Investigate genetics of dry matter distribution within tuber *Use genomic prediction model
Fry color & defects	*Chip clones fried beginning FY2 *Russet clones fried beginning FY4 in collaboration with Hancock SRF	*Lower storage temp for chips to 45F to improve selection for cold-sweetening resistance *Use genomic prediction model
Taste & Texture	*Informal tasting by program staff; chef evaluation with Dawson group *Clones in NFPT undergo sensory evaluation by processors	