**‘2023’ Annual Meeting of Regional Project NE2231**

**December 12 and 13, 2022**

**North Carolina State University, Raleigh (in person and via zoom)**

**AGENDA**

1. Call to order, additions and approval of agenda, approval of minutes from last meeting

Greg Porter welcomed us and called meeting to order at 1:00 PM. Minutes from December 2021 meeting unanimously approved.

2. Introductions

Craig Yencho (NC State), Mark Clough (NC State), Bonny Olaka (NCSU), Walter De Jong (Cornell U), Matt Falise (Cornell U), Greg Porter (U ME), Han Tan (U ME), Jessica Leahy (U ME), Mary Ellen Camire (U ME), Paul Collins (USDA-ARS Orono, ME), Doug Higgins (VA Tech), Xinshun Qu (PA State), Marcio Resende (U FL), Leo Hoffman (U FL), Lincoln Zotarelli (U FL), Pam Solano (U FL), Chris Clarke (USDA-ARS Beltsville MD), Chris Hopkins (Black Gold), Jonathan Price (Sterman Masser Farms), John Lundeen (Potatoes USA), David DeKoeyer (AAFC Fredericton, NB), Erica Fava (AAFC), Robyn Morgan (AAFC), Mitchell Smith (NB Dept Ag), Tommy Dixon (NB Dept Ag), Antoine Bedard (Patate Lac St-Jean), Jessica Shade (National Program Leader, NIFA).

3. Appointment of Committees

Resolutions – Lincoln Zotarelli, Craig Yencho, Walter De Jong

Site selection – Mark Clough, Xinshun Qu, Paul Collins

Nominations – Walter De Jong will be next chair, Han Tan will be next vice-chair, and Paul Collins will be next secretary.

4. Local Arrangements

In person meeting was held in the new plant science building at NCSU. Meeting will run till 5 pm Dec 12, resume at 8 am December 13.

5. Administrative Advisor Report – Jessica Leahy

Jessica became our new AA in January 2022 and helped shepherd our 2022 project rewrite through the NERA system. We are grateful! Jessica’s team can help submit annual report and minutes if assistance is needed.

6. National Institute of Food and Agriculture (NIFA) Report – Jessica Shade.

Jessica is the National Program Leader for Plant Systems – Production, and along with Ann Stapleton, is the NIFA representative for our project. NIFA funds ag research, extension, and education, with a total budget for 2021 of 1.8 billion dollars, about half of which went to capacity programs (e.g., Hatch funds). Most competitive grants are awarded through AFRI. Jessica provided an overview of NIFA program priorities: climate change, nutrition security, enhanced market opportunities, DEIA (diversity, equity, inclusion, accessibility).

7. Research presentations

Chris Clarke gave a presentation about detecting and genomically characterizing *Streptomyces spp*, with a view towards combatting common scab of potato. Has found that quantifying the thaxtomin operon works well to predict level of disease in greenhouse pots, but not so well in the field, and not at all for organisms that cause netted scab. Has sequenced ~250 potato-associated *Streptomyces* isolates. In the process found three new species (bringing total to 15 species now known to cause pitted scab). Species group does not predict disease severity.

David DeKoeyer spoke about revitalizing potato wart resistance breeding in Canada. Wart spores can survive 40+ years so very difficult to control once you have it. 39 wart pathotypes are known, with 2, 6, and 8 important in Canada, and 1 also present. Most varieties from Newfoundland are resistant to pathotype 1 but 2 is becoming more common. Pathotypes 6 and 8 have been found on PEI. Russet Burbank is resistant to 1, while Goldrush and Prospect are resistant to 2, 6, 8. AAFC has been working to rejuvenate the five acre wart screening site in Avondale NFLD, e.g., installing fence to keep out moose. Have marker assays to detect Sen1, 2, 3, 4 resistance genes. Sen3 marker is more predictive with russet than non-russet germplasm.

Marcio Resende talked about the new potato breeding program at U FL. 2022 is the first year they conducted all steps of a potato breeding program (crossing, early generation selection, replicated trials of advanced clones). U FL has invested in infrastructure (cold storage, greenhouse, potato harvester).

Han Tan gave a presentation about his continuing efforts to capture genetic diversity of eastern potato germplasm at the diploid level by prickle pollination of tetraploids. Already has many dihaploids, is now working to improve male and female fertility and long day adaptation, as well as introgress self-compatibility. IVP48 has worked better for dihaploid extraction than IVP101.

Craig Yencho summarized lessons learned while trying to implement genomic selection in potato and sweet potato. Lessons are: 1) need to have appropriate resources to start (genome sequence, existing markers) 2) need to have a team (bioinformatics, genotyping, breeder) – no one person can do it all 3) need to be prepared to change structure of breeding program to accommodate collecting and using marker data 4) dosage sensitive markers work better for genomic prediction than markers that can only be scored as AA, AB and BB. NCSU is currently using marker data on year three clones to identify parents. Key struggle at present is weighting multiple traits for a single selection index.

