

## Basic Information

- **Project No. and Title:** [NE2231: Collaborative Potato Breeding and Variety Development Activities to Enhance Farm Sustainability in the Eastern US](#)
- **Period Covered:** 10/01/2023 to 09/30/2024
- **Date of Report:** 02/24/2025
- **Annual Meeting Dates:** 12/16 – 12/17/2024

## Participants

Paul Collins (USDA-ARS ME), Mark Clough (NCSU), Marcio Resende (UF), Bonny Oloka (NCSU), Xinshun Qu (PennState), Mario Andrade (UMaine), Walter DeJong (Cornell), Han Tan (UMaine), Chris Clarke (USDA-ARS MD), Brett Shelley (USDA-ARS MD), Jenile Livesyi (USDA-ARS MD), Leo Hoffman (UF), John Mason (VT), David DeKoeyer (AAFC), Erica Fava (AAFC), Tom Dixon (NB-DAAF), Mitchell Smith (NB-DAAF), Matt Falise (Cornell), Matt Kleinhenz (OH), Brad Halladay (MediusAg).

## Brief Summary of Minutes of Annual Meeting

Progress on potato breeding, pest and disease screening, genomic selection, which holds considerable promise to accelerate breeding progress, is now underway in ME, NC and FL. NY released a new chip variety in 2024, 'Titus', whose primary attribute high yield, mid-season maturity, and moderate specific gravity—the maturity makes it well suited for the northeast where the growing season is shorter than in the western US, while the modest specific gravity helps reduces the frequency of blackspot bruise in our stony soils. The cooperate-to-minimize redundancy of the NE potato breeding team, long a central feature of the project, continues, exemplified, for example, by PA testing clones from ME, NC and NY breeding programs for resistance to late blight, early blight, and common scab.

### Annual Meeting of Regional Project NE2231

**December 16 – 17, 2024**

**Held in person and hybrid mode over Zoom, 12 PM to 5 PM EST on Dec 16<sup>th</sup> and 8AM to 2 PM on Dec 17<sup>th</sup> and Building 4 at USDA ARS, Beltsville, MD**

**Agenda additions:** none; motioned to approve and seconded.

**Minutes of 2023 meetings;** motioned to approve and seconded.

### Introductions

Resolutions – Paul Collins; Marcio Resende; Han Tan.

Site selection – Chicago, IL during 2025 Potatoes USA? December 8th, 2025;

Nominations – Paul Collins will be the next chair, Mario Andrade will be the next vice-chair, and Leo Hoffman will be the next secretary.

### USDA-NIFA Christian Tobias

Christian is responsible for the AFRI genome phenome and potato breeding program, specifically overseeing the NE2231 multistate project. He provided an agency update, discussing various impacts and funding opportunities. He highlighted different funding sources, including the SCRI projects that support potatoes and sweet potatoes. AFRI funds research aligned with the six priorities outlined in the Farm Bill, providing opportunities for breeding and genetic research. Both foundational and applied science also present funding opportunities.

The Request for Applications (RFA) for the potato breeding program grant is scheduled to be posted in January 2025, with a funding amount of \$4 million, primarily resulting from industry lobbying efforts and support from boards. Additionally, the AG2PI RFA is also expected in January, offering \$2 million. He shared application resources and grant links to assist with the application process and tracking progress. Key documents needed include a data management plan and a mentoring plan, which are required for projects involving undergraduate and graduate students, as well as postdoctoral researchers.

### **Margaret Smith**

NE2231 recently completed its 2nd year of a 5-year project, so renewal decisions are not looming for a couple years. This year's report should cover the period from 10/1/2023 through 9/30/2024. Among other things, the report needs to emphasize accomplishments for each of the project objectives, and list individual impact statements for ways that your multistate project had an impact on stakeholders. A year from now, I will need to conduct a mid-term evaluation of NE2231. This focuses on accomplishments by project objective, impacts, coordination/linkages among participants, information exchange, and attendance/participation. Documenting those things well in annual reports helps me write a strong mid-term evaluation.

### **Research Presentations:**

#### **Brett Shelley - "Understanding the Growth and Diversity of Streptomyces Causing Common Scab."**

He began by introducing the characteristics of the disease. During the presentation, he described how a pathogenicity assay was set up, revealing that the gene *txtAB* is linked to disease severity. Quantitative PCR (qPCR) proved to be an effective method for assessing disease severity, as it can reflect field conditions. However, it is important to note that some environmental and spatial heterogeneity may affect the results. There is a good correlation between the amount of bacteria in the soil and the level of disease pressure, but it should not be considered an absolute factor. Instead, it functions well as part of a comprehensive model for decision-making regarding field use based on cultivar resistance. Shelley also highlighted differences among various *Streptomyces* species and their growth patterns throughout different times during the season. He presented the steps taken to assess the diversity of *Streptomyces* in the United States, noting the discovery of new species in North Dakota and plans to expand the sampling areas.

#### **Marcio Resende - presented the UF potato breeding program updates and recent activities.**

The activities presented were on Pre-breeding, GxE, and Genomic selection projects. In collaboration with USDA-ARS ME, pre-breeding efforts have targeted heat tolerance and nitrogen and phosphorus use efficiency. This work has successfully identified clones that demonstrate better adaptation and more efficient use of resources. Marcio also shared preliminary results from a GxE study utilizing the NCP data, where a Factor Analysis (FA) model was implemented to predict the performance of clones in untested environments and to inform regional recommendations for clone selection. Additionally, various models were evaluated within the genomic prediction project, which showed potential for different traits. The program is already applying prediction methods for specific gravity to assist in the selection process during the early generations.

#### **Don Weber – USDA-ARS research entomologist, presented on the topic of the Colorado potato beetle and tools for behavioral control.**

He began with a brief introduction to the Colorado potato beetle, highlighting its destructive impact on potato crops. Notably, he emphasized that this is a constructed agroecosystem, as neither the potato nor the beetle is native to the area. Weber provided a list of chemicals to which the beetle has developed resistance and discussed various management practices, including chemical controls, biological control, cultural practices, and plant resistance. However, the primary focus of his talk was on behavioral control. He addressed the use of pest pheromones, predator pheromones, and plant volatiles in managing the beetle populations. In experiments, males of the beetle species stayed longer on plants that had previously been exposed to females, demonstrating a preference observed in a one-choice experiment where plants were either exposed to females and males or not. Weber described research conducted by Haber and Weber in 2021, which tested the attraction of field Colorado potato beetles (CPB) to volatile cues from conspecifics and potato plants. The results indicated that beetles were 2.3 times more responsive to plants treated with decamdiol compared to untreated plants. Additionally, he discussed the use of the predator, the spined soldier bug, employing its pheromone to deter beetles from feeding on plants. The synthetic pheromone produced non-consumptive effects on the beetle, leading to fewer larvae and less damage to plants, resulting in an impact on tuber yields. Interestingly, the pheromone also affected other CPB predators. Weber concluded by highlighting the importance of integrating these behavioral control strategies to reduce reliance on chemical control measures.

