**WERA89 – Meeting Minutes**

**Tuesday March 12, 2024**

**Location: The Bristol Hotel, 1055 1st Ave San Diego, CA**

**8:00 am to 5:00 pm Pacific Standard Time**

*Chair: Julie Pasche, North Dakota State University*

*Vice Chair: Brooke Babler, Wisconsin Seed Certification*

*Secretary: Chakradhar Mattupalli, Washington State University*

**7:30 am Registration Open**

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| --- | --- | --- |
| **In-person attendees** | | |
| **First name** | **Last name** | **Affiliation** |
| Noelle | Anglin | USDA ARS |
| Alex | Karasev | University of Idaho |
| Nora | Olsen | University of Idaho |
| Nina | Zidack | Montana Seed Certification |
| Sagar | Sathuvalli | Oregon State University |
| Mark | Pavek | Washington State University |
| Rebecka | Hendricks | University of Idaho |
| Walter | DeJong | Cornell University |
| Jonathan | Whitworth | USDA ARS |
| Ana Cristina | Fulladolsa | Colorado State University |
| Jaime | Willbur | Michigan State University |
| Alan | Westra | ICIA |
| Rhett | Spear | University of Idaho |
| Keith | Schultz | Agdia |
| Heidi | Falzon | Agdia |
| Eric | Wenninger | University of Idaho |
| Chris | McIntosh | University of Idaho |
| Pragati | Dahal | University of Idaho |
| Cole | Lubinski | Wisconsin Seed Potato Certification |
| Alex | Scalzo | University of Idaho |
| Kelie | Yoho | University of Idaho |
| Alice | Pilgeram | Montana State University |
| Josie | Spurgeon | Wisconsin Seed Potato Certification |
| John | Onditi | USDA ARS/ORISE |
| Melanie | Filiatrault | USDA ARS |
| Adam | Winchester | North Dakota SSD |
| Andrew | Houser | Colorado Potato Certification Service |
| Sarah | Hensley | Colorado Potato Certification Service |
| Chakradhar | Mattupalli | Washington State University |
| Julie | Pasche | North Dakota State University |
| Brooke | Babler | Wisconsin Seed Potato Certification |

|  |  |  |
| --- | --- | --- |
| **Zoom attendees** | | |
| **First name** | **Last name** | **Affiliation** |
| Amer | Fayad | USDA ARS |
| Aymeric | Goyer | Oregon State University |
| Benita | Matheson | Washington Seed Potato Association |
| Tami | Brown | Oregon State University |
| Caroline | Gray | Colorado State University |
| Eric | Byre | Minnesota Dept. of Agriculture |
| Eric | Hitchcock | Maine Seed Potato Certification |
| Jenn | Dillinger | Nebraska Potatoes |
| Joseph | Coombs | Michigan State University |
| Ken | Frost | Oregon State University |
| Kiwamu | Tanaka | Washington State University |
| Kylie | Swisher Grimm | USDA ARS |
| Lisa | Tran | ICIA |
| Mathuresh | Singh | Agri-Food Canada Potato Research Centre |
| Max | Feldman | USDA ARS |
| Teresa | Almeida | Colorado Potato Certification Service |
| Vamsi | Nalam | Colorado State University |
| Zachariah | Hansen | USDA ARS |
| Jason | Ingram | Cornell University |
| Amy | Charkowski | Colorado State University |
| Jacob | Schow | Montana Seed Certification |
| Damen | Kurzer | Michigan Seed Potato Association |
| Melinda | Lent | University of Idaho |
| Melissa | Bertram | University of Idaho |
| Mio | Sato-Cruz | Michigan State University |
| Hanu | Pappu | Washington State University |
| Karkee | Manoj | Washington State University |
| Jeffrey | Endelman | UW-Madison |

**Accomplishments**

* The potato virus and virus-like research and extension community continued to make advancements towards the management of economically important diseases caused by these organisms. Examples include:
* A Specialty Crop Research Initiative (SCRI) was awarded in 2021. The SCRI titled *Development of sustainable system-based management strategies for two vector-borne, tuber necrotic viruses in potato* is led by Alexander Karasev (U of ID). Many members of the WERA89 are involved in the four specific objectives outlined in the SCRI. Discussions were started on the next steps needed to advance research and extension efforts in this area.
* The renewal for WERA89 will be submitted during the next year. Discussions were initiated concerning responsibilities for completion of the resubmission.
* Validation studies for direct tuber testing of PVY is continuing in states such as Colorado, Wisconsin, and Montana.
* Mail-away PVY test project conducted with over 40,000 tubers yielded results comparable to those obtained from winter grow outs. Efforts are in progress to build an automated tuber sampling robot that will ease tedious sampling collection process involved with direct tuber testing.
* Role of dogs in detecting PVY from tubers was found to yield inconsistent results in studies conducted at Montana and Colorado.
* Modifying irrigation to manage powdery scab and/or PMTV tuber symptoms was not effective and resulted in significant yield and quality reductions.
* Field studies from Idaho showed that seedborne PVY can impact yield, but the response is cultivar dependent and physiological age of the seed.
* Ten peer reviewed papers, eight articles in trade journals, and six abstracts focusing on necrotic potato viruses were published between Mar 2023-24.

