Agricultural Research Stations
Annual Report
Calendar Year 2023
M. Peters, ARS Director
2023 Executive Summary

The Agricultural Research Stations had a very successful 2023. The year was certainly not without its challenges, but the research stations continue to meet their main mission by ensuring campus Principal Investigators have access to land and bench space; thus accommodating their vast and various research, teaching, and outreach needs. Close to 1300 research projects were completed while meeting the needs of over 350 Principal Investigators. Also in 2023, we estimate over 15,000 people formally visited the stations to partake in a field day or tour. Uncounted multitudes more visited the stations to walk gardens, see research plots, or take in the greatness of the animals and plants living on UW Madison’s campus extensions.

This summary includes detailed individual reports from each Station and the Campus Greenhouses. Each station manager was asked to report on activity in the following areas:

- Notable Station Achievements
- Outreach/Instruction Activities
- Research Activity
- Change
- Goals for the Coming Year
- Areas of Concern and Challenges

Common themes and challenges noted from station reports:

- Stations continue to be highly successful at engaging with the public and seeking community involvement. In addition to the traditional field day model, novel mechanisms are being employed by several stations to ensure field days/tours are relevant. Expanding use of social media continues to be an area where stations are expanding their reach. Continuing to grow the speed of internet connectivity at the stations will only serve to make the reach of the stations even greater.
- Stations continue to evolve to meet needs of a diverse pool of research needs. Staffing and land management are continually reevaluated; thus adapting to different research projects. Work for researchers needing new crops established can be difficult and time consuming, but stations try to accommodate as much as possible.
- Although not completely without error, stations meet research project demands with a high level of precision. This ensures strong repeatable data is available to principal investigators. When errors are made, process improvement is sought.
- Strategic planning and purchasing continue to take place at the ARS sites to replace aging tractors, planting and harvesting equipment. ARS recognizes that loaned/donated equipment can assist with our mission, but we must not rely solely on this mechanism to meet our research needs.
- Aging infrastructure at all stations is an ongoing balancing act. 2023 saw campus and ARS trying a new model to seek maintenance upgrades. This was met with some success
with boilers, roofs, and roads seeing some much needed maintenance. We are hopeful 2024 will allow us to do some critical demolitions of facilities that have reached the end of useful life.

• Staffing at the ARS units continues to remain steady with low turnover of employees relative to the greater job market. ARS recognizes that having long term employees that understand the importance of the scientific method is critical to our greater success.

• Across all ARS stations, the drought conditions of 2023 created challenging growing conditions. The dry conditions placed added demands on the irrigation systems at many research stations. The aging irrigation systems at many of the stations are reaching the end of their useful life. A plan to address this key aging infrastructure will need to be developed in 2024.

• Stations recognize the importance of having certified organic acreage available for research, and are looking to grow their portfolios in this area.

• Greenhouse operations (both the centralized services and the houses at the outlying stations) are an important investment for the College of Agricultural and Life Sciences. These facilities see a high utilization rate and remain in an important facility piece to helping our faculty meet their research work demands.

• The research stations are still a valuable asset for CALS and UW Madison. They are prepared to meet the demands of CALS faculty in 2024 and beyond.
<table>
<thead>
<tr>
<th>Station</th>
<th>Field Days</th>
<th>Tours</th>
<th>Instruction</th>
<th>Seminars/Meetings</th>
<th># of People attending</th>
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<td><strong>117</strong></td>
<td><strong>97</strong></td>
<td><strong>186</strong></td>
<td><strong>15,250</strong></td>
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## Research Projects and PI's using Ag Research Stations

**Cropping Year 2023**

**Complied by Jane Cahoon**

**March 20, 2024**

<table>
<thead>
<tr>
<th>Station</th>
<th>Field &amp; Veggie Crop Research</th>
<th>Fruit Crop Research</th>
<th>Animal Research</th>
<th>Natural Resources/Turfgrass</th>
<th>Campus PI's (Campus + External)</th>
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<td>325</td>
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<td><strong>85</strong></td>
<td><strong>211</strong></td>
<td><strong>281</strong></td>
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*Projects: DNR = 5, UW Non-CALS = 4, UW CALS = 11, Federal = 2, Other UW System = 3, Other = 9*
1. **Notable 2023 station achievements:**

The station successfully hosted the 2023 North American Manure Expo. The event took place in a field near the Blaine Dairy from August 9-10. Over 1,000 people from across the U.S. and Canada were in attendance, and the event featured dozens of vendors, numerous education presentations, and liquid and solid manure field demonstrations. Six items on the agenda had never been included at a previous Manure Expo, the most significant being a pressurized hose break demonstration. Attendees complimented the station’s appearance and how well the show was run. The event culminated 18 months of planning and about 4 years that it was on the station calendar. It had also been pushed back a year by the pandemic.

The 12,000 square foot machine shed lost in a 2022 fire has been rebuilt to specs, with construction wrapping up late in the year. Some landscaping and electrical work will be finished in spring, but the shed will be usable in early 2024. Twenty-seven pieces of equipment with a value of around $1.7 million were lost in the fire. We have located and purchased a lengthy list of replacement equipment including: a Kenworth semi-truck from a neighboring farmer, a pickup truck, hay merger, hay balers, grain wagons, grain head, header cart, flatbed trailer, cattle trailer, fertilizer spreader, salt spreader, and grain auger. This has taken considerable effort, but we were allowed to upgrade some equipment to better serve the station and research needs.

2. **Outreach/instruction activities:**

The station had around 5,000 in-person visitors and many more to the dairy, beef, sheep, and swine units. Several successful fields days were held. The highlight was the Manure Expo which was mentioned above. Another highlight was a 3-hour lab session for Agronomy 100 students to get their hands in the soil and experience agronomy outside the classroom.

<table>
<thead>
<tr>
<th>2023 Arlington ARS Highlighted Tours, Field Days, Seminars, Courses</th>
<th>Month</th>
<th>Group Name</th>
<th>Event</th>
<th>Participants</th>
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<td>various</td>
<td>3/1/2023</td>
<td>UW Pesticide Applicator</td>
<td>Commercial and Private Training</td>
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<tr>
<td>3/3-8/2023</td>
<td>CaseIH</td>
<td>Planter Jumpstart</td>
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<td>3/7-8/2023</td>
<td>MATC Vet tech</td>
<td>tours</td>
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<td>4/1/2023</td>
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<td>Operator Training</td>
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<tr>
<td>4/4/2023</td>
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<td>Sheep Days</td>
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<tr>
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<td>Strawberry Class</td>
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<tr>
<td>4/21-22/2023</td>
<td>DATCP milk inspectors</td>
<td>meeting</td>
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<td>tour</td>
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<td>5/2-4/2023</td>
<td>Wisconsin FFA</td>
<td>FFA Livestock Judging contest</td>
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<td>125</td>
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<tr>
<td>6/20/2023</td>
<td>Midwest Rural Energy Council</td>
<td>Stray Voltage Investigators training</td>
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<tr>
<td>7/6/2023</td>
<td>FFA youth</td>
<td>tour</td>
<td></td>
<td>50</td>
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<tr>
<td>7/10/2023</td>
<td>Small Grain Field Day</td>
<td>Field Day</td>
<td></td>
<td>75</td>
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<tr>
<td>7/10/2023</td>
<td>Organic Field Day</td>
<td>Equipment Field Day</td>
<td></td>
<td>75</td>
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</table>
3. **Summary of Research Activity:**

325 Crop-related research projects with 52 PIs supported.
45 IACUC approved animal research projects with 26 PIs supported.
The feed mill also provides feed for trials on campus and Vet Medicine.

4. **Key Changes in 2023:**

The Case Big Red Program is no longer supplying equipment to the station. This was a very beneficial program for all parties over the past decade with the station receiving tractors as well as planting, tillage, and haymaking equipment and Case IH receiving promotional and increased marketing opportunities. This has forced the station to acquire equipment to carry out key operations. In 2023, we purchased a large square baler, field cultivator, 300-hp tractor, and combine with corn and grain heads to replace previously donated equipment. This allows for increased flexibility, saves setup time, and avoids hour or usage limits. The tradeoff is increased costs to pay for this equipment.

We had a very stable year in terms of labor. We were able to fill key positions in the feed mill and maintenance shop despite concern it could be a challenging process. A 4% pay plan increase, though not realized until the end of the year, was welcomed by employees. This was the largest across the board increase in decades and will help keep wages competitive. We also hosted two very successful internships. One was funded through CALS and the other split with a researcher. CALS IT hired a network coordinator based at the station who has been helpful creating and maintaining our network infrastructure.