## Site Reports

FL – Potato acreage was ~19,000 acres. We had a good season, with good weather through the season, resulting in high specific gravity.

OH – acreage still low, a few thousand acres. Matt described the season as experiencing two extremes. In the South, it was primarily very dry, with only the areas that received irrigation performing well. In contrast, regions without supplementary irrigation suffered, resulting in poor crop quality. The rainfall was unevenly distributed, which negatively affected tuber quality and led to issues such as secondary growth. On the positive side, the season made field management easier.

ME – Potato acreage was 54,000 for the 2024 season (NASS). Yields in 2024 were higher than in 2023, at 340cwt/acre total tuber yield. The industry is about 60% fry and chips, with a higher number of fry growers, 20% fresh, and 20% seed. There was one late blight case registered in the state.

NY – Potato acreage 12,000 and 15,000. season weather was dry, some wind damage in the raised plots, and the yield was average.

NC – Potato acreage ~13,000 – Some planting occurred in mid to late February, much of this acreage had to be replanted in March due to wet, cold weather in early March. Overall, the season was very dry in April and June rainfall was just over a half inch. In July untimely rains cause late season rot and drops in gravity and yield. Still early season harvests had adequate yields and high gravity.

PA – Potato acreage ~5,000. 60% chipping and 40% fresh market. Season with high temperatures and dry conditions. In the research trial, the yields were below average and high hollow heart. PVY increases in this season.

NB/DAAF - Approximately 53,000 planted acres this year with very little abandonment. In late July and early August, things looked favorable for potential record yields, however, it turned quite dry. Overall, yields look decent around 320 cwt. Round whites, reds, yellows, and chippers yielded well. Russets came out at average or slightly below. The quality looks good and much better than in 2023. No major storage issues to speak of.

## Industry Representatives

N.A.

## Pathology Reports

Xinshun Qu: 39 potato cultivars and advanced clones were evaluated for resistance to early and late blight, and 40 for common scab.

David DeKoyer the scab plot did not show good symptom expression for the screening trial.

Group discussion about the increase in PVY over different regions.

## Breeding Reports

Maine. Planted 39,000 single-hills, saved 1.3%. The program currently has 55% russets / 35% chips and round whites fresh / 10% reds/specialty. Disease resistance priorities are for late blight, potato virus Y, and common scab. Use markers to identify clones with golden nematode and PVY resistance genes (3 sources). Varieties that graduated from the regional program have been evaluated for commercial release.

New York. A total of 18,000 to 20,000 first-year clones were planted using 4-hill plots, with a distribution of approximately 70% for chipping and 30% for fresh market. Selection in the third year based on table clones. For the fresh market, Walter mentioned that round whites are considered a niche market, while reds and yellows are the priority for the program. All advanced clones in the program exhibit resistance to PVY, except for some yellow clones. The *adg* gene is the most common source of this resistance. The NY174 clone is showing promise for release depending on industry needs. However, its size profile is reduced, so adjustments may be necessary to increase the sizes.

North Carolina. A total of 6,250 first-year clones were planted using 5-hill plots; during selection, a 10% intensity selection was deployed, remaining 622 clones were to second year (the lowest since we began to use 5 plant plot system) – waiting for lab results for PVY. Aiming 390 to go to the field. 70/30 chippers/fresh. In year 2 we planted 2 phenotyping trials and in year 3 we planted 2 phenotyping trials in NC and the University of Florida also planted the same lines in a phenotyping trial. Data from 2nd and 3rd trials (5 trials) were used to determine the top 10% of lines to move forward to year 4 trialing upcoming in 2025. NC821-30 continues to be cleaned up in the Potatoes USA program. High PVS levels hold back its advancement into the Fast track system.

USDA-ARS ME - program planted a total of 33,000 single-hills this season. Currently, 10% of the program consists of diploid varieties. The diploid materials used in the USDA-ARS program are sourced from both its own research and other programs. However, the program still has fewer entries in the most advanced stages due to a lack of leadership in breeding over the past few years.

AAFC - David DeKoeyer presented the program's numbers: approximately 190,000 TPS from 262 families, with around 23,000 clones in year one using 1-4 hill plots. From these, 1,050 clones were selected for the next season. The program utilizes MAS for PVY, PVX, H1, and potato wart. The disease screening process for potato wart is progressing well, demonstrating good symptom expression. However, isolating the pathotype from field trials proves challenging, making it difficult to identify the specific strain present. While some work has been done on markers, they still need to be validated.

Florida – program is slowing growing; secured funding to update the grading line and cold storage at Hasting; planted 8,000 year-one clones using 1 to 4-hill plots, goal to get to 12,000 4-hills plot year one; 60-70% chips and 40-30% fresh; Hastings incorporated some new land in the station, that has been used to the year one trial; Breeder seed was produced on an off-site in Citra, FL, which allows the program to have new seed to send to cooperators and national trials. No internal quality issues were reported in the trials.

### **NE2231 Trial Data, Reporting**

The data we submit to Mark Clough will be posted publicly unless we request otherwise. A new feature in neproject.medius.re was demonstrated by Brad Halladay from MediusAg, which includes new weather data available for each trial as well as new methods to split the data for comparing the performance of clones. Matt Kleinhenz and Mario Andrade suggested that weather-related data linked to plant development should be included on the site. Additionally, Marcio and Mario inquired whether it is possible to download pedigree data in an Excel file containing three columns: clone, parent 1, and parent 2.

**Seed Nursery** – Mario Andrade. Breeder's choices (all sites must evaluate these):

AF6465-7 (russet), AF6550-2 (chip/dual), AF6551-4 (fresh), AF6671-10 (chip), NY179 (chip), NY180 (chip), NY181 (chip), B3403-6 (chip)

Standard varieties to include in all NE2231 trials:

Atlantic, Chieftain, Katahdin, Kennebec, Snowden, Superior, Yukon Gold

**Eastern Region USDA-NIFA Potato Special Grant project** – We are currently in year 2 of 2 for the Potato Special Grant and will need to submit a proposal in Spring 2025.

### **Resolution Committee**

1. We recognize Christopher Clarke, ARS Beltsville and his lab for providing all the wonderful snacks and local arrangements for our 2024 NE2231 to enable us to meet in person and in hybrid mode on zoom on December the sixteenth and seventeenth of the year two thousand and twenty four.
2. Although Greg Porter is now fully retired, we would like to remind the 2025 committee that in 2024, the resolutions committee had wanted us to invite Greg to give the talk "Reflections on 38 years of regional project activity, NE107 to NE2231" in our next meeting. This committee unfortunately, did not have the foresight during the organizational phase to extend this invitation this time around.