**Impact Statement**

WERA89 continued to foster a collaborative platform for both seed potato certification agencies and potato researchers to discuss topics related to current state, challenges and prospects in seed certification; pest management; breeding innovations; diagnostic testing and optimization capabilities; and improving our overall understanding of necrotic viruses of potato.

**8:00 am Call to Order**

* + - Introductions (both in person and zoom)
    - 2023 Minutes approval: Julie (Chair) asked for motion to approve 2023 WERA89 meeting minutes. Alex Karasev moved the motion and Jonathan Whitworth seconded it. All attendees were in favor of approving the minutes.

**Administrative Advisor Report**

* **NIFA Rep: Amer Fayad, USDA (8:15 am – 8:30 am)**

Brief introductions and deadlines pertaining to various AFRI programs including A1112 (Pests and Beneficial Species in Agricultural Production), A1701 (Critical Agricultural Research and Extension), A1402 (Agricultural Microbiomes in Plant Systems and Natural Resources), A1541 (Data Science for Food and Agricultural Systems), A1113 (Pollinator Health: Research and Applications), A1181 (Agricultural Biosecurity), A1712 (Rapid Response to Extreme Weather Events Across Food and Agricultural Systems), SCRI, OREI, Education and Workforce Development RFAs, Methyl Bromide Transition Program, Crop Protection and Pest Management, and NIFA Equipment Grant Program were presented. Information on how to volunteer to become a grant panelist was also provided.

**State Certification Reports**

* **Tami Brown - Oregon State Seed Potato Certification (8:30 am – 8:32 am)**

Oregon had 3,277 acres of seed this year. Several fields were not accepted due to incoming PVY levels. We also had several fields with variety mix issues, some identified in the field and some in the post-harvest test. Clearwater Russet remains our top variety by acres planted and Ciklamen is second. We did deal with some issues in the greenhouse with delayed emergence and chemical type symptoms and are not sure why. Our late harvested Clearwater have always had a dormancy-growth issue in the greenhouse, we found this year that putting lots in the warming room prior to treating with GA for 1-2 weeks had a great effect of reducing those issues. We have had a request for dormant (direct) tuber testing but will not make that a part of Certification as this time.

* **Alan Westra Idaho – Crop Improvement Association (8:32 am – 8:38 am)**

2023 seed potato acres applied increased 13.0% to 34,287 acres.  Rejections were only 0.4% of acres entered and were primarily due to ineligible/incompletely documented planting stocks.   No PLRV was detected during field inspections or the winter grow-out.  PVY detections during field inspections increased to 5.5% of seed lots versus 5.0% in 2022.  Approximately 1.0% of acres showed some amount of black leg or aerial stem rot, but incidence in afflicted seed lots was low (0.01 – 0.17%).  There has not been a BRR detection since the 2016 crop.  Idaho has tested more than 4.2 million tubers since implementing a BRR screening program in 2014.  Mosaic (PVY) levels in the post-harvest test increased significantly from 2022 levels and were 4.34 and 4.38% per lot and acre, respectively.  The increase may be attributable to the unhappy coincidence of several factors, including (1) a 2022 crop seed shortage that required seed and commercial potato growers to plant lower quality seed, (2) a growing season that required seed fields to be vine-killed later than normal, and (3) higher than normal aphid populations.

* **Nina Zidack - Montana Potato Seed Certification Program (8:38 am – 8:54 am)**

Montana completed their postharvest test on Oahu by mid-January. There was a reduction in total PVY for the postharvest test for the 2023 crop and winter observations were consistent with summer readings. Montana performs visual readings and tests 100% of the plots for PVY using ELISA. Montana also tests some duplicate tuber samples of G1 and G2 using IC-PCR. All of the potatoes that were tuber tested were treated with Rindite which resulted in very good detection of PVY. The field results from Hawaii and the tuber testing were in very good agreement. The overall amount of virus dropped dramatically from the 2022 crop but there is still a base level in lots that are destined for recertification. The varieties with the most significant virus problems in G2 are Umatilla and Norkotah. G1 virus levels were very low except for Umatilla.

* **Brooke Babler - Wisconsin Seed Potato Certification Program (8:54 am – 9:15 am)**

There were 9725.56 acres of certified seed grown in Wisconsin during the 2023 growing season. PVY was seen during the growing season and in conjunction with increased late season aphid movement we saw elevated PVY levels in the post-harvest test (PHT) that was performed on Twin Bridge Farms. This was the highest level of mosaic symptoms seen in the state in recent years. We visually inspected 688 winter test samples and followed up with ELISA testing on 355 of these samples. Approximately, 66.8% of acreage was classified as foundation (≤ 0.5%), 25.7% was classified as certified (0.5 ≥ 5.0%), and 7.5% was ineligible for certification (≥ 5.0%). There is a shortage of Silverton seed looking to the 2024 season with 58.3% seed lots ineligible for recertification.

* **Andrew Houser - Colorado Potato Certification Service (9:15 am – 9:37 am)**

Information regarding the 2023 post harvest test (PHT) was presented. The winter grow-out was conducted in Hawaii again this year. Potato Virus Y levels were higher this year than last year, with 37% of the crop over 5% PVY. Samples of the variety Canela Russet did not go to Hawaii this year, due to its difficulty in breaking dormancy. This year, all the Canela Russet PHT samples were tested using an IC-PCR Direct Tuber Test (DTT). This is the first time this particular test has been used to certify seed in Colorado. Overall, the IC-PCR DTT results matched when compared with a sprout test of the same sample.