5. **Station goals for the coming year**

Another major piece of equipment to replace that was previously donated is a corn planter. We are planning to purchase a used 12 row planter to increase the efficiency of planting production fields, so we have more time to focus on research needs.
Station events and Public Events Building use have been steadily increasing since the pandemic. We are planning to replace a projection screen, add more signage, and add a display promoting the benefits of an education from CALS.

Several improvements at the Wisconsin Foundation Seeds facility (WFS) will happen this year. 1) Equip the drying wagon with a lift hoist to reduce the amount of shoveling when emptying it. 2) Purchase plastic bulk seed storage containers which are more durable, safer, and easier to maintain than our older, wooden bulk seed storage boxes. 3) A color sorter which uses cameras to clean seed and grain with a level of precision that is unattainable with conventional cleaning equipment has been obtained. After an employee is sent for training, this will be another valuable service offered.

6. Areas of concern and challenges

The station budget has absorbed increased costs of labor, supplies, fuel, land acquisition, capital equipment, and the shed fire. We were fortunate to have good crop yields and prices for several years to increase station income and cover some of these costs. It appears prices will be depressed in the coming year, which will make it more difficult to move station finances out of the red.

We have done a great job maintaining station buildings with limited budgets, but deferred maintenance is catching up to us. A new system with physical plant taking responsibility should help with the cost. Many buildings, including the feed mill, from the 1960s and earlier have outlived their useful life span and need significant maintenance or replacement. Station infrastructure such as roads, parking lots, wells, water lines, irrigation, and septic are aging, and maintenance costs continue to increase.

We are fortunate that faculty hires are a CALS priority, but an area of concern would be making sure that new faculty have the staff, equipment, facilities, and land to develop successful research programs. Along these same lines is that there has been a shift to more corn silage and manure research with larger plot sizes requested. We are excited to support this research, but many of our fields are not big enough. Our manure tankers are reaching the end of their life cycle and repair costs have been increasing. Replacement is being explored. For corn silage, we need to supply adequate, consistent feed to the dairy, and timely harvest is critical. Too many studies could spread out the harvest and affect the feed harvested.

Significant changes occurred to the Commercial Driver License (CDL) application process in 2022. Drivers now need to pass in-depth classroom and behind-the-wheel training from a registered training provider prior to a road test. This has affected our ability to get employees properly licensed to operate station trucks. We have explored many options but haven’t been able to find one that works well for our situation and budget. We also help departmental employees obtain CDLs to operate their vehicles to move equipment to research sites.
**US Dairy Forage Research Center**  
**2023 Annual Report.**

*Leading the world in integrated dairy forage systems research*

**Number of Research Projects:**

During 2023 we supported 5 USDA primary researchers, 4 UW researchers an increase of two additional researchers over 2022. These researchers also included various collaborating scientists, post docs and graduate students from within both institutions, nationally and internationally. These scientists/researchers performed 13 dairy research trials including behavioral, nutritional, and reproductive efforts supporting the DFRC vision. These trials utilized an average of 87 cows and/or heifers per month (range 37-190). We continue to use the Jersey herd in trials comparing them to the Holstein cows, mainly in the area protein utilization. Agronomic trials continue with low lignin alfalfa, experimental work on inter-seeding alfalfa in corn silage plots and tracking how much nitrogen is lost in various stages of the growing, harvest, feeding, waste stream and crop nutrient application.

**Outreach:**

We had a group of

- 4th graders and parents from St. John’s school (25), this group is extremely happy to return each year.
- We also hosted a group from the American Society of Farm Managers and Rural Appraisers (ASFMRA) (30)
- a group of Foremost Farms field reps (15)
- NRCS Ag Engineers were here for a training where they set up several stations around the facility that dealt with nutrient management.

**Challenges:**

We had a big increase in calf scours in 2023 that started earlier in the year and continued throughout. This was attributed to cryptosporidium and most likely spread by birds and/or flies. We have experienced an increase in overtime/weekend hours due to lapses in the quality of maintenance work. We have been working on communications between the maintenance crew to reduce these instances.

**Opportunities:**

This is a continuation from last year’s opportunity. We are working more one on one with the 5 ACT III employees we have working at the farm. Our goals are:

- Increase the size of this team.
Develop our next supervisor(s)
Develop a higher-level position in total herd health.
Identify a person that is interested in feeding and communication with researchers.

Accomplishments and Goals:

- We made progress on a couple of our challenges and opportunities I listed in last year’s report.
  - Our employee retention and overall engagement has made a big jump over the last year. Due to:
    - ACT IIIs being more involved and participating in decision making.
    - Ongoing monthly meetings with all employees, offering a ZOOM option for those that are not scheduled to be at the farm.
    - Increased interaction with/by our farm supervisor.
  - Second, our ACT III group spent a few meetings reviewing the book Emotional Intelligence 2.0. This improved their ability to see their strengths and weaknesses in working with others.
- We have almost a full year of the RARC trainers spending time each month improving the skill set of interested employees.
- Pounds of milk sold, and the quality of that milk is always a SMART goal for the year. We did not have our best year for production, or quality. We did increase our pounds sold/cow by 2 pounds and on a fat corrected basis by 1.4 pounds. We look forward to increased milk production in 2024 while maintaining component and quality parameters.

<table>
<thead>
<tr>
<th>Year</th>
<th>Yearly total</th>
<th>BTSCC</th>
<th>BFAT</th>
<th>Protein</th>
<th>OSOL</th>
<th>Total Bovi Sync Cows</th>
<th>Avg sold/cow</th>
<th>FCM 4%</th>
<th>FCM 3.5%</th>
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<td>3.87</td>
<td>3.08</td>
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<td>89.9</td>
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<tr>
<td>2020</td>
<td>10,961,372</td>
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<td>3.80</td>
<td>3.09</td>
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<td>345</td>
<td>85.94</td>
<td>86.6</td>
<td>93.6</td>
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</table>

- Our preg rate ended the year at a consistent 32% the same as 2022.
- We had a jump in mastitis in January through March (19, 38, 24) that took us up over 2022 levels but returned average 10/month the rest of the year.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases/Yr</th>
<th>Cases/100 cows</th>
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<td>374</td>
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<td>31.17</td>
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<tr>
<td>2023</td>
<td>172</td>
<td>41.95</td>
<td>14.33</td>
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</table>

- I do not track employee turnover, but I do know the employees we do have are the most cohesive, high performing team we have had at DFRC in the years that I have been here. We have seen a few of the longest-term employees step up to their potential and become leaders instead of instigators.

**Research Activity:**

We are seeing a continued increase in the total number of trials that are using an increased number of Green Feed units that measure various greenhouse gases on an individual cow basis. Repro trials being conducted by UW researchers are looking at the “whys” of one cow getting pregnant and a similar cow not.

**Future Research:**

We have 1 trial continuing into 2024 (started in 2022) that is following calves through their first lactation to determine the effect of their dams’ diet on performance. These calves are the offspring of a previous transition/repro trial where the cows were fed high and low energy diets. We have two studies scheduled on utilizing various cover crops in mid-lactation cows and the second on early lactation cows. We will be working with a group of bull calves that will be used to see what the effects of acidosis are on young calves. We will possibly be adding some computer feeding stations to do some preliminary research on PMR intakes and performance of various “robot pellets”.
Station information

Three facilities:

- **Walnut Street Greenhouse**
  - 72 glass greenhouses, campus hot water heat, 66% air-conditioned, 15,000 ft² bench space
  - 4 growth chambers
  - 52 cold frames

- **King Hall (Soil Science)**
  - 4 glass greenhouses, campus hot water heat, all air-conditioned, 1000 ft² bench space

- **West Madison ARS**
  - 2 polycarbonate/vinyl dome-roof greenhouses, 36 irrigated benches plus floor space for taller crops, natural gas forced air heat, evaporative cooling, 4200 ft² total growing space

Summary of research activity

- The greenhouses served 53 principal investigators and other entities in 2023. These research groups are associated with various departments within CALS, L&S, UW Extension and USDA, as well as some non-UW organizations.
- Research was conducted on a large variety of vegetable, cereal, pulse, fiber, fruit, nut, and ornamental crops, as well as soils and agricultural research equipment.
- There are currently over 200 active greenhouse users.
- Hundreds of experiments are conducted in these facilities each year.
Notable station achievements

- Performed extensive trials and evaluations of LED greenhouse supplemental lighting options. Produced a specification for future greenhouse lighting upgrades and began the work of capturing energy savings incentives and moving toward purchase of new light fixtures.
- Expanded beneficial insect rearing and release program, with the addition of several predatory species and broader release patterns.
- Defined and executed a protocol for screening new pest control products to identify phytotoxicity risks prior to using new products on research crops. Screened five new products in 2023.
- Made modifications to pesticide selection and recordkeeping processes to provide more collaboration within the greenhouse team, higher efficiency, better pest control, and more transparency for researchers.
- Completed conversion of aging flood bench irrigation at West Madison greenhouses to a more versatile and precise drip irrigation system.
- Worked with the Werle weed science lab to procure two new growth chambers utilizing gifts from the Wisconsin Corn Promotion Board and Wisconsin Soybean Marketing Board, respectively. This increases growth chamber capacity at Walnut Street Greenhouse by about 40%.
- Streamlined and organized processes surrounding space assignment and fee assessment to reduce errors and provide more transparency to researchers.