3. Han Tan, Paul Collins and Mario Andrade for being the current chair, vice-chair and secretary of this meeting.
4. Leo Hoffman for stepping up to be the secretary for the 2025 NE2231 meeting.
5. We would also like to thank Christian Tobias (National Program Leader for National Institute of Food and Agriculture/NIFA) for presenting an overview of the NIFA funding programs.
5. Brett Shelley (USDA-ARS), Don Weber (USDA-ARS) and Marcio Resende (UF) for giving presentations on their research to the project members.
8. Mark Clough of North Carolina State University for his leadership on the database management and electronic data capture efforts on behalf of the NE2231 project.
9. Craig Yencho of North Carolina State University is recognized for his decades of leadership in the Eastern Breeders group. We wish you a speedy recovery and hope you get well soon.
10. Mario Andrade for leading the discussion on the Eastern Regional Potato Special Grant Project, including the budget, RFA, last year's reviews, and new ideas.
11. 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.

#### **Meeting Adjourned**

## **Accomplishments**

#### **Project Accomplishments:**

This multidisciplinary, regional project utilizes the potato breeding and variety development expertise in the eastern US to breed, select, and develop new potato varieties for growers at all scales of production. It encourages the pooling of regional resources and promotes increased communication within the potato community located in the northeast, mid-Atlantic, and southeast. The overarching goal of this project is to identify new potato varieties for use in the Northeastern, mid-Atlantic, and Southeastern US, which will contribute to a more sustainable and profitable potato industry.

Even after a variety has been released, it can take many years until it becomes clear how well the variety has met industry needs. Looking back at varieties released by this project over the past ten years, the following have had an especially significant impact (ranking among the top 100 potato varieties grown in the U.S. in 2024 based on seed acreage). Caribou Russet, released by ME in 2015 for fry processing and russet fresh market, has been rapidly adopted due to high yields, scab and verticillium resistance, and excellent consumer quality. Certified seed acreage rose to 2268 acres, making it the 10<sup>th</sup> most widely grown variety in 2024. Hamlin Russet was released by ME in 2021 for early fry processing and russet fresh market and is moderately resistant to common scab; seed acreage in 2024 rose to 543 acres (ranks 36<sup>th</sup> in the US). Lady Liberty, a chipping variety released by NY in 2018, is resistant to the golden nematode and PVY; at 670 acres of seed, it ranked 29<sup>th</sup> in 2023. Bliss, another NY chipping variety, was released in early 2023 and currently ranks 58<sup>th</sup> (248 acres of seed). The NY-released Lamoka is now the 7<sup>th</sup> most planted variety, with 3489 acres in 2024. On the east coast, potato varieties released by the NE2231 group were grown on 3,869 seed acres in Maine and New York during 2024, with a seed potato value of approximately \$11.9 million. This seed crop has the potential to plant 33,990 acres in 2025, with a ware value estimated at \$110.5 million.

The NE2231 project and its predecessors have: 1) allowed potato breeders to share breeding materials and trial results; 2) facilitated potato germplasm selection and evaluation under diverse environmental conditions in the eastern US; 3) given research and extension personnel the opportunity to evaluate new selections from several potato breeding programs; 4) facilitated regional germplasm screening for specific characteristics at a single location (e.g. early blight, late blight, and common scab resistance in PA; scab and virus resistance in ME; nematode resistance in NY); 5) developed variety profiles and cultural recommendations for potato selections that enter commercial production; and 6) resulted in the release and adoption of many important US potato cultivars.

Potato breeding for improved quality, stress tolerance, and pest resistance was conducted in FL, ME, NY, and NC in 2024. During the year, our programs collectively generated 972 new tetraploid families (767,228 seeds) from crosses using parents with desirable quality, utilization, adaptation, and/or pest resistance traits. Progeny (74,438) from earlier crosses were field-selected, resulting in 3017 clones that will be further evaluated during 2025 under conditions with diverse abiotic and biotic stress in the eastern U.S. and beyond. Our breeding programs focus on specific pest, climatic stress, and marketing issues, so that regional resources are used efficiently. For example, ME is the only breeding program in the region that focuses on russets and long whites for processing. In terms of pests and diseases, ME emphasizes research on late blight, pink rot, potato virus Y (PVY), soft rot, and scab resistance. NY focuses on white-skinned chipping crosses but also selects fresh-market clones of varying skin and flesh colors and emphasizes resistance to golden nematode, scab, and PVY, but also crosses for late blight, and white cyst nematode.

Our potato breeding programs are focused on developing plant materials with greater resilience to heat stress and climate change, with our NC and FL programs particularly suited to developing heat-stress-tolerant germplasm. NC's potato breeding program focuses on heat-stress tolerance, PVY resistance, and resistance to internal heat necrosis. For the fresh market, NC's priority is to find a replacement for Dark Red Norland because of its low yield and variable skin color in stressful SE environments. During 2021, FL initiated a new potato breeding program that will further strengthen our region's efforts to create heat-tolerant potato germplasm with adaptation to the SE. In 2024, 115 FL crosses resulted in 33,390 true seed for future selection and variety development. FL evaluated 7,590 first-year clones during 2024, selecting 70 for continued evaluation in 2025.

Disease screening is an important part of potato variety development. Disease-resistant varieties generated by this project have the potential to greatly reduce growers' losses to devastating diseases such as late blight, pink rot, and PVY and can also reduce agricultural chemical use and production costs. Screening trials in 2024 in PA evaluated our NE2231 and advanced breeding clones for early blight (56 clones), late blight (245 clones), and common scab resistance (66 clones) tolerance. NY, NC, and ME all made extensive use of molecular markers in 2024 to increase the frequency of PVY resistance in their programs.

To improve potatoes for resistance to heat stress, in 2024, FL planted, for a second year, a trial to evaluate heat tolerance in a diverse population. A severe hailstorm damaged the field and hindered data collection; the trial will be repeated in 2025. The first year of data revealed cultivars that performed better than commercial checks under high heat conditions. Those cultivars were included in FL crossing blocks to generate new populations for future evaluation. To understand the genetics of nitrogen uptake efficiency (NUE), the same population evaluated for heat tolerance was also used to evaluate genotypic response to varying amounts of applied nitrogen. As expected, genotype by environment interaction was observed, and the experiment will be repeated in 2025.