* **Adam Winchester - North Dakota Seed Potato Certification (9:37 am – 10:00 am)**

After two lost winter tests in Florida in 2021 and 2022, North Dakota conducted its first grow out in Hawaii for the 2023 crop. This was the worst year on record for PVY in North Dakota: only 42% of lots were eligible for recertification based on visual results in the Hawaii grow out. North Dakota has voted to increase its certified class tolerance from 1% to 2%. This will go into effect on 10/1/24.

**10:00 am – 10:20 am -------Break----------**

* **Jennifer Dillinger - Nebraska Potato Certification Association (10:20 am – 10:30 am)**

Nebraska had 344 lots entered the post-harvest test, representing 6,529.68 acres. 296 lots were planted in Hawaii during two different planting sessions, while the remaining lots were sprout tested at the PCAN laboratory. Emergence was moderate, and PCAN staff were able to perform field inspections on the lots. Leaf samples were tested for PVY (and some for PLRV) at the University of Hawaii, Manoa. PVY was detected in two lots, and one lot was rejected from certification. Overall, 6486.46 acres were accepted for certification.

* **Jaime Wilbur – Michigan State University (10:30 am – 10:48 am)**

In 2023-24, Michigan certification program experienced substantial increases in rejected lots due to PVY. We continue to compare PCR-based tools to traditional grow out methods to identify cost-effective options for seed certification, and to characterize potato varietal responses to regionally-prevalent PVY strains to inform certification and breeding efforts. In three years of testing, results from direct tuber methods were comparable to winter grow out results. As in other U.S. potato-growing regions, PVY strains N:Wi and NTN are most prevalent in Michigan seed potato lots. And, strain x variety response assays indicate some notable impacts of seedborne PVY on biomass and tuber yield in susceptible varieties (Michigan Seed Potato Association, Michigan Department of Agriculture and Rural Development, and Michigan State University).

* **Benita Matheson – Washington State Department of Ag (Zoom; 10:48 am – 10:55 am)**

•Any producer selling potatoes for propagation must be entered into the seed potato certification program. Stock entered into certification is inspected, tested and indexed for harmful viruses and virus-like diseases. - Funded by grower fees

•September 15, 2023: WSDA added a requirement that all lots of potatoes entering the isolation district for planting or further sale, except for those intended for immediate human consumption (example: potatoes sold in grocery stores), must be tested and found negative for Bacterial Ring Rot (BRR) by an approved laboratory at origin.

•A total of 3,320 acres of seed potatoes were entered for certification during the 2023 growing season. This is a 416-acre decrease from last year, due to one grower exiting the certification program.

•October-early November -Shipped to Hawaii - 124 samples

•January 8-16 - Post Harvest inspections w/weed pressure (apple of Peru), morning glory, grassy weeds- rain

•Leaf sampling Jan 16 – samples frozen in transit; sprout testing conducted

* **Eric Byre – Minnesota Certified Seed Potato (Zoom; 10:55 am – 11:06 am)**

Minnesota certified seed potato growers applied on 6,826.91 acres for crop year 2023, with 1,026.66 acres rejected for severe mosaic, varietal mix, vine killed prior to third inspection, and not meeting eligibility, leaving 5,800.25 acres certified. Russet Burbank remained the variety with the most acres planted. Our winter test was conducted on the island of Oahu, Hawaii utilizing our cooperator farm Twin Bridge Farms. The growers submitted 310 samples from 285 different seed potato lots. Jeff Miller and Andrew Decker travelled there and the seed lots were planted November 29th and 30th of 2023. Eric Byre, Jeff Miller and Andrew Decker arrived on the island January 2nd, 2024, to evaluate the plot. The adequate growing conditions allowed us to visually read the plot for disease, withstanding a 7” rainfall the second week of January. The seed plot is evaluated visually for PVY, and those visual observations are picked, along with a control leaf, and are confirmed with an ELISA test at the University of Hawaii in Honolulu at Mike Melzer’s Lab. There was an increase in the amount of PVY observed in the plot compared to past winter tests, with 67% of all certified seed potato lots meeting the tolerance of 0.5% PVY, and 73% of all certified seed potato acreage remaining eligible for recertification, compared with 85% of all seed lots and 84% of all seed potato acreage in crop year 2020. The increase in the amount of observed PVY is attributed to the lack of a winter test for crop year 2022 along with an increase in green peach aphid across Minnesota during the growing season.

* **Eric Hitchcock – Maine (Zoom; 11:06 am – 11:15 am)**

The 2023 growing season was very challenging for many growers as large rain events during the growing season likely impacted the crop in many instances. Seed acreage was down again slightly, roughly 7 percent from last year.

During the growing season inspectors noticed areas with high aphid concentration in the late season as much of the grain crop had lodged and aphids moved around in pretty much all growing areas. While PVY, varietal mix, and blackleg was noted by field staff, PLRV did not seem detectable in the field which has been a continuing and concerning trend over the last 5 years or so.