Outreach and instruction activities

- Administered greenhouse orientation, WPS training, and specialized equipment training to new and returning greenhouse users. Training was provided to over 200 individuals during the year.
- Provided tours and information to prospective and current students seeking educational and career advice in the protected plant culture industry, as well as members of the public.
- Greenhouse staff presented on the topic of biological controls as part of undergraduate horticulture classes offered at the UW.
Key changes

- Procurement of two new growth chambers.
- Continued integration of beneficial insects into pest control program.
- Completed conversion to drip irrigation at West Madison greenhouses.
- Hired a student worker. This was possible due to funding provided by ARS Headquarters.

Challenges and areas of concern

Ongoing:
- Age of greenhouses and lack of precision and reliability in environmental controls. Current research demands a level of control over the environment which we cannot consistently offer in many of our greenhouse spaces. Some of our buildings and equipment are reaching end of life and/or obsolescence.

Emerging:
- Greenhouse crop lighting systems are aging, and parts are becoming more difficult to obtain. There is also a significant energy cost savings in newer lighting technology. Lighting system upgrades will be a top priority in coming years.
- Knowledge capture and transfer – Longtime greenhouse staff possess a wealth of experience related to protected culture of plants in a research context. This is highly specialized knowledge and should be preserved for the benefit of future research at the greenhouses.

Goals for the coming year

- Continue design and implementation of robust greenhouse space assignment, billing, maintenance, inventory, and pesticide application recordkeeping systems.
- Move forward with the purchase of upgraded greenhouse supplemental lighting systems.
- Explore additional alternatives and supplements to chemical pest control.
- Seek opportunities to expand staff knowledge and skills through learning and networking.
- Capture staff knowledge – document processes and provide instruction to ensure redundancy.
- Increase functionality of greenhouse work and storage areas.
- Explore standardization and upgrade opportunities in irrigation and fertilizer delivery systems.
- Learn, grow, and enjoy our work while providing excellent support to research at UW-Madison.
HARS 2023 Annual Station Report

Notable Station Achievements

Field: We had a challenging year with warmer and drier than average weather but had higher than average crop yields and quality. We felt we had a very high success rate on all our research projects based on yields and feedback received from our PI’s post-harvest this past growing season. Since it has continued to be a challenge securing tractors and combines through the UW’s lease program, in 2023 we opted to purchase a new mid-size Case IH tractor, and a new soil finisher for the station. This tractor comes with precision farming tools which helps expand our research capabilities for PI’s utilizing HARS. The next big equipment priority we need to purchase will be a new spray coupe and we have been working to find ways to purchase this unit. All options are being explored to find a mechanism to secure this critical and expensive piece of field machinery.

Storage: We officially added a new 2-year fixed-term finite position to the SRF staffing structure. The new position is a research tech (Vanessa Barczi) and adding this position has had a high value impact on our storage research program’s ability to process sample evaluations more efficiently. Since Amber’s transition from research specialist to SRF Manager and mine to Superintendent, the SRF lost a net position and we have been working towards making her team whole again to help maintain the high level of service that our storage PI’s and potato & vegetable industry collaborators have come to expect. Adding Vanessa’s position, as well as the continued growth and development of research tech Jamie Boyd, has significantly added to the capacity of projects and abilities of the SRF, which as a direct result has helped continue to grow the SRF’s annual revenue. Facility upgrades include new lighting in both the alleyway and laboratories; upgraded electric French fry slicer to reduce risk of repetitive task injuries; replaced the current printer with one more aligned with our needs (i.e. printing on index cards instead of writing by hand which saves a significant amount of time). Future goals include working with WPVGA to finalize the purchase and installation of a replacement for our current compressor that powers air through all storage spaces, upgrading remaining bin and locker light fixtures, and working to get protective channels installed in the locker spaces to protect the walls of the lockers from pallets of crates of potatoes (more detail in goals section).

Overall Station Improvements: we continue to update some of our older equipment (we recently purchased a mid-size Case IH tractor with precision farming tools along with a new soil finisher in 2023). We also ordered a new F-350 truck in 2023 that is slated to deliver in 2024. Paul and his team have already performed many LED lighting upgrades in the SRF (alleyway, lab, bins, lockers) for Amber and her staff. This has saved us a tremendous amount of money as compared to the lighting specialist that arrived from UW-Madison and quoted us a price of $30,000 to update the entire building. My team will end up getting this project completed in-house for around a quarter of that cost. I’ve also recently given the go-ahead to upgrade our A/V system in the conference room with a ceiling-mounted projector with built-in speakers, peripheral room camera with wireless screen mirroring and connectivity capability.

Outreach/Instruction Activities

Annual Processing Crops Meeting (March); HARS Field Day (July); Midwest Food Processors Field Day (July); hosted our annual Garden Show in our horticultural display garden along with field tours of the station (July); Global Conference on Sandy Soils led by UW-Madison faculty Jingyi Huang and Alfred Hartemink (June); we hosted kids from three different area schools (Plainfield, Wautoma, Red Granite) each year for planting of pumpkins during their last week of school in spring then they return in the fall after they’ve started the next grade to harvest and take pumpkins home with them; Amber did a nice job delivering her storage/potato variety development presentation at the WPVGA’s annual grower’s
education conference, (February); Amber and I attend the annual PAA conference in July (PEI, Canada); Paul/Amber/Troy attend and help facilitate various meetings and tours for the UW, the WPVGA and other industry collaborators throughout the year: i.e. HARS’ annual User’s Meeting for faculty and students via zoom (March); WPVGA’s Member Development Program (Dec), HARS hosts the annual Rural Youth Safety Day for 200-300 local grade-schoolers each May (Plainfield, Wautoma, Adams); Paul/Amber/Troy have been working with the Farming for the Future Foundation Team helping to support their new Food, Farm & Exploration Center that recently completed construction in 2023. Paul was asked to be on the agronomy consulting team and is helping them spec equipment and develop the agronomic protocols for growing their small-scale vegetable crops and Amber and I have agreed to be speakers in their upcoming ‘guest speaker spotlight’ series to talk about potato storage and variety development; UW-Madison Extension South Central Regional Crops Educator, Natasha Paris, facilitated a new program called ‘Hancock Highlight Series’ in 2023 at the station. This past year we showcased field research from four non-potato researchers throughout the 2023 growing season: John Jones (Soils), Jingyi Huang (Soils), Valentin Picasso (Plant & AE Sciences) and Yiqun Weng (Plant & AE Sciences). Amber and I have been attending the student job fairs at local high schools (Plainfield in spring 2023) to help recruit high school summer student workers. In 2022/2023, we hired a Wautoma high school student as part of Wisconsin’s Youth Apprenticeship Program to work in the storage research facility. She gained valuable experience and earned money to place towards her secondary education.

Summary of Research Activity

Overall, we ended up helping to facilitate around 166 total research projects at HARS in 2023. Of these 166 total projects, 146 were field crop research and the remaining 20 were storage research projects. We had 59 different PI’s across all 166 total projects in 2023 with 39 of them being campus PI’s, and the remaining 20 being PI’s in the potato and vegetable industry. Paul adds that a lot of new biologicals and other growth regulators are trialed at HARS every year by many of the following UW PI’s along with our industry PI’s to see how they might work on our irrigated, low organic matter sandy soils: Water quality studies- Lysimeter project (Arriaga), N. leaching instruments (Huang), New ideas in cover crop/intercropping (Colquhoun), Herbicide on vegetables (Colquhoun/Heider) Rotation soil health studies (Ruark), vegetable and crop disease management (Gevens/Smith), Insect management in vegetables (Groves), Potato Breeding & Diploid Transplants (Endelman, Bethke), Potato genetics and gene bank grow out (Bamberg), pH and potassium interaction in field crops (Jones), Cucumber genetics (Weng), Precision agriculture practices (Wang), Corn fixing N. (Ane’), Corn genetics (Kaeppler), Taste Evaluation on Beets (Goldman), Forage for cattle (Akins).