Field trials were conducted from ME to FL to help select promising potato clones worthy of commercialization. Advanced clones from our project were introduced to growers through field days, presentations, publications, websites, and direct contact with stakeholders. Nine advanced clones were entered into tissue culture programs during 2024, leading to commercial seed production for continued research and development. Several advanced clones and newly released varieties are currently being evaluated in on-farm commercial-scale trials for their potential use across the US.

Each eastern breeding program submits its most promising advanced clones to the NE2231 regional project's seed nursery in Maine, where a clean seed stock of certified seed is produced and distributed to all cooperators. During 2024, the project distributed seed potatoes for 12 regional potato variety trials conducted in seven states and two Canadian provinces. Eleven standard varieties and 35 experimental clones were tested for yield, tuber quality, and pest resistance. All trials were grown using standard commercial cultural practices. Marketable yield, tuber quality and appearance, maturity, storage life and processing potential were evaluated and compared to commercial standards. The diverse environmental conditions present in the eastern U.S. allow us to quickly screen potato clones for stress sensitivity as well as for adaptation and suitability to specific growing areas and markets. Multi-site evaluation of early-generation clones speeds the breeding and selection process and enables us to identify both broadly- and specifically-adapted clones that will be useful to the U.S. potato industry and potato growers at all scales of production. During the 2025 season, we will continue the highly important regional trial, which is essential for identifying clones with the greatest potential for advancement to larger commercial trials. Each regional trial site reports results to their local stakeholders and submits their data to the project website coordinator located in NC.

Our project web site and searchable database continue to grow in size and utility. The database has now migrated to the more powerful and user-friendly Variety Data Management (VDM) platform (<https://neproject.medius.re/>). The web site provides current contact information for project cooperators and recent research reports, as well as access to our searchable regional variety database and a dynamic summary generator for all released varieties. This new database can provide side-by-side

comparative data for potato clones and varieties as well as advanced analytical tools. It is a valuable tool for researchers, Extension, and stakeholders.

#### **New varieties and descriptions.**

Bliss, formerly evaluated as NY163, was named and released in early 2023. Mid-late season chipstock, its principal strength is exceptionally light fry color out of cold storage. Yields are similar to those of the Atlantic, with a specific gravity of about 0.005 less than that of the Atlantic. Tubers are round to oblong with lightly netted skin. Moderate resistance to common scab. Resistant to race Ro1 of the golden nematode.

#### **Advanced Experimental Potato Clones Showing Particular Promise in 2024 include:**

NDAF113484B-1 (ND060570B-1R x ND8555-8R) is an attractive, mid-season, red with bright skin that holds its color well in storage. It has white flesh and mid-season maturity with moderate scab, shatter, and blackspot resistance. Tuber size and yields are similar to those of Dark Red Norland. It has had low hollow heart incidence but has had internal heat necrosis problems in several southern and mid-Atlantic trials.

AF5071-2 (AF3011-29 x AF3051-2) is a late-maturing russet with good fry quality, fair tuber appearance, and high yields. Its specific gravity is higher than that of Russet Burbank, and the fry color from storage has been good. Fry color uniformity is very good. It is moderately susceptible to scab and hollow heart but has moderate verticillium, blackspot, and shatter resistance. It was a strong performer in the Potatoes USA National Fry Processing Trials.

AF6377-10 - dual-purpose russet, long tubers, medium-late maturity, very high yields, moderate gravity, good tuber appearance, good fry color and uniformity, PVY resistance, and moderate resistance to shatter.

AF5521-1 (AF4320-7 x AF2291-10), a dual-purpose russet with large, long-blocky tubers, medium-late maturity, high yields, high gravity, excellent fry color, and outstanding fry color uniformity. It is resistant to golden nematode and moderately resistant to early blight, shatter, and blackspot. It was a strong performer in the Potatoes USA National Fry Processing Trials.

AF5707-1 (A93575-4 x Dakota Trailblazer) dual-purpose russet, long tubers, medium-late maturity, very high yields, moderate gravity, good tuber appearance, good fry color and uniformity, moderate resistance to soft rot, blackspot, and shatter.

AF5819-2 (Dakota Crisp x AF4552-5), a medium-maturing fresh market clone with bright skin, round tubers, high yields, low specific gravity, moderate scab resistance, medium-sized tubers, and good internal quality. It also has pink rot, soft rot, and shatter resistance.

AF6200-4 (Sebec x Tundra) Medium-late maturing, high yields, slightly netted skin with fair tuber appearance, moderate specific gravity, good chip color, moderate resistance to VW, fusarium, soft rot, and shatter.

AF6671-10 – Medium maturing, high yields, high specific gravity, netted skin with a fair appearance, low external defects, larger tuber size profile, good chip color, resistance to shatter bruise and blackspot. Good performance at the NCP (Potatoes USA) national trial in the fresh (southern) locations in 2024.

AF6206-5 (AF4386-16 x Lamoka) a medium-late-maturing chipping clone with high yields, low internal defects incidence, excellent chip color, and high specific gravity. It has moderate external defects incidence being especially prone to growth cracks, but low internal defects incidence. It has bruise tolerance, moderate scab resistance, and golden nematode resistance.

NC470-3 (Marcy X NC182-5) – Selected in 2012 this chipping clone is for fresh out of field chipping. Vines tend to be vigorous, mature late, show little to no ozone damage, exhibit resistance to early blight, and have an upright to spreading growth habit. Tubers are mostly oblong, medium to large in size, with brown netted skin, yields have averaged 106% of Atlantic, gravities are +/- 4 points of Atlantic and do not express internal heat necrosis. Hollow heart incidence is similar to Atlantic at 2% across all yield trials. This clone is also resistant to PVY (Ryadg marker) and has some tolerance to common scab and moderate resistance to late blight. Has been in NCPT trials and entering SNAC trials in 2024.

NC821-30 (NC41-1 X NC182-5) – Selected in 2015 this chipping clone is for fresh out of field chipping. Vines are vigorous and late maturing with a spreading growth habit. Tubers are mostly round, medium in size with very few if any oversize. Skins are tan and moderately smooth. Yields have averaged 91% of Atlantic gravities are + 4 to 6 points higher than Atlantic and do not express internal heat necrosis. Hollow heart and brown center incidence is less than Atlantic across all yield trials. This clone is also resistant to PVY (Ryadg marker), Golden nematode (H1 marker) and has some tolerance to early blight and late blight. Has been in EGSS, NCPT and is preparing for entry into SNAC in the coming seasons.

NY165 (NY148 x F48-4) is a mid-season, moderate to high specific gravity, chip stock clone. It has round to oblong tubers with slightly netted skin. Yields have been high in many NY trials; however, specific gravity may not be high enough for commercialization outside the northeast. Chip color from storage is very good. It has moderate scab resistance and is resistant to golden nematode (Ro1) and PVY.