As of September 11, 2023, the certification program had 9,033 acres of field certified seed from 66 farms. Harvest conditions vastly improved compared to the rain events of the summer. The top 5 varieties by acreage field certified for 2023 are:

1) Caribou Russet (PVP) 1311 acres

2) Atlantic 674 acres

3) Russet Burbank (MT) 601 acres

4) Waneta (PVP) 518 acres

5) Lamoka (PVP) 502 acres

The post -harvest test started in the last week of September where approximately 150 samples were dropped off by growers and were dipped in Gibberellic Acid and then gassed with Bromoethane. The remaining samples continued to be dropped off until the first week of November where a total of 4 gassings were used to prepare 704 Maine and approximately 150 New York samples for sprouting. Sprout testing using ELISA proceeded from November till mid-January where several samples (approximately 50) still had not sprouted. We believe that this was due to low efficacy of the Gibberellic acid that had lingered longer than normal in solution in our dip tank. Next year we will try switching out the solution at least twice to hopefully get better results on the final samples that are treated prior to being sent to the laboratory. In previous years we had only done 3 dipping / gassing sessions and they were much closer together generally starting in Mid-October vs. late September.

Upon completion of the post-harvest test, we were able to quantify that based on the results there were only 59 lots out of the 704 that had failed with a total virus over 5%. This was good news for growers and the program. Despite an unfavorable growing season and a lot of inoculum from the previous crop year planted, the failure rate was less than half of the previous year in 2022. The summary below shows the 10-year average of post-harvest test results to give a sense of how the 2023 crop was compared to past years.

SUMMARY OF POST-HARVEST TEST RESULTS (2014-2023)

CROP YEAR 2023

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  | Percentage of Acreage in each category | | |
| **Year** | **No. of Samples** | **Acreage Tested** | **0-0.55** | **0 .56-5.0** | **Over 5** |
| 2023-24 | 704 | 8,317.18 | 42.12 | 51.09 | 6.79 |
| 2022-23 | 799 | 9,842.93 | 34.81 | 50.09 | 15.1 |
| 2021-22 | 877 | 9,632.46 | 65.58 | 32.77 | 1.65 |
| 2020-21 | 828 | 9,385.04 | 63.4 | 33.41 | 3.19 |
| 2019-20 | 869 | 9,650.21 | 44.49 | 48.2 | 7.31 |
| 2018-19 | 853 | 9,429.07 | 71.93 | 23.96 | 4.11 |
| 2017-18 | 989 | 9,608.61 | 64.36 | 29.99 | 5.65 |
| 2016-17 | 1045 | 9,637.79 | 74.68 | 23.03 | 2.29 |
| 2015-16 | 0 | 0 | 0 | 0 | 0 |
| 2014-15 | 1001 | 10,694.78 | 57 | 37.8 | 5.2 |

\*All PVY readings were from ELISA lab test results.

**Research Updates** **- *Potato Virus Y***

* **Kelie Yoho, U of Idaho - *PVY mineral crop oil* (11:15 am – 11:37 am)**

The efficacy of mineral crop oils against the spread of PVY under overhead irrigation has not been well established, leading to low levels of adoption of oils in integrated pest management programs in the Pacific Northwest. Combinations of mineral oil and/or insecticide spray programs were applied to potato fields from emergence until vine kill, after which daughter tubers were evaluated for PVY infection. Additionally, vacuum sampling was used to monitor beneficial arthropod communities throughout the season in each treatment. PVY infection was significantly reduced in both the mineral oil only and mineral oil/insecticide combination spray treatments. Beneficial arthropod communities do not appear to be significantly affected by the usage of mineral crop oils. These results in combination suggest that mineral crop oils could be a useful tool to combat PVY on overhead-irrigated farms.

* **John Onditi, USDA-ARS - *Epidemiology and control of potato virus Y in Kenya* (11:37 am – 11:54 am)**

Potato virus Y (PVY) is the most important virus of potato (Solanum tuberosum L.) crop worldwide. Virus prevalence surveys are one of the options for obtaining information that can be used in virus control. A potato leaf sampling survey was therefore conducted in the major potato growing regions in Kenya to help in identifying cultivars with low virus prevalence (virus resistant) after several years of replanting of uncertified seed tubers and exposure to high virus pressure in the farmers’ fields. An interview with farmers during the survey indicated that farmers had limited knowledge of virus transmission and control. Enzyme Linked Immunosorbent assay (ELISA) test results on sampled leaves indicated high virus prevalence in virus susceptible cultivars and low virus prevalence on resistant cultivars like Shangi, Kenya Karibu, Sherekea and Unica. Similarly, regions where farmers planted virus resistant cultivars had lower virus prevalence as compared to regions where farmers planted virus susceptible cultivars. The result on resistance in cultivars were further confirmed by the data obtained from controlled greenhouse PVY inoculation experiment. This study provided a basis for increasing awareness of farmers on potato virus control and recommending already adopted cultivars in the farmers’ fields as a ready option for virus control.