Key Changes in 2023

While still not perfect, supply-chain issues have improved since we’ve distanced ourselves from 2020. While I understand this won’t come as a shock to any of us in 2024, getting capable candidates to apply for our open vacancies at the station, let alone attracting any kind of significant numbers of applicants is becoming more of a struggle, so anything the UW can do to keep the compensation of our ARS staff as competitive as it can be compared to our area industry employers, is always appreciated. This also helps retain high-performing employees from ‘jumping ship’ to industry.
Goals for the Coming Year:

- Start sourcing a new spray coupe for the 2025 growing season (CASE IH direct donation vs. HARS financing?)

- Installation of ceiling-mounted A/V projector and wall connectivity port panel in conference room.

- Install modern workstation on far wall of basement conference room using furniture I picked up from campus last year. (can be utilized as private office for visiting PI's/Extension Agents/ARS Leadership, etc.)

- DEI emotional intelligence training (already scheduled for March 2024; RARS is participating)

- HARS Team Goal: ‘Proactive Time Management’; using available staff and time to efficiently stay on schedule even when changes in plans leave us with less options.

- Design and invest in a ‘variety development’ trade show display to showcase ‘nex-gen’ potato varieties at our annual WPVGA Grower’s Education Conference

- Install steel channel in all of our lockers where the floor meets the wall, then apply spray foam insulation in all corners where the floor and ceiling meet the vertical walls. This will aid in energy efficiency and the lockers being better able to maintain their desired temperatures for greater success in storage projects. This will also help to eliminate unwanted water and CIPC sprout nip gas from leaking between locker to locker where they meet at the floors and ceilings to afford them to be more independent from each other and not share unwanted liquids and gases due to their poor original construction design.

Ongoing ‘Wish-List’ Goals As Extra Monies Materialize:

- Pave/blacktop the approaches going to the SRF and connect them to our existing pavement in several areas (reminder that covid got in the way of this plan in 2020)

- Update the tables and chairs (especially chairs) in the conference room of our main office (old and no longer any cushioning)

- Update SRF’s primary compressor with new one, install old one as secondary backup compressor (Amber’s working with WPVGA Director Tamas Houlihan to utilize their SRF maintenance fund to help cost-share this expense; potential 2024-2025 timeline completion)

- Replace original carpeting in office area of main office building (Troy/Paul/Sue office area)

Key Areas of Concern and Challenges

Equipment – Funds to upgrade/modernize/replace expensive aging equipment that’s core to our station. Our primary focus for this year is to replace our primary spray coupe which is getting close to 30 years old. Almost all of our research trials heavily depend on it and we are currently in the process of working with Mike to purchase a new one, or perhaps maybe even getting one directly-donated by CASE IH. Either way, we will need to have a new one here by next growing season. Our research gardener position has been another struggle. The employee we hired for this position has been dealing with a severe, non-work-related physical disability and has not been able to work many hours this past growing season and harvest when they were needed the most. We’ve been just getting by with our other employees stepping up and picking up some of the neglected workload, but it was a huge stress-point, and we can’t go through another growing season without a gardener to manage our horticultural display garden, maintain the building grounds, and as a reminder, this HARS Research Gardener position also had a seasonal SRF accountability that is not currently being fulfilled.
1. **Notable Station Achievements**
   - Supported just over 8,100 user-days of diverse station activity and provided 4,899 person-nights of lodging. (User days is calculated based on overnight lodging and day-use only visits.)
   - Generated outside donations, including:
     - $10 thousand donation to implement the Hamilton Roddis Memorial Lecture Series; and
     - $24 thousand in donations to support general station infrastructure improvements and programming.
   - Completed several station improvement projects, including:
     - Painted Mead Hall as a part of our exterior painting maintenance rotation;
     - Removed several hazard trees from the grounds;
     - Implemented foundation landscaping rotation on Mead Hall to keep basements dry;
     - Built custom memorial benches in memory of John Cary;
     - Installation of the WiscoNet weather station; and
     - Improved kemp trail safety with gravel improvements.

2. **Outreach & Instructional Activities, Including Hosted Conferences/Workshops**
   - **Outreach**
     - Conducted 12 outreach events as part of the Kemp Summer Outreach Series with 404 attendees;
     - Hosted 4 external day-use only outreach events with just over 101 people attending in total;
     - Co-organized and implemented the tenth year of the *Science on Tap* outreach series. We held 8 events attracting 600+ people;
     - Continued a monthly radio program called *Field Notes* that airs on local public radio station WXPR. The program is a joint venture of Kemp and Trout Lake research stations, and it has been very well received. The WXPR listening audience is approximately 13,000 people weekly;
     - Organized the 2023 Hamilton Roddis Memorial Lecture in collaboration with the Great Lakes Timber Professionals Association; and
     - Prepared 2 issues of *Kemp’s Point*, the semi-annual station newsletter that is distributed to over 1,100 households and individuals.

   - **Instruction**
     - Supported 12 field classes involving 4 UW-Madison departments and one UW-System university. Provided 649 person-nights of instructional lodging.

   - **Conferences/Workshops**
     - Hosted 26 conferences & workshops with overnight lodging and 17 day-use only conferences & meetings. This includes the Science in the Northwoods conference, an event held every 3-4 years;
Provided 573 person-nights of conference related lodging; and
Provided for 300 person-days of day-use only conference & meeting use.

3. **Research**
   - Supported 44 research projects involving 33 principal investigators from 10 UW-Madison academic departments and 12 extramural universities/agencies;
   - Provided 3,070 person-nights of research lodging;
   - Attracted 4 new researchers to the station; and
   - Hosted a diverse range of projects representing 5 of the 6 CALS Priority Themes: *Bioenergy & Bioproducts, Changing Climate, Economic & Community Development, Health & Wellness, and Healthy Ecosystems.*

4. **Change**
   - Designed new fee structure for lodging, the first fee increase in many years.

5. **Goals for the Coming Year**
   - Continue to build relationships with Kemp Station personnel, ARS administration, and community partners;
   - Continue five-year maintenance plan for Kemp Station buildings and infrastructure;
   - Continue outreach campaign to attract new researchers to Kemp Station;
   - Onboard new maintenance and custodial staff to continue Kemp Station’s excellent service;
   - Address the boathouse piling maintenance; and
   - Foster Kemp Station’s relationships of current and new donors.

6. **Areas of Concern & Challenges**
   - Keep our budget in the black; and
   - Address $150k in station maintenance projects, including replacing remaining roofs, replacing decayed structural logs, painting buildings, and replacing sliding patio doors.
1. **Notable Station Achievements**-
   2023 was a challenging year with weather related activities for the Lancaster Ag Research Station. The wet beginning turned to a dry rest of the year. Our main achievement of the year was to still be able to complete all the research projects and produce enough feed to support our cattle research and operations. Some production was reduced, but there were no cancelled projects and no additional feed that needed to be purchased.

   A notable grazing research project began that incorporated 5 different faculty from CALS, UWEX, and USDA DFRC. The project examines grazing paddock length on its impact on cattle and pasture performance along with weed impacts. The project also utilized dairy beef cross cattle as part of the animal component to compare with beef cattle performance while grazing. This project continues in 2024 and we hope this will be the start of more research with dairy beef cross cattle as well as more activity from the 4 new faculty and staff that have interacted at Lancaster for this project.

2. **Outreach/Instruction Activities**-

   We were able to host 2 different large groups of producer tours this past year. Both groups were interested in beef and forage activities. On June 24th we were part of the Wisconsin Cattlemen’s Association Summer Tour that visited Southwest Wisconsin. About 60 producers took part in lunch and tour of the Station. Also, on July 11th we hosted a group of 50 Alabama beef producers for a tour. The tour highlighted our beef herd activities and handling facilities as well as our forage production practices for grazing and harvested forages to support our cow calf herd.

   On August 14th we had planned a crop rotation field day to highlight various activities for the public, but unfortunately a rare day of rain canceled our event leaving us with no producer field days for the crops area in 2023. We did host a student class tour as part of the UW System Freshwater Collaborative that included instructors and students from 6 UW system campuses including UW Madison. Students learned about various research at Lancaster ARS that looks to improve water quality, such as cover crops and our long-term crop rotation study that has been in operation since the mid 1960’s. A group of about 30 individuals visited during the weekend part of the class tour around the driftless area in Southwest Wisconsin.

3. **Summary of Research Activity** –

   **Agronomic Crop Projects** – 38 total projects including areas of corn, soybeans, forages, small grains, cover crops, soil conservation, and fertility. 10 different faculty members from 5 different departments.

   **Beef Cattle and Grazing Projects** – 6 total projects including cow/calf genetics, cow/calf reproduction, nutrition, grazing management, weed management, and grazing plant species.
performance. 8 different faculty members from 2 different departments including 2 newly hired UW Extension Specialists, and 2 researchers from the USDA DFRC.