NY174 (NY148 x E48-2) is a full-season, moderate to high specific gravity, chip stock clone. It has round to oblong tubers with slightly netted skin. Yields have been high in many NY trials averaging 122% of Atlantic (11 trials). Low levels of internal and external defects have been observed to date. Chip color from storage is very good. It has moderate scab resistance and is resistant to golden nematode (Ro1) and PVY.

NY177 (NY148 x E48-2) is a mid- to late-season, high specific gravity, chip stock clone. It has round to oblong tubers with slightly netted skin. Yields have been high in many NY trials averaging 115% of Atlantic (14 trials). Low levels of internal and external defects have been observed to date. Chip color from storage is very good. It has moderate scab resistance and is resistant to golden nematode (Ro1) and PVY.

#### **Short-term Outcomes:**

1. Eastern potato growers need new potato varieties which are highly productive and less susceptible to stress, diseases, and insects than current varieties. This regional potato breeding and trial network produces new potato varieties and evaluates their potential to serve fresh, processing, and specialty potato markets in the East. These new varieties will improve grower profitability by increasing yields, enhancing market quality, and/or decreasing costs associated with pests. Farm gates receipts for Eastern potatoes exceed \$460M per year. Potatoes can cost more than \$3000 per acre to produce and devastating diseases such as pink rot and/or late blight can totally destroy the crop. Resistant varieties greatly decrease the risk of losses and, in the case of late blight resistance and plant viruses, can reduce production costs by reducing the number of chemical sprays applied to protect the crop. Several areas in NY could not produce potatoes without the golden nematode resistant varieties developed as part of this and other research projects. Potato virus Y (PVY) has become increasingly difficult to control and seed producers have lost millions of dollars to this pest in recent years. All of our breeding programs develop new plant materials with resistance or tolerance to one or more of these important plant pests. As noted above, several of our advanced selections that are in or heading toward commercialization trials are resistant to one or more important pests. Internal heat necrosis (IHN) is a common stress-related defect in the mid-Atlantic and southeastern U.S. While several of our trial sites help our programs screen for this defect, NC provides an excellent screening site for selecting more stress-tolerant potato varieties. In 2023 NC screened 284 clones from other eastern potato breeding programs to assess heat tolerance and adaptation to the southeast.
2. Genomic selection holds much promise to accelerate breeding progress. NC phenotyped and genotyped (with assistance from FL) 600 second year clones to generate breeding values for specific gravity and marketable yield; this data was used to inform selection of third year clones. ME genotyped another 188 third year clones, bringing their total training population up to 768 genotyped and phenotyped clones. FL genotyped a population that includes the chipping and fresh market parents of their nascent breeding program at 22,000 SNP loci using the Flex-Seq platform. Preliminary training of their genomic selection models resulted in prediction accuracies of 0.58 for marketable yield and 0.44 for specific gravity.
3. Field trials were conducted from ME to FL to help select promising potato clones that are worthy of commercialization. Advanced clones from our project were introduced to growers through field days, presentations, publications, web sites, and direct contact with stakeholders. Over the years, the eastern regional project has resulted in the release of many commercially important potato varieties. Just in the past decade our releases include the following 'top 100' cultivars: Caribou Russet, released by ME in 2015



for fry processing and russet fresh market, was the 10<sup>th</sup> most widely grown variety in 2023; Lady Liberty, a chipping variety released by NY in 2018, ranked 36<sup>th</sup> in 2023; Hamlin Russet, released by ME during 2021 for early fry processing and russet fresh market, currently ranks 42<sup>nd</sup>; Bliss, another NY chipping variety, was released in early 2023 and currently ranks 76<sup>th</sup>. Older and still widely grown varieties developed by this project include: Lamoka, the most widely grown cold-storage chipping variety in the US (released by NY in 2011; ranks 7<sup>th</sup>); Waneta, another NY cold-storage processing variety (released in 2011, ranks 14<sup>th</sup>); Lehigh, a yellow fleshed cultivar (released by NY in 2007, ranks 47<sup>th</sup>). Historical potato seed acreage data is available at <https://potatoassociation.org/seed-acres-reports/>

4. The project places special emphasis on breeding and selecting clones with resistance to late blight, early blight, scab, golden nematode races Ro1 and Ro2, and PVY. Advanced clones and recent variety releases from our programs typically have resistance to several important potato pests and/or physiological disorders. As an example, Caribou Russet has resistance to verticillium wilt, common scab, soft rot, and powdery scab as well as excellent bruise resistance. Cornell releases typically have golden nematode resistance and scab tolerance, plus many recent releases also have resistance to PVY and late blight. Brodie (NY140) was released during 2018 and is the first U.S. cultivar with resistance to golden nematode race Ro2 and it is also resistant to race Ro1. Ro1 is the long-time golden nematode pest in NY, while Ro2 is a newer race that has become increasingly difficult to manage. Golden nematode cannot be effectively managed without resistant varieties. Marker-assisted selection for PVY and golden nematode resistance is now an integral part of our breeding programs. Disease screening trials in PA, evaluated varieties and advanced breeding clones for early blight, late blight, and common scab resistance. ME also conducts screening studies for susceptibility to important potato diseases (e.g. verticillium wilt, common scab, soft rot, pink rot, fusarium, PVY, etc.). NY screens all of its advanced clones for common scab (field screening) and golden nematode (bioassay) resistance. These data are used to select resistant varieties/breeding clones. Disease resistant varieties generated by this project have the potential to greatly reduce growers' losses to devastating diseases such as late blight and can also reduce production costs.
5. Our project web site and searchable database continues to grow in size and utility. The database has now migrated to the more powerful, user-friendly Variety Data Management (VDM) platform (<https://neproject.medius.re/>). The web site provides current contact information for project cooperators and recent research reports, as well as access to our searchable regional variety database and a dynamic summary generator for all released varieties. This new database can provide side-by-side comparative data for potato clones and varieties as well as advanced analytical tools which help stakeholders and researchers determine which advanced clones are worthy of commercialization trials.

## Outputs:

### Cultivars released this year:

Titus, formerly evaluated as NY165, was named and released in early 2024. Titus is a chipping variety with high yield, mid-season maturity, and moderate specific gravity. The maturity makes it well suited for the northeast where the growing season is shorter than in the western US, while the modest specific gravity helps reduce the frequency of blackspot bruise in our stony soils. Chip color from storage is very good. Titus is moderately resistant to common scab and resistant to golden nematode (race Ro1), late blight (race US-23) and PVY.