[Meeting adjourned at 5:00 pm December 12. Resumed 8:00 am December 13].

8. State Site Reports

FL – Potato acreage has been on a downward trend, and the mix of varieties, once 80% chip/20% fresh, is shifting towards 50/50. Growing conditions were good, with somewhat low temperatures, which both raised specific gravities and increased length of growing season until crop maturity was achieved. Program intends to use Atlantic as a biomarker for harvest date, rather than an arbitrary days after planting number, to determine harvest date in the future. E.g., harvest when Atlantic is 90% senesced.

ME – perhaps 57,000 acres for 2022 (NASS estimate of 59,000 is deemed by industry to be too high). Yields in 2022 were even higher than the high yields of 2021, at about 345 cwt/acre. Yields in university trials were the highest Greg Porter has ever seen. Industry about 60% fry and chips, 20% fresh, 20% seed. No late blight in 2022.

NY – estimated 12,000 acres. USDA-NASS no longer reports potato acreage for NY. Severe drought reduced yields throughout the state.

NC – currently has about 13,000 acres of potatoes, with industry still about 70/30 - chip/table. Planting typically in March, with harvest in June and July. Good growing season. Chip acreage is moving to irrigated land. NC had 17 yield trials in 2022, plan on 19 in 2023.

PA – Estimated 4500 acres, 60% chip/40% fresh. Hot and dry season reduced yield but quality still OK.

NB – Good growing season, 52,000 acres, 70% planted to processing potatoes, 18% to table potatoes, 12% seed. Crop is storing well. Russet Burbank had elevated hollow heart and sunburn this year. Overall yields about 330 cwt/acre.

QC – Report emailed to be shared with the group. Approximately 50000 acres, 50% fresh/40% process/10% seed. Cold, wet spring, small size profile, average yield, good quality.

9. Comments from Industry

Jonathan Price: expressed interest in creamer potatoes, especially those that are scab resistant. Most European creamer potatoes they have tested have been scab susceptible.

John Lundeen (Research Director for Potatoes USA) noted that at recent National Chip Program meeting, the default now is to trust breeders for EGSS and NCPT decisions, but for industry to be heavily involved when deciding which clones enter SNAC trials. Two key criteria for SNAC: clone needs to beat existing alternatives and show nationwide potential.

Chris Hopkins: smaller chip potatoes are needed by industry, but not at the cost of reducing overall yield or specific gravity. The ability to grow with less water and nitrogen is increasingly important. Disease resistance is a plus if it allows growers to use less pesticides. Some Black Gold customers are asking them to plant on irrigated land, to reduce risk of supply failure. Thus the increased use of irrigation on potatoes in North Carolina (see NC state report above).

10. Pathology Reports

Erica Fava: incidence of scab on susceptible clones in 2022 scab plots was low; data will be sent out soon.

Greg Porter: colleague Jay Hao continues to screen for pink rot and soft rot resistance. Pink rot data comes from a field trial, which shows good differentiation between clones. The breeding program runs *Verticillium* and *Fusarium* resistance trials. Greg has already distributed scab resistance trial results.

Xinshun Qu: evaluated ~38 clones for resistance to common scab, early blight and late blight. Report has been sent out by email.

11. Breeding/Genetics Reports

Maine. Greg Porter will retire at the end of 2023. U ME hopes to hire a successor soon, to provide a year of overlap. Planted 45,000 single-hills, saved 2.7%. Program currently 50% russets / 40% round whites, chips, yellow flesh / 10% specialty. Disease resistance priorities are for late blight, potato virus Y, and scab. Use markers to identify clones with golden nematode and PVY resistance genes. Have begun to use Field Book app – has proven useful for field data collection, but not for grading line. Recent release of Caribou Russet: industry continues to be happy with it, seed acreage still going up. Although susceptible to internal heat necrosis, it has high yield and good quality, good tolerance to bruise and soft rot, and few internal defects. AF5280-5, a round white, performed well from FL to the Maritimes. AF6194-4 is another promising round white, with good resistance to common scab and PVY immune. AF5819-2 is high yielding, but eye depth and uniformity are possible issues. NDAF113484B-1 is a red with large tuber size and moderate scab resistance. A6289-2, a breeder’s choice last year, is being dropped; not pretty enough. MSAFB609-12 is resistant to PVY and late blight; a chipping clone. MSAFB635-15 will be in SNAC trials in 2023, suitable for out-of-the-field chipping, and resistant to *Verticillium*, tolerant to pink and soft rot; specific gravity higher than Atlantic.

New York. Severe drought in 2022 – no rain entire summer in our unirrigated seed plots. Finding harvest help was the most difficult it has ever been. Planted 18000 seedlings. Deer pressure was high, which complicated making selections. Most promising clones currently in program are NY163 (lightest fry color of any clone yet developed at Cornell) and NY174 and NY177 (which will both be in SNAC trials in 2023). The set of chipping clone NY181 is relatively high, a trait we have been increasingly selecting for.