Key Changes in 2023 –

Key changes for Lancaster Ag Research Station in 2023 both revolved around working with new faces. First, several of our researchers, both faculty and graduate students, were new to our facility and most to the UW system. This is a promising situation as it means that we are having new interest and users for our Station. Time investment for working with new staff often is increased to assist them to successfully carrying out their projects. Hopefully our efforts in 2023 with the 4 new faculty and several different graduate students will translate in continued research activity in 2024 and beyond. If our efforts have been effective the research staff will be more independent with less assistance needed for the future.

UW Lancaster ARS has several UW Extension staff that we regularly work with in our region and areas of interest that are new to their positions. We have had a long-standing tradition of closely working with our surrounding UW Extension staff and many state UW Extension Specialists. Over the last year we have had departures in both our regional livestock and crops educator staff. Late in 2023 we learned that our regional nutrient pest management program educator would be advancing and taking a leadership role in that program. These 3 positions work closely with us for public outreach in field days, tours, and other schools/trainings. They have also cooperated on other demonstration and research projects. Currently the regional crop and livestock positions have new educators that we are building relationships with. The nutrient and pest management position is currently being recruited. In addition to these 3 staff there are new beef and grazing extension specialists that we have also been growing our relationships with. Both individuals have had previous UW positions that interacted with Lancaster ARS so that has helped as they grow into their new roles. As we continue to move past Covid times we hope to return to a more active outreach program for Lancaster ARS. Cooperation and assistance from these UW Extension positions greatly enhances our efforts and success.

Goals for the Coming Year –

2023 was able to bring potential funding for removal of our old wooden dairy barn structures at Lancaster Ag Research Station. Hopefully that funding will be finalized in 2024, and we will be able to remove these aging structures that are rapidly deteriorating. This project has been in process for many years and hopefully we will be able to finally complete it this year.

Again for 2024 we hope to continue increasing public outreach activities. We already have scheduled a tour for beef industry producers and professionals in August as part of a national sponsored Beef Stockmanship and Stewardship program. The program will take place nearby at the Grant County Fairgrounds in Lancaster, but the potential 150-200 attendees will have a tour of Lancaster ARS where we will highlight different stewardship and sustainability activities. In September we are cooperating with UW Extension and the Grassworks organization to host a two
day beef grazing school for 20-25 beginning producers to learn all about grazing beef cattle. In addition to these events we hope to host another one to two more field days highlighting various research and activities going on at Lancaster ARS.

An additional goal for the Lancaster ARS management staff is to support our Office Manager as she helps the transition for Spooner ARS to hire a new Office Manager position after the retirement of their long-time employee. Over the last 4 years the Spooner ARS Office Manager periodically helped us transition as we refilled our Office Manager role after a retirement plus also this summer as our current Office Manager was off for extended medical leave. As with all things, we all work better together, and we hope to ease this transition for Spooner ARS in the upcoming year as they replace their Office Manager position.

4. Areas of Concerns and Challenges

Hopefully we are beginning to move along the path of progress to remove the two aging wooden dairy barn structures at Lancaster ARS, but it is still a high area of concern. Their condition continues to deteriorate and at some point delayed action will lead to further structural issues and even safety implications. Our addition of a machine shed allows for storage of larger equipment to replace these 2 buildings. Additional storage for other small equipment is still needed. Potential renovation of the footprint of one of these old structures could provide space to fulfill these needs.

Requests for larger agronomic plot areas to carry out agronomic research. Lancaster ARS is known for its terrain with steep slopes and contoured fields that help alleviate erosion. Historically most agronomic research projects were able to be adapted to fit our 90-foot-wide contoured fields. There is a continued increase of agronomic projects looking for larger plot areas that we are not able to accommodate. There are additional land areas surrounding Lancaster ARS that could provide additional viable land options, but nothing that resides on the land that we operate now.

Decreased faculty numbers in key interest areas of Lancaster ARS such as beef, grazing, and forages. As has been mentioned previously we continue to reach out to limited new faculty to utilize station resources in these areas. These areas also represent strong interest areas in Wisconsin and especially in our local Southwest region of our state. Activity in this area also provides continued interest for important user groups and opportunities to highlight our work in outreach activities to the public in our local area and across the state.
2023 Notable Station Achievements

- MARS hosted a press conference and tour of the station for Senator Tammy Baldwin, announcing federal dollars earmarked for the construction of an admin office at MARS. Speakers at the event included Dean Glenda Gillaspy, USDA Director Dennis Hancock, and CALS leadership. As part of her visit, Senator Baldwin spoke about the Institute for Rural Partnerships program, funding she helped secure to address needs of rural communities.

- Two capital equipment purchases funded by the Dairy Innovation Hub were installed in animal barns. A series of 32 Calan Broadbent feeding research gates with a high rise were installed in June in the cow barn. Three feed efficiency studies used the newly installed gates in 2023. High resolution cameras were mounted and connected in three cattle barns as part of a study monitoring growing heifer behavior.

- Significant animal welfare program enhancements were made. MARS staff underwent trainings on fitness for transport (built into SOP’s), an RARC down cow training which included new equipment for animal extrication, a comprehensive training for on-farm euthanasia, adoption of an animal transportation emergency plan (built into SOP’s), and replacement of grooved crossover mats in two barns. A USDA funding request for the replacement of mattresses in the heifer barn was approved and planned for 2024.

- Necessary farm equipment was acquired in creative ways. For just over $142,000, the MARS station was able to acquire 14 pieces of equipment (i.e., four skid loaders, a manure spreader, two TMR mixers, a telehandler, a 24’ cattle trailer, and more). Equipment purchases were leveraged as federal purchases, annual trade-ins, cost-shared purchases with Dairy Science, Hatch cost-shared purchase, and finding good deals on used equipment.

- Following a nearly two-year recruitment period, Ashley Blackburn is hired as MARS assistant superintendent and agronomist. Ashley most recently worked with the UW NMP program and as an agronomist for Vita Plus. Ashley brings both knowledge of the UW as well as contemporary ag/agronomy experience to the position.

Outreach/Instruction Activities

- Twenty-nine groups toured the north farm campus, totaling 555 visitors.

- General station tours comprised 36% of north visitors. About 54% of activities taking place on the north farm fell under the category of education/instruction yet yielded 79% of all visitors at the farm.

- Supported an experiential learning opportunity for one ARS intern, Paige Brock.

- Four area public schools and two technical colleges used the MARS station for agricultural classes, farm safety days, and Food for America (ag literacy program).

- In a unique collaboration with Golden Sands Resource Conservation and Development (RC&D) and the Wisconsin DNR, MARS partakes in a purple loosestrife biocontrol project. Staff and community members worked together to rear “Cella” beetles and distribute them in areas densely populated by purple loosestrife.

- In cooperation with The Nature Conservancy and the local watershed, MARS organized and hosted a field day in July which included a meal (sponsored by TNC), speakers and field day topics on conservation farming. Eighty-five people participated.
The station took part in the cost-share program, Feed in Focus. This program seeks to advance the dairy industry Net Zero Initiative (sustainable practices in dairy). As participants in this program, MARS generated $8700 in financial support to offset costs of planting 155 acres of cover crops.

MARS hosts Youth Apprenticeship opportunities and job shadow career-based learning experiences for six area high school students.

**SUMMARY OF RESEARCH ACTIVITY**

- Twelve animal research projects, involving 16 PIs from UW and USDA. 520 calves, heifers, and cows were used on ACUC approved studies. Twenty-eight field research trials covering 102.9 acres with 11 PIs from UW (CALS and Extension) and USDA.
- Supported the research for multiple CALS graduate students from Agronomy, Animal and Dairy Science, Entomology, and students in the Endocrinology and Reproductive Physiology (ERP) Graduate Training Program. Support ranged from general assistance, data collection, data management, and troubleshooting technology transfer and recording equipment.
- Lais Lima, Graduate Research Assistant in the Department of Animal Sciences at the University of Florida, completed year one of a two-year study at MARS under the direction of Dr. David Jaramillo, USDA researcher. Lais is studying plant and animal responses to grazing meadow fescue with varying treatments of nitrogen.
- Paige Brock was hired as MARS ARS Intern. Paige worked as a student Research Technician for UW entomologist, Dr. Claudio Gratton, on a study identifying populations of dung beetles on pastures grazed at three grazing intensity levels. Paige assisted grad student, Skye Bruce, on a Dr. Gratton pollinator study.
- Four greenfeed machines were in use capturing GHG data on livestock studies on pasture and in the barns. One of the units was built into cow pen 96 to accompany feed efficiency research.