## Impacts

1. Titus is a new potato variety released in 2024 by NY. In 2024, 35 advanced NE2231 clones from ME, NY, NC, and USDA were evaluated in seven states and in two provinces in Canada.
2. Potato varieties from NE2231 breeding efforts have been widely adopted in the U.S. Several varieties rank among the top 100 most planted, including Lamoka (7<sup>th</sup>), Caribou Russet (10<sup>th</sup>), Waneta (16<sup>th</sup>), Lady Liberty (29<sup>th</sup>), Hamlin Russet (36<sup>th</sup>), Bliss (58<sup>th</sup>), and Lehigh (63<sup>rd</sup>).
3. Nationwide, potato varieties released by NE2231 were grown on 9,094 seed acres in 2024, with an approximate seed value of \$31.8 million. The resulting seed crop can plant 90,939 acres in 2025, with a retail value estimated at \$295.5 million.
4. Collaborative breeding for heat stress tolerance and wide adaptation involved active breeding efforts in ME, NY, NC, and FL and evaluation across seven states, from ME to FL.

5. SolCap and DArTseq genotyping of third-year selections was performed in all breeding programs to increase selection accuracy and enable the creation of genomic selection models that can be implemented to increase genetic gains.
6. The updated NE2231 website and searchable database provide project reports, contact information, and data and analytical tools to enable side-by-side clone and variety comparisons over multiple years from all trial locations across the Eastern United States. This tool is publicly available and can be accessed by any stakeholders from the potato industry.

## Publications

### Refereed Journal Papers

- Agha, H.I., J.B. Endelman, J. Chittwood-Brown, M. Clough, J. Coombs, W.S. De Jong, D.S. Douches, C. Higgins, D. Holm, R. Novy, M.F.R. Resende, V. Sathuvalli, A. L. Thompson, G. C. Yencho, L. Zotarelli, L.M. Shannon. 2024. Genotype-by-Environment interactions and local adaptation shape selection in the United States National Chip Processing Trial. *Theoretical and Applied Genetics*. 137:99. <https://doi.org/10.1007/s00122-024-04610-3>
- da Silva, A.L.B.R., H.B. Dias, R. Gupta, L. Zotarelli, S. Asseng, M.D. Dukes, C. Porter, G. Hoogenboom. 2024. Assessing the impact of irrigation and nitrogen management on potato performance under varied climate in Florida. *Agricultural Water Management*, 295:108769. <https://doi.org/10.1016/j.agwat.2024.108769>
- Sandhu, A.K., A.K. Sharma, N. Kaur, S.K. Sindhu, R. Singh, L. Zotarelli, K.T. Morgan, C.T. Christensen, L. Sharma. 2024. Evaluate the phosphorus application response in potatoes under high phosphorus soil test in Florida. Farming System : (2)100067. <https://doi.org/10.1016/j.farsys.2023.100067>
- Sharma, A.K., A. Singh, S.K. Sandhu; L. Zotarelli, L. Sharma. 2024. Fresh leaf spectroscopy to estimate the crop nutrient status of potato (*Solanum tuberosum* L.). *Potato Res.* <https://doi.org/10.1007/s11540-024-09766-5>
- Sharma, A.K., S.K. Sandhu, A. Singh, L. Zotarelli, L. Sharma. 2024. Optimizing UAV hyperspectral imaging for predictive analysis of nutrient concentrations, biomass growth, and yield prediction of potatoes. *Am. J. Potato Res.* <https://doi.org/10.1007/s12230-024-09966-2>
- Sharma, A.K., A.K. Sandhu, S.K. Sidhu, S. Riley, U. Ahmad, W. Griffin, L. Zotarelli, L. K. Sharma. 2023. Sulfur source effects on soil sulfur concentration, vegetation indices, biomass, and sulfur uptake in potato. *Agrosystems, Geosciences & Environment*, 7:e20530. <https://doi.org/10.1002/agg2.20530>
- Sharma, A.K., L. Zotarelli, C.T. Christensen, L. K. Sharma. 2024. Assessing the impact of sulfur application on potato sulfur uptake and yield in sandy soils of Florida. *Potato Research*. <https://doi.org/10.1007/s11540-024-09727-y>
- Sidhu, S.K., L. Zotarelli, L.K. Sharma. 2024. A Review of potassium significance and management approaches in potato production under sandy soils. *Journal of Sustainable Agriculture and Environment*. 2024:3:e12106. <https://doi.org/10.1002/sae2.12106>
- Shelley BA, Pandey B, Sarwar A, Douches D, Collins P, Qu X, Pasche J, Clarke CR. 2024. The Role of Soil Abundance of *TxtAB* in Potato Common Scab Disease Severity. *Phytopathology* 114:1176-1185.
- Ma, X., Zhang, X., Stodghill, P., Rioux, R., Shrestha, S., Babler, B., Rivedal, H.M., Frost, K., **Hao, J.**, Secor, G., and Swingle, B. 2024. Analysis of soft rot Pectobacteriaceae population diversity in US potato growing regions between 2015 and 2022. *Frontiers in Microbiology* 15:1403121. DOI: 10.3389/fmicb.2024.140312.
- Klasek, S., Crants, J., Abbas, T. Ashley, K., Bolton, M. Celovsky, M., Gudmestead, N. **Hao, J.**, Ibarra Caballero, J., Jahn, C., Kamgan Nkuekam, G., Lankau, R., Larkin, R., Lopez, E., Miller, J., Moore, A., Pasche, J., Ruark, M., Schroeder, B., Shan, S., Skillman, V., Srou, A., Stasko, A., Steinke, K., and Steward, J. 2024. Potato soil core microbiomes are regionally variable across the continental US. *Phytomiomes Journal* 8:168-178. DOI: [10.1094/PBIOMES-07-23-0060-R](https://doi.org/10.1094/PBIOMES-07-23-0060-R).
- Teng, L., J., Zhang, X., Fan, X. W. Askarizadeh, M., Ashley, K., Morris, Gao, Y.H., S., Chim, B.K., and **Hao, J.** 2024. Field evaluation of Orondis Gold for controlling pink rot of potato in Maine, 2023. *Plant Disease Management Reports*, 18: V029.
- Gao, Y.H., Zhang, X.Y., Teng, L.J., Fan, X.W., Askarizadeh, M., Ashley, K.A., Morris, S., Zhang, X.Y., and **Hao, J.** 2024. Effect of seed treatment using fungicides for the control of black scurf of potato in Maine, 2023. *Plant Disease Management Reports*, 18: ST003.
- Fan, X.W., Zhang, X.Y., Teng, L.J., Morris, S., Gao, Y.H., Askarizadeh, M., Ashley, K.A., Chim, B.K., Zhang, X., and **Hao, J.J.** 2024. Evaluation of fungicides for controlling foliar diseases of potatoes in Maine, 2023. *Plant Disease Management Reports*, 18: V060.
- Fan, X.W., Zhang, X., Teng, L.J., Morris, S., Gao, Y.H., Askarizadeh, M., Ashley, K.A., Chim, B.K., Zhang, X.Y., and **Hao, J.** 2024. Evaluation of multiple fungicides to control foliar diseases of potatoes in Maine, 2023. *Plant Disease Management Reports*, 18: V059.
- Teng, L., J., Zhang, X., Fan, X. W. Askarizadeh, M., Gao, Y.H., Ashley, K., Morris, S., Chim, B.K., Zhang, X.Y., Porter, G., and **Hao, J.** 2024. Examining resistance of potato variety and clones for pink rot in 2023. *Plant Disease Management Reports*, 18: V049.