* **Nina Zidack, Montana State University– *Using dogs to detect PVY: Shared experiences by certification programs* (11:54 am – 12:40 pm)**

Montana conducted two different types of trials evaluating dog’s ability to detect PVY in seed potatoes. The first trial type was testing dog’s ability to sniff PVY in tubers. In 2022, the dog sniffed 80 200 tuber samples of seed potatoes. After the dog was used to evaluate the potatoes, 40 samples were processed in the lab and PCR was used to detect PVY and 40 samples were sent to Hawaii for the field grow out. Of the 40 samples processed in the lab, the dog positively identified 5 positives that were in agreement with PCR but also hit on 5 false positives. The number of false negatives was 21 and the number of correct negatives was 10. For the samples evaluated in the field, the dog identified 4 samples that were positive in Hawaii but hit on 9 that were negative in Hawaii. There were 14 false negatives and 13 where both the dog and the field growout did not detect PVY. A mock field trial was planted in the summer of 2023 with 4 treatments: 1. Umatilla 50% PVY, Umatilla tubers from PVY + plants, 2. Umatilla (no PVY), 3. Dark Red Norland (1 plant in one plot tested PVY +), Healthy Umatilla. Treatment plots were mixed in with Payette Russet plots. Payette was chosen because it is resistant to PVY. Leaves were picked from all of the treatment plots and tested for PVY. All of the Umatilla 50% PVY tuber and Umatilla from PVY + plants had PVY detected by ELISA. One of the Dark Red Norland plots had 1 PVY. The dog ran the plots the first time on 6/27/23. It alerted on 3/11 (PVY positive by ELISA, 8/11 false negative). It alerted on 4 plots that were negative for PVY plus it alerted on 4 of the Payette Russet plots. It ran the plots again on 7/9/23. It alerted on 2/11 (positive by ELISA) and did not alert on 9/11 that had tested positive. It alerted on 3 of the treatment plots that were negative by ELISA and on 5 of the Payette Russet spacer plots.

**12:40 pm – 1:20 pm Lunch Provided**

**Research Updates** **–** ***Cultivar Development***

* **Jeff Endelman, U of Wisconsin – *Update on true seed* (1:20 pm – 1:40 pm)**

Over the next decade, the potato industry must continue to innovate to meet consumer expectations, environmental regulations, and a changing climate. But rapid progress is limited by the tetraploid genome of cultivated potato and the economics of vegetative propagation. A new paradigm is needed, Potato 2.0, in which F1 hybrid varieties are created from inbred parents and distributed to growers as botanical (true) seed rather than plantlets in tissue culture. Building on years of prior research, the Potato 2.0 CAP will bring together researchers and extension specialists from diverse scientific backgrounds to address three components of the production system and post-harvest management of botanical seed.

**Research Updates – *Diagnostics***

* **Nora Olsen, U of Idaho – *PVY impact on yield and does mother tuber seed size influence PVY levels*****(1:40 pm – 2:00 pm)**

Two University of Idaho studies were presented with the objective to understand distribution of PVY within a seed lot and to determine yield impact of seedborne PVY under commercial-like production conditions. The distribution of PVY within a seed lot appeared to be uniform regardless of the mother tuber size used to produce a successive plant and the response was consistent with cultivar, PVY infection level, and year. Results indicate that selecting for tuber size, whether for the winter grow out or in commercial plantings, does not influence the level of PVY observed. Effects of seedborne PVY infection on yield and grade were dependent upon cultivar. Russet Burbank and Russet Norkotah yields had an inverse relationship with seedborne PVY infection, as PVY infection increased, yields decreased, although yield reduction was not a linear function for Russet Burbank. Ranger Russet yield or grade was not significantly impacted by seedborne PVY infection in the current study. These results align with previous studies indicating seedborne PVY can impact yield, but the response is cultivar dependent and physiological age of the seed may be playing a significant role in seed productivity.

* **Melanie Filiatrault, USDA-ARS – *Mail-away PVY testing* (2:00 pm – 2:20 pm)**

A brief summary of the results for the Mail Away PVY testing project conducted in 2022 was presented. The Mail Away PVY testing used farm labor to collect tuber cores from over 40,000 tubers and press cores onto Whatman Plantsaver FTA® cards (FTA / FTA cards), then a molecular assay was used to detect PVY. Overall, the FTA method of direct tuber testing showed an overall accuracy of 88% when compared to winter grow out results and using 1% PVY as a determination of seed lot fate. Where exact percentages of PVY from summer inspections and official state reports were given, comparisons with FTA direct tuber testing showed summer inspections under report and results of the winter test overlap within the confidence limits of FTA direct tuber testing. While continuing to analyze the data, summaries of various topics are emailed each week to continue follow up and engagement with participants.

The Mail Away Project expanding efforts to move towards multiplexing and optimizing molecular approaches to detect multiple pathogens to reduce overall costs and reduce variability. A collaboration with a foreign diagnostic company allowed for assessment of the accuracy, sensitivity, and specificity of a multiplexing approach for detection of PVY and PLRV. PVY and PLRV were detected using FTA direct tuber testing using a triplex qPCR reaction that included a control for plant material. The accuracy for PVY detection was 88%, which was consistent with our previous FTA direct tuber testing studies. The accuracy for PLRV was close to 95%.

The ability to differentiate the two scab causal organisms is important. Using the same FTA protocol and an existing qPCR duplex that detects and differentiates between the common scab pathogen and the powdery scab causing pathogen, the FTA direct tuber testing method was able to detect Spongospora (powdery scab) from a tuber. A synthetic qPCR target suitable for the common vs. powdery scab duplex was developed for quantification of both these pathogens to measure “disease load” in tubers.