**KEY CHANGES IN 2023**

- The USDA manure processing building was repurposed to serve as a field chemical rinsate, pesticide storage, and seed storage building. All field chemicals were brought to the north farm campus and are readily available for usage. With the modification of this building, staff no longer must transport chemicals 10 miles between the Stratford and Marshfield farms.
- FPM assists in needed building repairs. Through the UW Madison Facilities Service Request portal, projects were either completed or commitment was made for repair. Projects included replacing shop heaters, repair shop sensors on exhaust units, barn posts repair in the UW heifer barn, light fixture upgrades in the UW heifer barn, and shop concrete apron extensions.
- The acquisition of H&S by Oxbo resulted in the loss of two zero lease H&S forage boxes. This impacts MARS budgets as forage boxes will need to be purchased.

**GOALS FOR THE COMING YEAR**

- In January, with leadership from the Sustainability Office, MARS completed a STARS GHG report detailing data to support an application for a solar installation grant. Replacements of metal halides and fluorescent fixtures with LED fixtures will take place in the USDA cow barn and UW heifer barn.
- Renew an agreement to partake in the Feed in Focus program, a best management practice in feed and forage production with the purpose of advancing the U.S. Dairy Net Zero Initiative.
- Support outreach activities planned for 2024, to include hosting a train the trainer workshop for the Division of Vocational Rehabilitation (DVR), AgrAbility, and UW Extension; Wood County Clean
Sweep; a 2-day grazing school funded by a grant through GrassWorks and Beginning Farmer and Rancher Development; and a DIH Advisory meeting and tour.

- Prep for the 2024 CALS AAALAC accreditation by updating SOP’s, ensuring staff are fully trained, ensuring all veterinary paperwork and animal records are accurate, and station animal facilities are neat and orderly.
- The Soils and Forage Lab will remove property from the Marshfield UW building by June 30, 2024. MARS will offer reasonable assistance to assist in reaching this deadline.
- With a background in precision agriculture by use of unmanned aircraft systems, MARS agronomist Ashley Blackburn will renew her license to use this technology in the field program.

**AREAS OF CONCERN AND CHALLENGES**

- Although MARS has experienced success using the FPM repair portal, the combination of limited budgets, stringent/restrictive purchasing rules, and aging infrastructure provide an immense challenge to addressing necessary facility repair.
- MARS has done tremendous work internally to maintain network capabilities. However, a fiber-optic internet is needed to improve speed, real-time applications, and handle large amounts of data.
- While being creative in acquiring equipment necessary to conduct work, gaps and glitches remain in these equipment procurements. From years of purchasing used equipment, persistent breakdowns and costly repairs are common, resulting in job delays, costs to hire custom operators to complete work, and longer work hours and overtime. The school lease program has its own obstacles. MARS is limited by what equipment dealers have in stock. MARS will need to find the money for equipment leases and/or make new equipment purchases.
- Concern exists over the shrinking land base. 124 acres of MARS south land was purchased in 2023 by the City of Marshfield. Land around the north station is high priced, competitively sought, and in limited supply.
- Although UW buildings at MARS South are vacant, their general maintenance falls under management of the station. Many of these buildings still serve a purpose in housing equipment and supplies. However, buildings are old, contain lead and asbestos, and lack of use is revealing new issues.
- MARS would like to integrate automation into the facility. Cost and purchasing obstacles to building augmentations limit the station’s ability to adopt these innovative and precision-based technologies that may enhance our research portfolio and improve efficiencies.
PENINSULAR AGRICULTURAL RESEARCH STATION – 2023

NOTABLE STATION ACHIEVEMENTS

In 2023 PARS hosted several tours and meetings to connect local producers with members of the University and statewide agriculture. Separate meetings were organized for the new Dean of CALS and the Wisconet Web Developer to interface with local fruit growers. These events gave UW personnel a chance to interface with the cherry and apple growers of the region and learn more about their current and future collaboration with PARS and the UW.

The grower meeting to discuss their user interface and predictive modeling needs regarding the Wisconet system was just one component of PARS’ role in transitioning weather stations from Enviroweather to Wisconet. In addition to connecting Wisconet staff with current and future weather data users and advocating for grower needs, PARS staff was able to support in-field upgrades of the Door and Kewaunee stations with Wisconet’s Manager and Instrumentation Engineer.

Collaboration continues to be a priority at PARS in both research and outreach. Events at PARS were hosted by and with The Door County Master Gardeners, UW Madison Professors, USDA NRCS, Door County Soil and Water, and local nonprofit groups to communicate important conservation and agriculture information to stakeholders.

A Major achievement in collaborative outreach this year was the initiation of the ‘Door County Science on Tap’ program that was launched with the cooperation of 8 local not-for-profit enterprises. Starting in October, one event was held each month to educate any interested parties on a wide range of scientific topics. The event was very well received for its first year with at least 25 attendees at each of the events and plans to continue this spring and in the winter of ’24-’25.

Many research projects continued in 2023, including the rootstock trials which are replicated at other sites throughout the U.S. and Canada. One planting had its final year of data collection (2014 Apple Rootstock Trial) while a new cider apple trial was planted this spring as part of this project (2023 Cider Apple Rootstock Trial). Wisconsin’s plantings continue to perform well and contribute much needed data to commercial and noncommercial growers throughout the state.

Along with continued long-term work, the Station’s research portfolio continued to diversify in 2023 with the planting of new table grape and hazelnut trials, expanding production acreage with the new no-till drill and no-till corn planter, and the start of new plant pathology work in conjunction with the Holland lab.

The United States Potato Genebank, located on the PARS grounds, supplied 3782 germplasm units in 2023 to 67 domestic recipients in 26 states and 10 foreign recipients in 5 countries. These went to support efforts in anthropology, breeding, genetics, home gardeners, pathology, physiology, entomology, and education.
OUTREACH/INSTRUCTION ACTIVITIES

- 5 Station tours serving 55 people
- 9 Outreach events serving 726 people
- 6 Education events serving 595 people
- Assisted 42 Homeowner walk/call in requests
- Provided 9 seasonal Commercial Fruit Pest Updates for apple, cherry, and grape producers on the PARS website
- Coordinated commercial apple and cherry scouting program covering 200 cherry & 230 apple acres (five producers) and delivered over 100 seasonal pest reports

RESEARCH ACTIVITY

- 2 Tart cherry: 1 PARS/Horticulture, 1 Horticulture
- 5 Apple: 3 PARS/Horticulture, 1 T3 Biosciences, 1 Plant Pathology
- 2 Grape: 1 Plant Pathology, 1 Horticulture
- 1 Hazelnut: 1 UW Extension/Center for Integrated Agricultural Systems
- 1 Small grain: 1 Agronomy
- 1 Forages: 1 USDA ARS

CHANGE

PARS’ Equipment Operator retired after 21 years of service and his institutional knowledge will be missed. We will be examining our future goals and needs before planning to refill the position in 2025.

STATION GOALS FOR THE COMING YEAR

- Expand the amount of research focused on agronomic crops and sustainable production
- Establish annual fruit grower education
- Expand the number of agronomic field days
- Establish the Station house as potential housing for visiting scientists and graduate students

AREAS OF CONCERN AND CHALLENGES

Necessary repairs to facilities and equipment continue to be our primary challenge. As discussed with campus facilities and UW ARS administration, many of the facilities onsite, including those that house the Potato Genebank, require significant repairs. The steam boilers are particularly demanding of PARS’ staff time due to age and neglect. Additionally, aging infrastructure is leading to safety concerns regarding decaying electrical systems.

The lack of a fruit extension outreach specialist in the state and any agricultural extension personnel locally has also continued to be a significant demand for PARS’ staff time. Without available resources toward which to direct homeowner and Master Gardener questions and education needs, Station staff have assumed this responsibility.
Notable Achievements

1. Four publications appeared in 2023 based on germplasm developed at RARS:
   
   
   
   Song L, Endelman JB (2023) Using haplotype and QTL analysis to fix favorable alleles in diploid potato breeding. *Plant Genome* e20339. doi:10.1002/tpg2.20339
   

2. Lin Song graduated in August 2023 with a PhD in Plant Breeding and Plant Genetics. Her dissertation explored the use of diploid potato for genomic prediction and relied on populations developed at RARS.

3. Infrastructure investments were made to enable research on potato seedling transplants as an alternative to minitubers, particularly for diploid hybrid breeding. A heater was installed for hoophouse #2 (2000 sq. ft.) and a mechanical transplanter was purchased.

4. Over 8000 pounds of seed, representing over 20 varieties, was distributed to over 50 collaborators for trialing to academic and industry collaborators across the US and in Canada.

5. The CY23 summer field inspection concluded that all 21 seedlots entered for certification 100% disease-free. In addition, the winter test resulted in all 14 seedlots being granted either foundation or certified designation.

6. Three new specialty varieties were disclosed as inventions to WARF: a red fingerling selected by a commercial partner in California; a purple skin/yellow flesh variety with round tubers named ‘Indigold’; and a unique bicolored fingerling named ‘Andi’. An additional seven varieties were disclosed as inventions to WARF in 2023.