Williams, N., Kornelis, G., Tan, E. H., Collins, P. (2024) Report of a Spontaneous Potato Monoploid Resulting from a Biparental Diploid Potato Cross. American Journal of Potato Research <https://doi.org/10.1007/s12230-024-09971-5>

## Published Abstracts

- Sharma, A., L. Zotarelli, A. Singh, L. Sharma. 2024. Potato yield prediction using UAV-Hyperspectral imaging [Abstract]. ASA, CSSA, SSSA International Annual Meeting, San Antonio, TX. <https://scisoc.confex.com/scisoc/2024am/meetingapp.cgi/Paper/161851>
- Ricken, E. C.<sup>6</sup>, J. de Matos Oliveira, B.A. Silva, C.T. Christensen, E. van Santen, L. Zotarelli. 2024. Improving phosphorus fertilizer use efficiency in potato crop using different sources and timings of application. [Abstract]. ASA, CSSA, SSSA International Annual Meeting, San Antonio, TX. <https://scisoc.confex.com/scisoc/2024am/meetingapp.cgi/Paper/161605>
- Sidhu, S. K., A. Sharma, R. Singh, S. Singh, R. Singh, L. Zotarelli, L. Sharma. 2024. Potassium interaction with nitrogen and phosphorus: yield response and fertilizer use efficiency in potato production [Abstract]. ASA, CSSA, SSSA International Annual Meeting, San Antonio, TX. <https://scisoc.confex.com/scisoc/2024am/meetingapp.cgi/Paper/160811>
- Sidhu, S. K., L. Zotarelli, E. Babaeian, L. Sharma, L. 2024. Potassium availability in sandy soils and limitations of soil-test based crop response [Abstract]. ASA, CSSA, SSSA International Annual Meeting, San Antonio, TX. <https://scisoc.confex.com/scisoc/2024am/meetingapp.cgi/Paper/162102>
- Zotarelli, L., E.C. Ricken, C.T. Christensen, E. van Santen, L. Sharma, K.T. Morgan. 2024. Regional evaluation of soil p availability and potato yield response to p-fertilizer in northeast Florida [Abstract]. ASA, CSSA, SSSA International Annual Meeting, San Antonio, TX. <https://scisoc.confex.com/scisoc/2024am/meetingapp.cgi/Paper/161628>
- Dhakal R., R. Gupta, L. Hoffman, C. Messina, G. Hoogenboom, L. Zotarelli, M. F. R. Resende. Genomic selection and crop growth modelling applied to potato breeding. 2024. 8th annual UF Plant Breeding Retreat August 7-8, 2024, Daytona Beach Shores, FL, USA.
- Agha HI, Endelman JB, Chitwood-Brown J, Clough M, Coombs J, De Jong WS, Douches DS, Higgins C, Holm D, Novy R, Resende MFR, Sathuvalli V, Thompson AL, Yencho CG, Zotarelli L, Shannon LM (2024) Genotype-by-Environment interactions and local adaptation shape selection in the United States National Chip Processing Trial. Theoretical and Applied Genetics 137:99. <https://doi.org/10.1007/s00122-024-04610-3>
- De Jong WS, Wang X, Halseth DE, Plaisted RL, Perry KL, Qu X, Paddock KM, Falise M, Dandurand L-M, Christ BJ, and Porter GA (2024) Brodie, a Dual-Purpose Chipping and Tablestock Variety with Resistance to Pathotypes Ro1 and Ro2 of the Golden Cyst Nematode and Partial Resistance to Pathotype Pa2/3 of the Pale Cyst Nematode. American Journal of Potato Research 101:45-51. <https://doi.org/10.1007/s12230-023-09939-x>
- Anglin NL, Yellareddygarri SKR, Gudmestad NC, Sathuvalli V, Brown CR, Feldman M, De Jong WS, Douches DS, Novy RG, Coombs JJ (2024) A Genome Wide Association Study (GWAS) Identifies SNPs Associated with Resistance to Tobacco Rattle Virus (TRV) and Potato Mop-Top Virus (PMTV) in a Tetraploid Mapping Population of Potato. American Journal of Potato Research 101:1-16. <https://doi.org/10.1007/s12230-023-09933-3>

## Other Publications

- Nelson, H., J.M. Oliveira, J. Lai, L. Zotarelli. 2024. Soak or flow? Choosing the right water path for potatoes. Choices Magazine. <https://www.choicesmagazine.org/choices-magazine/data-visualizations/soak-or-flow-choosing-the-right-water-path-for-potatoes>
- Hadjiabadi, S., M. Resende, L. Zotarelli, L. Hoffmann. 2024. Growing superior potato varieties in northeast Florida. Handouts for the 2024 UF/IFAS Potato Field Day. 1p.
- Hoffmann, L., P. Solano, B. Barrineau, L. Zotarelli, M. Resende. 2024. Greenhouse: Mini-Tuber Production for Potato Breeding in Hastings, FL. Handouts for the 2024 UF/IFAS Potato Field Day. 1p.
- Dhakal, R.<sup>6</sup>, L. Hoffmann, L. Zotarelli, M. Resende. 2024. Utilizing genomic selection to accelerate the potato breeding efforts for developing high-yielding varieties suited to Florida. Handouts for the 2024 UF/IFAS Potato Field Day. 1p.
- Ricken, E. C.<sup>6</sup>, L. Zotarelli. 2024. Improving phosphorus fertilizer use efficiency in potato crop using different sources, and timings of application. Handouts for the 2024 UF/IFAS Potato Field Day. 1p.
- Qu XS, Cohen A. 2024. Evaluation of potato cultivars and breeding lines for resistance to early blight, 2023. *Plant Disease Management Reports* 18:CF022.
- Qu XS, Cohen A. 2024. Evaluation of potato cultivars and breeding lines for resistance to late blight, 2023. *Plant Disease Management Reports* 18:CF023.
- Qu XS, Cohen A. 2024. Evaluation of potato cultivars and breeding lines for resistance to common scab, 2023. *Plant Disease Management Reports* 18:CF024.