From lab-based samples, the late blight pathogen *P. infestans* was detected from both leaves and tubers sampled to FTA cards.

* **Brooke Babler, University of Wisconsin-Madison – *IC-PCR survey results* (2:20 pm – 2:40 pm)**

This past season, Wisconsin performed a direct dormant tuber (DTT) survey on 99 winter test samples and compared these results to post-harvest results (visual and ELISA). To confirm the need for a warming period, 28 winter test samples (out of the 99) were tested via DTT immediately following harvest and then stored at room temp for three weeks and DTT tested again before being sent to Hawaii. It should be noted that the same tubers were sampled across all testing methods. Thirty-four winter test samples were found to have virus and 14 of the 34 were samples DTT twice. Initial conclusions are 1) There does not appear to be a significant difference between DTT and ELISA testing, 2) Visual readings appear to be significantly lower than DTT and ELISA results, which corresponds with varieties exhibiting latent PVY symptoms, and 3) A three-week room temperature warming period is needed, especially in lots with higher PVY levels. Additional, research is needed to examine seasonal and varietal effects.

* **Manoj Karkee, WSU - *Automated tuber sampling* (2:40 pm – 2:55 pm)**

Molecular-based diagnostic assays for pathogen detection directly from potato tubers hold promise, but manual sample extraction and preservation onto an FTA card is labor-intensive. Research on automating this sampling process using a vision-guided robotic sampling system is being conducted at the Center for Precision and Automated Agricultural Systems, Prosser, WA. A potato tuber image dataset was generated to identify optimal sampling locations on a tuber using various deep-learning-based models such as YOLOv5, YOLOv6, YOLOv7, and YOLOv8 variants. Among all the tested models, YOLOv6s showed the best trade-off between detection accuracy and inference time. Ongoing work includes fine tuning this model and integrating it into a robotic sampling system

* **Keith Schuetz, Agdia – *Optimization of PVY antibodies* (2:55 pm – 3:10 pm)**

Keith presented on optimization of antibodies for immunocapture qPCR, which is just one important factor in optimization of the method. Analysis of antibody source selection and loading concentrations should be evaluated as part of the optimization process. Antibody concentration alone can influence the analytical sensitivity of the method at least an order of magnitude. Given the nature of PVY, its relative low concentration and random distribution in tubers, it is paramount to select antibodies with high analytical sensitivity and that have been fully characterized on PVY strains.

**3:10 pm – 3:30 pm ----------Break--------------**

**Research Updates -** ***Powdery scab / PMTV /TRV***

* **Nora Olsen, U of Idaho - *PMTV and irrigation: Idaho results* (Olsen and Miller) (3:30 pm – 3:50 pm)**

A 2-year collaborative research between the University of Idaho and Miller Research looked at the effect of irrigation on powdery scab and PMTV symptom development. Decreasing irrigation (either 80% or 90% ET) early in the season or throughout the whole season did not impact the incidence of PMTV symptoms at harvest or after time in storage in Alturas (year 1) and Shepody (year 2). Modifying irrigation to manage powdery scab and/or PMTV tuber symptoms was not effective and resulted in significant yield and quality reductions.

* **Noelle Anglin, USDA-ARS - *PMTV tuber testing* (3:50 pm – 4:15 pm)**

The talk was about viral distribution of PMTV. We dissected different tissue parts of infected PMTV tubers and tested for the virus to try to understand what is the best tissue source for diagnostics to help ensure no false positives. We looked at ½ cm slices of the tuber length and width, peel, eyes, flesh, pith, necrotic and non-necrotic tissue. We found unlike some other potato viruses, PMTV was equally distributed in all parts of the infected tuber.

* **Kylie Swisher Grimm, USDA-ARS - *Update on TRV and PMTV Research* (Zoom) (4:15 pm – 4:30 pm)**

Tobacco rattle virus and Potato mop-top virus cause internal and external tuber necrosis that render potatoes unmarketable. Understanding the epidemiology associated with each pathogen, their vectors, and different cultivars commonly grown is needed to develop management strategies for growers across the United States. Results from a one-year greenhouse study indicate that the vector of Tobacco rattle virus originating from North Dakota behaves differently than the same species of vector originating from Washington State. Here, fecundity and viral transmission rates varied between populations, and cultivars were identified with decreased vector fecundity. Results from a two-year field study indicate that the presence of Potato mop-top virus in seed leads to higher internal tuber necrotic symptoms and viral presence in daughter tubers as compared to healthy seed. These results indicate that Potato mop-top virus presence in Commercial potato seed could result in losses for the grower at harvest.

**4:30 pm Election of Secretary**

Alex Karasev nominated Jaime Wilbur and Julie Pasche seconded it.

**4:45 pm – 5:00 pm Group Brainstorming Discussions**

Attendees split into three groups to discuss topics related to Diagnostics, Certification, and Cultivar development.

* Certification – Discussed that PMTV and Powdery scab being tested for in certification can be challenging and at a crossroad.
* Breeding – Need for TRV screening with markers to increase breeding opportunities.
* Diagnostics – Ring Test for direct tuber testing for PVY across labs to ensure all labs are optimizing capture antibodies and detecting accurately detecting the pathogen.