7. Based on its strong performance in small plots, the dual-purpose variety W17098-19rus was accepted to move on to Tier 2 of the National Fry Processing Trial. This variety was first selected as a single plant in 2016 at RARS.

8. Based on strong performance, nine varieties were accepted to move on to Tier 2 of the National Chip Processing Trial and 18 varieties were accepted as Tier 1 candidates.

9. After being eliminated from the national SNAC trials, we saw success in cultivating 5,000 minitubers of the W15125-4 variety from Sklarczyk seed farm. We were able to harvest over 100 cwt of seed to distribute to cooperators for further trials.

10. On behalf of the Rhinelander Agricultural Research Station, secured four solid letters of support of the University of Wisconsin Agricultural Research Station’s proposal submitted to the USDA NIFA AFRI program in pursuit of funding towards the recruitment and training of undergraduate students in research and extension.
Outreach/Instruction Activities
2. RARS has aligned with SoilSerdem, a start-up that emerged from Iowa State University and is currently backed by a National Science Foundation grant. Yones Khaledian and Daniel Linton aim to strengthen and validate the efficiency of their soil mapping system.
3. In conjunction with Life Link III (led by Lucas Stoflet and Ryan Stauff), RARS committed to supporting their outreach initiatives to educate and provide secure air medical transportation options for farmers in Northern Wisconsin.
4. Teamed up with UW-Extension's Michelle Bachand, Farm Management Project Coordinator, to plan and execute the driving portion of Tractor Safety Training. Iain Runney, a student staff member, successfully completed both the book and behind the wheel portions of the certification course.
5. Liana Teter, RARS Hatch Intern, was the subject of an interview conducted by UW-Madison graduate student, Julianne Renner, which was then published on campus and shared on social media platforms.
6. Conducted an Eye on Breeding workshop for ten students enrolled in a gardening course at Prentice High School. Students were eligible for a science credit upon completion.
7. Successfully hosted a Night on the Farm event that gained exposure on Up North at WJFW Channel 12 and eCALS. We were able to harvest 120 cwt of potatoes for distribution to several local food pantries.
8. With the help from ARS, fabricated a handicap accessible tour wagon to use for outreach events.

Change
1. In 2023 RARS experienced 2 resignations and 1 replacement hire. Jaden Olski, our Research Technician, left the team, but we welcomed Emily Krulc as her replacement. In late November, Emily Krulc announced her resignation and subsequent move to the US Forest Service, with Taylor Payne slated to fill her position in April 2024.
2. This season marked the debut of the newly built pot washing station.
3. Drastic measures to purge PSTVd pathogen from potato breeding material in 2018 left the program with a reduced number FY5+ plots in CY23.
4. Upgraded internet and voice services throughout the facility's grounds. Partnered with CALS IT to procure equipment and implement upgrades.
5. All RARS greenhouses were equipped with Bluetooth waterproof HOBO data loggers, allowing us to record precise temperature and light data throughout the entire season.
6. Thanks to the WPVGA Associate Division grant, we were able to upgrade our tractor with a spray monitor, allowing us to apply pesticides with greater accuracy.
7. The addition of Traceable Live to our basement coolers allows us to remotely track temperature changes.
8. Revamped the seeder tubes on a large grain drill to promote more uniform seed distribution and depth, ultimately enhancing the emergence of the cover crop.
9. This was the first year with the capability to extrapolate onsite weather data from our Wisconet Station https://wisconet.wisc.edu/. Collaborated with Caitlin Wienkes to install extra instrumentation.
Research
1. Bioenergy – 5 Research Projects, 6 PIs
To better understand how yield limiting factors interact on marginal vs. productive soils the Great Lakes Bioenergy Research Center (GLBRC) established six experimental plot sites on low productivity marginal soils. The following conference proceedings were delivered using data collected from the Rhinelander GLBRC plots:


2. Phytoremediation – 4 Research Projects, 5 PIs
With RARS collaborators, phytoremediation researchers of the USDA Forest Service, Northern Research Station (USDA FS NRS) designed and implemented strategically placed phytoremediation plantings for phytofiltering of disinfectant wastewater.


Areas of Concern or Challenges
1. Maintaining the Station's efficient and successful operation despite the obstacles of aging facilities, a limited budget, and staffing concerns.
2. Precipitation for the period of May-September was 11.6" below normal and average temperatures above normal. If irrigation seepage ponds do not continue to recharge sufficiently, RARS may have water availability issues.
3. Securing program tractors and in-kind donations to cover operational supply expenses has become increasingly challenging.
4. The Town of Stella in Oneida County has discovered PFAS contamination in both private drinking water and groundwater within our vicinity.
5. Securing proficient labor equipped to handle the manual requirements of small plot research.
6. Maintaining positive staff morale can be difficult in times of heavy workloads and understaffing.

Station Goals for 2024
1. Ensure success across all aspects of the breeding program and continue to uphold the esteemed standing of the UW Agricultural Research Station. Efficaciously complete RARS mission to support existing research.
2. Continue to work on determining opportunities for improving operational efficiency.
3. Host a well-attended field day in July.
4. To achieve long-term success, it is important to keep expanding on-farm sustainability by considering new rotational crop possibilities and implementing alternative methods for pest control in the greenhouses.
5. Persist in the effort to build a cohesive, effective, and enjoyable work environment that cultivates teamwork, camaraderie, and open dialogue. Continue to hold daily meetings during the growing season, emphasize staff development in inclusivity, regularly share and discuss ARS meeting minutes, and continue staff gatherings.
6. Encourage the growth of our staff by emphasizing the importance of professional development, allowing them to pursue opportunities that enhance their expertise and abilities through education and networking.
7. Increase the awareness of RARS utilizing social media, our website, and event avenues.
1. Notable station achievements:

The Spooner Ag Research Station (SARS) hosted 23 agronomic or horticulture research trials for 12 different principal investigators. Three of these are new trials started in 2023. Being located four hours from Madison, SARS staff do much of the planting, management, data collection and harvesting in coordination with project staff.

Ten of the trials were variety testing for the corn grain, corn silage, soybean, barley and oats variety testing or development programs. Variety trial results are disseminated statewide through UWEX publications, internet sites and two state farm newspapers. Genetic lines were tested in miscanthus for winter survival and potential biofuel production.

Soil pH trials were done on a range of soil pHs for corn and corn silage yield. Also, a four-year liming application and tillage trial is in its second year. This trial is intensively soil sampled yearly by depth to determine liming effects in no-till and chisel/disk tillage systems. A boron fertilizer products/rates on alfalfa was conducted. Soybeans had two additional management trials with artificial intelligence management decision making and testing of ten different biological seed treatments.

Three fields are maintained for organic crop research. The Seed to Kitchen vegetable trials, spring wheat variety trial and winter wheat variety trial were projects on the organically managed fields. The Seed to Kitchen project had a squash variety trial, a pepper variety trial, leaf lettuce trial, potato variety trial and tomato variety breeding trial evaluation in a High Tunnel greenhouse. A notable side benefit of the Seed to Kitchen project is the positive publicity gained from donating produce to area food pantries and non-profit agencies. Separate from the vegetable trial is the demonstration garden in conjunction with area Master Gardeners and UWEX.

Two long-term plantings are a table grape variety evaluation and a five-acre field size hazelnut (Go First Hazelnuts) planting were started in 2022 and each increased their number of plantings in 2023.

Working with campus Facilities, a wood sided machine shed was painted in 2023.

2. Outreach/instruction activities:

SARS hosts many meetings held by the UW-Extension Ag Agent meetings related to the demonstration garden. The Twilight Garden Tour was a highlight in late August, drawing over 200 visitors.
The Spooner Ag Research Station gained two Extension area staff into our office group. Donette Hopke is in the Family Living Program area as a Human Development and Relationships Extension Educator and Kelsey Hyland is a Agriculture Water Quality Outreach Specialist. Both cover larger regions but their offices here mean more positive exposure for the research station.