Hao, J., Teng, L., and Zhang, X. 2024. Advances in the use of bioprotectants/biocontrol agents to control diseases in potato. Chapter 20 Advances in bioprotection of plants against diseases (ed. Professor Shashi Sharma and Dr Minshad Ansari). Burleigh Dodds Science Publishing.

North Carolina Potato Variety Trial and Breeding Report – 2024 (59pp)

North Carolina NE2231 State Report – 2024 (14pp)

De Jong, W.S. 2023. Cornell potato breeding program annual report (Potato Show&Tell). 29 pp.

#### **Presentations:**

L. Zotarelli, C.T. Christensen, E. Ricken, L. Sharma, K.T. Morgan. 2024. Phosphorus fertilizer rate trials for potato yield response in Northeast Florida. Florida Society of Horticultural Sciences Annual Meeting. June 10, 2024. Orlando, FL.

L. Zotarelli, C.T. Christensen, E. Ricken, L. Sharma, K.T. Morgan. 2024. Potato marketable yield and plant uptake in response to phosphorus fertilizer from regional trials in Northeast Florida. Florida ASABE Annual Meeting. June 13, 2024. Jensen Beach, FL.

Zotarelli L. 2024. Update on the P fertilizer rate studies for potatoes. University of Florida, IFAS, Plant Nutrient Oversight Committee. Feb 12, 2024. Gainesville, FL.

Hadjiabadi, S., M. Resende, L. Zotarelli, L. Hoffmann. 2024. Growing superior potato varieties in northeast Florida. Handouts for the 2024 UF/IFAS Potato Field Day. Hastings FL, March 29, 2024.

Hoffmann, L., P. Solano, B. Barrineau, L. Zotarelli, M. Resende. 2024. Greenhouse: Mini-Tuber Production for Potato Breeding in Hastings, FL. Handouts for the 2024 UF/IFAS Potato Field Day. Hastings FL, March 29, 2024.

Dhokal, R., L. Hoffmann, L. Zotarelli, M. Resende. 2024. Utilizing genomic selection to accelerate the potato breeding efforts for developing high-yielding varieties suited to Florida. Handouts for the 2024 UF/IFAS Potato Field Day. Hastings FL, March 29, 2024.

Ricken, E.<sup>6</sup>, L. Zotarelli. 2024. Improving phosphorus fertilizer use efficiency in potato crop using different sources, and timings of application. Handouts for the 2024 UF/IFAS Potato Field Day. Hastings FL, March 29, 2024.

Resende, M. Potatoes from Florida: The need for heat tolerance and local adaptation. Florida Society of Horticultural Sciences. Orlando, FL. June 11, 2024

“Penn State Potato Research Trials 2023”. Mid-Atlantic Fruit and Vegetable Convention, Hershey, PA, February 1, 2024.

“Penn State Potato Trials 2024”. POTATO TWILIGHT FIELD MEETING, Northampton County, PA, September 17, 2024.

“Potato Virus Y”. POTATO TWILIGHT FIELD MEETING, Northampton County, PA, September 17, 2024.

Zhang, X., Ge, T. Fan, X., Chim, B.K., Johnson, S.B., Porter, G., Larkin, R.P., and Hao, J. Taxonomic switches and interactions of bacterial species causing blackleg and soft rot of potato in the Northeastern United States. Annual Meeting of Potato Association of America, Portland, Oregon. Jul. 21-24, 2024.

Hao, J., Zhang, X., Johnson, S.B., and Larkin, R.P. 2024. Dynamics and interactions of bacterial species causing potato blackleg and soft rot. World Potato Congress. June 23-26, Adelaide, South Australia.

Hao, J. Title: “Understanding the dynamics and taxonomy of pathogens for improved management of potato soft rot.” 2024 Crop Health Conference, Northeastland Hotel, Presque Isle, ME. Dec. 4, 2024.

Hao, J. Title: “Integrating biological and chemical strategies for controlling potato diseases.” 2024 Crop Health Conference, Northeastland Hotel, Presque Isle, ME. Dec. 4, 2024.

Annual NC Potato Association Meeting – 5/20/24

NC Northeastern Regional potato meeting – 11/22/24

LSU Plant Science Symposium – 11/09/24

De Jong, W. Twilight grower meeting at site of on-farm chip potato trial, 20 August 2024, Arkport, NY

C. Sleeper, M. H. M. L. Andrade, B. K. Chim. Tailoring Spacing to Potato Varieties: Enhancing Growth and Yield, (2024). 2024 Potato Field Day – Aroostook Research Farm, August 10, 2024, Presque Isle, ME.

Andrade, M.H.M.L., “UMaine Potato Breeding and Advanced Clones/ Leveraging Spectral Data in Potato Breeding Selection and Detecting PVY”, 2024 Potato Field Day – Aroostook Research Farm, August 10, 2024, Presque Isle, ME.

#### **Tours, Field Days, Work Shops, Trade Shows:**

2024 UF/IFAS Potato Field Day. Hastings FL, March 29, 2024.

Potato Variety Demonstration Show, Penn State’s Ag Progress Days, Russell E. Larson Agricultural Research Center, Centre County, PA, August 13-15, 2024.

Potato Variety Demonstration Show, Northampton County, PA, September 17, 2024.

Maine Potato Research Field Day –Aroostook Research Farm, Presque Isle, ME. Aug. 14, 2024. ~100 attendees.

Cornell/USDA Potato Field Day, 1 July 2024, Thompson Vegetable Research Farm. Day-long event showcasing potato research conducted by Cornell and USDA scientists based in Ithaca, NY.

**Web-based Reports:**

UF-IFAS Vegetable Variety Trials Website. <https://hos.ifas.ufl.edu/extension/variety-trials/> - Web page hosting results of variety trials, including potatoes, conducted in the state. Database is updated annually.

Pennsylvania Potato Research Report 2023 (<https://plantpath.psu.edu/research/areas/plant-disease-management/penn-state-potato-research-program/pennsylvania-potato-research-reports>).

Annual NC Potato Association Field Tour – 5/19/24

Cornell/USDA Potato Field Day, 1 July 2024, Thompson Vegetable Research Farm. Day-long event showcasing potato research conducted by Cornell and USDA scientists based in Ithaca, NY.

**Newspaper, Radio, Television Media Articles:**

DeJong, W. 2024. Interviewed about potato and climate resiliency on Marketplace. 9/20/2024

<https://www.marketplace.org/shows/marketplace/the-working-mans-burning-man>

Andrade, MHML. “Can scientists make fruits and veggies resilient to climate change?”. ScienceNews. August, 2024.

Andrade, MHML. “How the potato industry is working to address abiotic stresses in the near future.” [Spudman](#). February, 2024.

Andrade, MHML. “New head of breeding program wants to save Maine potatoes from climate change.” [Bangor Daily News](#). January 5, 2024.