Potential meeting locations for WERA89 meeting in 2025 – Tuscon, Nashville, Florida, San Diego, and Denver. First and second week of March are ideal meeting dates.

**5:00 pm** **Adjourn**

Nora Olsen moved the motion to adjourn the meeting, and Alan Westra seconded. Vote to adjourn was approved unanimously.

**Wednesday March 13, 2024**

**8:00 am – 5:00 pm** SCRI Research Annual Updates Call to Order

**Peer-reviewed Publications:**

Bvindi, C. N., Howe, K., Wang, Y., Mullen, R. T., Rogan, C. J., Anderson, J., Goyer, A. J. 2023. Potato non-specific lipid transfer protein StnsLTPI.33 is associated with the production of reactive oxygen species, plant growth, and susceptibility to *Alternaria solani*. Plants 12:3129. <https://doi.org/10.3390/plants12173129>

Dahan, J., Pedroni, M.J., Thompson, B.D., Chikh-Ali, M., Dandurand, L.-M., Kuhl, J.C., and Karasev, A.V. 2023. First report of tomato chlorotic dwarf viroid infecting litchi tomato (*Solanum sisymbriifolium*). Plant Disease 107: 2564. <https://doi.org/10.1094/PDIS-03-23-0422-PDN>

Dahan, J., Orellana, G.E., Wald, K.B., Wenninger, E.J., Cooper, W.R., and Karasev, A.V. 2024. Bactericera cockerelli picorna-like virus and three new viruses found circulating in populations of potato/tomato psyllids (*Bactericera cockerelli*). Viruses 16: 415 <https://doi.org/10.3390/v16030415>

Daniel, J., and Chikh-Ali, M, 2024. Dynamics of potato virus Y infection pressure and strain composition in the San Luis Valley, Colorado. Plant Disease (Accepted Jan 2024. *In Press*).

Gnanasekaran, P., Zhai, Y., Kamal, H., Smertenko, A., and Pappu, H.R. 2023. A plant virus protein, NIa-pro promotes disease development via by modulating Indole-3-acetic acid amido synthetase. Frontiers in Plant Science. 14:1112821. <https://doi.org/10.3389/fpls.2023.1112821>

Goyer, A. J., Bvindi, C. N. 2023. Overexpression of VQ motif-containing gene does not affect infection rates of potato with potato virus Y. American Journal of Potato Research 100: 233–239. <https://doi.org/10.1007/s12230-023-09913-7>

Goraya, M., Yan, G., Whitworth, J., and Swisher Grimm, K.D. 2023 Advancing nematode identification on potato: An isothermal recombinase polymerase amplification assay for stubby root nematode, *Paratrichodorus allius*. American Journal of Potato Research 101:52-64. <https://doi.org/10.1007/s12230-023-09940-4>

Kamal, H., V. Lynch-Holmes, H.R. Pappu, and Tanaka, K. 2024. Starch plays a key role in sporosorus formation by the powdery scab pathogen *Spongospora subterranea*. Phytopathology 114:568-579. <https://doi.org/10.1094/PHYTO-07-23-0224-R>

Rodriguez-Rodriguez, M., Chikh-Ali, M., Feng, X., and Karasev, A.V. (2024). Genome sequences of six recombinant variants of potato virus Y identified in North American potato cultivars grown in China. Microbiology Resource Announcements 12: e00512-23 <https://doi.org/10.1128/MRA.00512-23>

Wenninger, E.J. and Rashed, A. 2024. Biology, ecology, and management of the potato psyllid, *Bactericera cockerelli* (Hemiptera: Triozidae), and zebra chip disease in potato. Annual Review of Entomology 69:139–157. <https://doi.org/10.1146/annurev-ento-020123-014734>

**Abstracts:**

Arjarquah, A., Singh, J., Zitnick-Anderson, K., Pandey, B., Gill, U., and Pasche, J.S. 2023. A draft reference genome of *Spongospora subterranea* from North America. (Abst.) Amer J Potato Res. (*In Press*)

Dahan, J., Pedroni, M.J., Thompson, B.D., Chikh-Ali, M., Dandurand, L.-M., Kuhl, J.C., and Karasev, A.V. 2023. An asymptomatic infection of tomato chlorotic dwarf viroid in litchi tomato (*Solanum sisymbriifolium*). (Abstr.) Phytopathology 113: S3.197. <https://doi.org/10.1094/PHYTO-113-11-S3.1>

Gelles, N., N. Olsen, M. Thornton, A. Karasev, R. Hendricks, and Woodell, L. 2023. Alternative methods to initiate sprouting in potatoes to facilitate PVY testing (abstract). *American Journal of Potato Research* 100:115-134.

Ingram, J.T., Mattupalli, C., Charkowski, A.O., Karasev, A.V., and Filiatrault, M.J. 2023. A grower-supported mail-away dormant potato tuber test for molecular detection of potato virus Y, and two other tuber necrotic viruses. (Abstr.) Phytopathology 113: S3.35. <https://doi.org/10.1094/PHYTO-113-11-S3.1>

Kud, J., Dahan, J., Orellana, G.E., Dandurand, L.-M., and Karasev, A.V. 2023. A novel rhabdovirus associated with the Idaho population of the potato cyst nematode Globodera pallida. (Abstr.) Phytopathology 113: S3.21. <https://doi.org/10.1094/PHYTO-113-11-S3.1>

Qin, R., Goyer, A. J., and Torabian, S. 2023 Effect of potassium fertilization on the nutritional contents of potato tubers. ASA, CSSA, SSSA International Annual Meeting <https://scisoc.confex.com/scisoc/2023am/meetingapp.cgi/Paper/149926>

**Thesis:**

Gelles, N. A. 2023. Altering potato tuber physiology to promote dormancy break and implications of PVY in seed certification. *Master’s Thesis, University of Idaho*.