North Carolina. Now use five-hill plots in first field year. Selected 13% of chipping clones, lower percentage of tablestock. Intend to discard all PVY susceptible clones (based on marker analysis) going forward. NC470-03 will be in SNAC trials in 2024. Have used European clones to bring in Ry-sto resistance gene. Are trying to push harvest date to 90-95 days after planting to select for earlier maturities. Will get a new storage cooler soon, which will triple current storage space.

USDA-ARS. 60% chip/30% table/10% diploid. Planted 28000 single-hill plots, 448 12-hill plots, 15 40-hill plots, 34 100-hill plots, and are also evaluating 29 advanced clones. Working with U FL to study heat tolerance, NUE, and PUE.

AAFC. Working towards a four-hill system for first field year. 35000 seedlings in 2022 (mix of single and 3-4 hill plots). Field years 3 and 4 represent preliminary trials, while field years 5+ are national trials. Program is increasing emphasis on French fry varieties. Released six table varieties in 2022, one of which now has plant breeders’ rights. Use a small plot-harvester from 3rd year on, which saves a lot of labor. Have optical sorters at all major national trial sites. Have begun to use genomic selection to choose parents. Using DArTag markers, find get acceptable DNA from tuber eyes. Use Potatobase for recordkeeping and like it.

Florida. Made 160 crosses, produced seedling tubers from 4000 clones, planted 7000 single-hill plots (and selected 115). Are using Field Book app for data collection and UAV imaging, too. For parents, are only using those that have yielded more than 330 cwt/acre in the past with a specific gravity above 1.075.

12. Update on the NE2231 website/database/data reporting

Data we submit to Mark Clough is posted publicly unless we ask that it not be. New feature in neproject.medius.re is that number of years and number of locations is shown when comparing varieties.

13. Seed nursery – Greg Porter

Greg emailed all participants a list of 39 test clones and 12 standard varieties to be considered for evaluation.

**Breeder’s choices** (all sites must evaluate these):

AF6565-8 (chip)

AF6601-2 (chip)

NDAF141Y-3 (red)

NY174 (chip)

NY177 (chip)

BNC559-1 (purple skin, white flesh)

BNC917-2 (purple skin, white flesh)

**Standard varieties to include in all NE2231 trials**:

Atlantic

Chieftain

Katahdin

Kennebec

Snowden

Superior

Yukon Gold

The cost of seed per hundredweight has been fixed at $75 for many years, with U ME covering the ever-increasing costs of production. Virus tests alone are $100 per clone. Going forward, to spread the costs more fairly, each breeding program will pay $200 per entry in the seed nursery.

14. Eastern Region Potato Special Grant

We are currently in year 2 of 2 for the Potato Special Grant and will need to submit a proposal in Spring 2023. Plan is for the new breeder in Maine to assume responsibility as lead PI (just like Greg has done), as Maine is the largest potato producing state in the Northeast.

15. NE project rewrite.

We submitted a proposal early in 2022, which was approved. Our new project is now NE2231, and runs for five years (until 30 Sept 2027).

16. Grants/Funding: new opportunities?

AFRI grants for conventional plant breeding – mentioned by Jessica Shade – are something we should look into.

17. Old Business

Greg has already collected data from us to write annual reports.

18. New Business – none.

19. Committee Reports

Site Selection: Chris Clarke has graciously agreed to host our next meeting on 11-12 December 2023 in Beltsville, MD.

Resolutions (approved unanimously):

1. We recognize and congratulate Greg Porter for 40 years of excellent leadership and contribution to the potato industry, academia, and the time he dedicated as our project coordinator, and we wish him our best in retirement.

1. Craig Yencho, Emily Genther, and Mark Clough (NCSU) for hosting and assisting with the logistics of the meeting

1. Chris Clarke (USDA-ARS), David De Koeyer (AAFC), Marcio Resende (UFL), Ek Han Tan (Univ. of Maine) and Craig Yencho (NCSU) for giving presentations on their research to the project members

1. J. Leahy, Associate Director of the Maine Agricultural and Forest Experiment Station, for attending our meeting and providing guidance as our Administrative Advisor

1. Jessica Shade (National Program Leader for National Institute of Food and Agriculture/NIFA) for presenting an overview of the NIFA funding programs.

1. Mark Clough of North Carolina State University and Brad Halladay of Medius Ag for his on-going database management and electronic data capture efforts on behalf of the NE2231 project.

1. Walter De Jong from Cornell University for serving as the NE1731 Secretary;

1. All NE2231 presenters, potato breeders, agronomists, plant pathologists, industry, technical assistants, collaborators, and trial cooperators for their dedication to our group effort and their intellectual engagement in the process of potato improvement, selection, and variety development.

20. Other Business – none

21. Adjournment – 11:50 am