**Trade Publications:**

Duellman, K., and Wenninger, E. 2023. Tracking Potato virus Y. Potato Grower 52(13):28-29.

Duellman, K., Wenninger E., and Woodhall, J. 2023. Monitoring vectors of potato pathogens to assess risk. Potato Grower 52(11):24-25.

Grimm, K. S., Quick, R., Cimrhakl, L., Feldman, M., and Pavek, M. 2024. Improving our understanding of potato mop-top virus in the northwest U.S. Potato Grower 53(1):33-38.

Karasev, A., and Olsen, N. 2023. Potato virus initiative developing direct tuber testing alternatives. Potato Grower 52(4):22-23.

Miller, J. N. Olsen, and J. Woodhall. 2023. Can irrigation management reduce powdery scab or PMTV symptoms? Potato Progress 23(6).

Schreiber, A., A. Jensen, S. Rondon, E. Wenninger, S. Reitz, and Waters, T. 2023. Integrated pest management guidelines for insects and mites in Idaho, Oregon and Washington potatoes. <https://www.nwpotatoresearch.com/item/pest-management-options>

Zidack, N. 2023. Seed potato workshop proves highly valuable. Potato Grower 52(6):36.37.

Zidack, N. 2024. Why Hawaii for seed growout? Potato Grower 53(1):90-91.

**Presentations:**

Berrian, T., Clarke, C., and Goyer, A. J. 2023. Annual Meeting of the Potato Association of America, "Testing thiamin as an immunity inducer against diseases of potato," Charlottetown, Prince Edward Island, Canada. July 23, 2023.

Duellman, K.M., Lent, M.A., Liu, C., McKinney, L.F., and Wenninger, E.J. 2023. Timing of in-season plant-to-plant spread of Potato virus Y in potato in Idaho, United States. 12th International Congress of Plant Pathology, Lyon, France, August 20-25, 2023 (poster).

Gelles, N. and Olsen, N. 2023. Breaking tuber dormancy to support the seed certification process. WERA89 Meeting. Denver, CO, March 16, 2023.

Gelles, N. and Olsen, N. 2023. Use of smoke in seed certification to induce sprouting. Nebraska Potato Council Meeting (virtual). January 27, 2023.

Goyer, A. J., Bvindi, C., Wang, Y., and Mullen, R. T. 2023. International Society of Plant Microbe Molecular Interactions, "Functional characterization of a member of the non-specific lipid transfer protein family in potato," Providence, Rhode Island. July 17, 2023.

Goyer, A. J., Combest, M., and Bvindi, C. 2023. Annual Meeting of the Potato Association of America, "Inferring gene functions from transcriptomic data: a precautionary tale," Charlottetown, Prince Edward Island, Canada. July 23, 2023.

Hendricks, R. and Olsen, N. 2023. PVY and Yield- How much of an impact. WERA89 Meeting. Denver, CO, March 16, 2023.

Hendrick, R. and Olsen, N. 2023. Progress on sprout promotion for direct tuber testing and the WGO, PVY impact on yield, seed size and PVY relationship, and extension activities. Potato Virus Initiative SCRI meeting. Denver, CO, March 17, 2023.

Olsen, N., A. Karasev, E. Wenninger, K. Duellman, and Whitworth, J. 2024. PVY and PMTV and what we have learned from the SCRI project. Idaho Potato Conference. Pocatello, ID January 18, 2024.

Olsen, N. R. Hendricks, and Karasev, A. 2023. Highlights from the Potato Virus Initiative. Idaho Association of Plant Protection Annual Meeting. Rupert, ID. November 2, 2023.

Olsen, N. 2023. Potato Production and Storage Research: Emphasis on testing for PVY. Snake River Weed Management Tour and Field Day. Kimberly, ID, June 28, 2023.

Olsen, N. and Karasev, A. 2023. Potato Virus Initiative: developing solutions update and discussion. Washington State University Potato Field Day. Othello, WA, June 22, 2023.

Olsen, N. 2023. Diagnosing potato diseases and management options. Shoshone-Bannock Tribes ARM 29th Annual Grower Meeting. Fort Hall, ID, March 2, 2023.

Olsen, N. 2023. Seed potatoes: stem numbers, seed size and PVY. Bingham Ag Services Annual Grower Meeting. Blackfoot, ID, March 1, 2023.

Olsen, N. and Miller, J. 2023. Interactive storage disease diagnosis workshop. Idaho Potato Conference. Pocatello, ID January 18, 2023.

Qin, R., Goyer, A. J., and Torabian, S. 2023. ASA, CSSA, SSSA International Annual Meeting, "Effect of potassium fertilization on the nutritional contents of potato tubers," St Louis, Missouri. October 31, 2023.