3. **Research Activity:**

Joe Lauer, Agronomy, Wisconsin Corn Grain Variety Trial (Dryland, Silt Loam & Irrigated)
Joe Lauer, Agronomy, Wisconsin Corn Silage Variety Trial (Silt Loam & Irrigated)
Shawn Conley, Agronomy, Wisconsin Soybean Variety Evaluation (Silt Loam & Irrigated)
Shawn Conley, Agronomy, Artificial Intelligence Management in Soybeans
Shawn Conley, Agronomy, Biological Seed Treatment Evaluation in Soybeans
Lucia Gutierrez, Agronomy, Oats and Barley Variety Breeding Line Trial
Lucia Gutierrez, Agronomy, Organic Spring and Winter Wheat Variety Breeding Line Trials
John Jones/Francisco Arriaga, Soil Science, Soybean Yield Response to pH Level (pH plot area)
Erik Sacks, University of Illinois multistate Miscanthus Variety Hardiness Evaluation
Julie Dawson, Horticulture, Seed to Kitchen Vegetable Variety Trials
Yoana Newman, UW-EX Forage Specialist UW-River Falls, Boron Product and Rate Effect on Alfalfa Yield
Kevin Schoessow, UW-EX Ag Agent & Area Master Gardeners, All America Display Garden
Jason Fischbach, Ashland/Bayfield UW-EX, Hazelnut Production Trial
Amaya Atucha, Multi-location Table Grape Variety Evaluation
Kevin Schoessow, UW-EX Ag Agent, Garden Demo of Wine Grapes
Farmer Led Council, Soil Quality and Cover Crops research area with Inter-seeding Cover Crops for their Effects on Corn Grain Yield

4. **Changes:**

- New projects and the facility work listed in the achievements.
- Long Term TE and former full-time employee fully retired and have a new TE

5. **Station goals for the coming year**

- Increase number of agronomic research trials.
- Explore different crops and cropping systems to reduce costs or increase income
- Utilize more acres of reduced tillage and/or no-till row crop production

6. **Areas of concern and challenges**

- Attracting Student Interns and LTE employees
- Replacing/training Office Manager Retirement in 2024
2023 West Madison ARS Annual Report

1. Notable Station Achievements

With the ‘flash’ drought this season, we piped nearly 6 million gallons of water for research crops (higher than previous 6 yrs combined, 2nd only to 2012 with 10 M gals pumped that year). Despite not being irrigated, forage inventory goals were met and grain crops achieved high yields. Winter rye, seeded the previous fall and harvested before flowering stage produced clean (weed-free, seed-free) high-demand mulch. Grass and alfalfa seedings fared well despite lack of rain during the first 60 days of establishment. The 30-yr old ag bag asphalt pad was renovated and expanded in September. The 30-yr old furnace in the Chemical Management Facility finally wore out and was replaced by FPM. Sliding doors on Machine Storage II (used by BSE, PAS, and WMARS) were fitted with rubber skirting to hinder access/machinery damage from small mammals.

The display garden provided gorgeous beauty and a serene setting for visitors and passersby. At the entrance of the garden, thousands of petunia, impatiens, begonia, and daylilies welcomed visitors. Another 5,000 ornamental herbaceous plants further up in the garden were also on display and evaluated for industry and greenhouse businesses. Stakeholders and industry partners appreciated the side-by-side trials and evaluations we provided. Flowering woody shrubs and fruit trees were also on display for visitors. With the volunteers and summer interns’ help, we provided a very aesthetic, therapeutic setting for anyone to enjoy and learn from.

The campus food waste program continued, and it expanded to daily deliveries with over 230 tons delivered in 2023; that was twice the level year-over-year from July 2022 when program began. Thankfully, contaminant levels have remained low and appropriate C:N ratios are being honed in on to reduce odor and moisture before field application. It has been a well-coordinated
process of campus truck drivers inspecting, weighing/documenting, and rinsing out their trucks on-site.

Our fence line brush clean up project (5 miles worth) was nearly completed. Highly visible stretches are clear and pleasing to the eye and now much easier to maintain with occasional mowing.

Station staff safely navigated through urban traffic on daily basis around the station as well as to and from campus through ever-present road and busline construction with large trucks and tractors and farm implements.

2. Outreach Instruction/Activities

Nine tours were given to 116 visitors. Four field days had 140 people in attendance and included organic cereals/kernza; hazelnut/seedless table grapes; organic strawberries; and the ornamental trials in the display garden for the Commercial Growers of Wisconsin. Conference room users totaled 608 mostly for their organizations’ meetings and workshops but also included some horticultural events/plant sales for the public with another 860 attendees. Instructional activities to over 58 participants included several in-person, hands on training events. 1) grape pruning and disease workshop; 2) students and faculty from University of Puerto Rico-Mayaguez visited our soil pit/soil horizons to learn about WI ag, soils, and water quality; and 3) BSE students learned about ag equipment in their lab and got to see or operate equipment at the station namely field tillage, silage harvest, and combine experience. We also continued to provide new and current Master Gardener Volunteers opportunities to acquire service hour requirements for their certification. Our station’s location with high visibility from Mineral Point Rd. and the various activities throughout the season makes the station a very popular place.

3. Summary of Research Activities

The station met the multiple needs of researchers, both on station and at the campus livestock units. Over 1500 tons of silage and haylage and 40 tons of straw were produced for livestock research and maintenance rations, and campus silos were refilled quarterly. Straw was chopped and provided as a feed component for transition cow research diets at the dairy cattle center. Regarding research plots, most acres were used for crop nurseries or variety trials to improve crop genetics for field, fiber, and food crops: Field and sweet corn, small grains, tomato, peppers, carrots, seedless table grapes, hazelnuts were examples of crops studied. Other applied crop research included production treatment comparisons on celery, swiss chard, beets, no-till rye in organic vegetable systems for weed control, wine grapes using organic fungicides, and strawberries testing pest-repelling mulches. Biological Systems Engineering used fields and field roads to test out the safety of autonomous tractor operation. Several other unique projects this year included novel crops: Kernza, pennycress, N-fixing corn, hemp, and pea trials. There were several projects utilizing drones on a regular basis to collect data and images.

4. Key Change in 2023

No retirements or hiring happened for WMARS per se but some veteran research program technicians and key project leads retired or left their programs leaving limited expertise to carry out field trials. The Agronomy and Horticulture merged and renamed as Plant and
Agroecosystems Sciences. Increased building maintenance support from FPM was very supportive.

5. **Goals for the Coming Year**
- Balance budget
- Acquire forage bagger
- Remove old tree plot from early 2000’s to recover the land for new research
- Hire and train interns and Master Gardener Volunteers for display garden.
- Continue cooperation among other ARS units: WSGH bench space at WMARS in late Spring; snow plowing/mowing OJNoer & WSGH; sharing trucks and implements with DFRC, AARS.
- Promote station activities and events on Facebook page to increase awareness.

6. **Areas of Concern and Challenges**

Annually available greenhouse bench space in the Spring is never secure. The Display Gardens are grounds for national plant trials, All America Selections program, and demonstrations for the general public. In 2023, most of these trial plants were started in the greenhouses (GH) at West Madison, with 1200 sq ft of bench space needed; 85% of the GH need is from mid-April to late May. This GH option provides us essential access and efficiency to get to the plants for regular care and monitoring. It is also ideal to have this tremendous volume of plants on site as we began staging them outside during hardening off before transplanting in the display garden. Unfortunately, GH space is in high demand and scarce everywhere so there are no other viable alternatives.

Constant high speed and high volume of traffic on Mineral Point and Pleasant View—need ‘Caution! Farm ahead’ signage or flashing lights similar to what pedestrians use when crossing streets. A no U-turn sign at our crossing at Mineral Point entrance would be nice, too.

The asphalt lot around the main facilities has many potholes and large areas that should be overhauled vs. patched.

Abutting neighbors expect personalized farming systems and special treatment for living by the station (dumping yard debris/dog poop over the fence, not maintaining trees that are leaning over, wanting access for their construction; trespassing into fields).

Maintaining weed control/weed seed spread especially near/in research plots or in tight rotations following research crops that lacked a strong canopy or had uncropped/unmanaged areas.

Maintaining city sidewalks during heavy snow events is challenging. The sidewalks are narrow, the slopes are steep along the 2-mile path. Drifting is always an issue on Pleasant View Rd. To compound the challenges, when the city plows the roads with their big winged plows, large chunks of ice and snow are hurled from the road onto the sidewalk which then render our snow blower useless. A skidsteer is about the only piece of equipment that will work to remove deep, chunky snow and even that is at risk of tipping and getting stuck or tipping.
1. **Accomplishments**
   The year started with multiple projects being planned and executed by the core turf research scientists. Over 50 projects were planned for the Noer grounds in 2023, with many of the projects taking measurements long before the snow melted. Project work began in earnest in April. Early June saw the station assist with housing the Am Fam Championship by providing staging area for security and broadcast equipment. In June, Mr. Bruce Schweiger announced his retirement from UW. With Bruce’s guidance, a plan was built to provide interim management of the station and ensure research projects would be successful for the remainder of the growing season. Thankfully, Kurt Hockemeyer Turfgrass Diagnostic Lab Manager, and Audra Anderson, Office Manager, took an active role in helping with the delivery of key services at the Noer Station. With their expertise the remainder of the season was a success. Through collaborative work, the Noer ensured research program success. Also, the team of scientists and staff delivered a highly attended field day in August. In the final growing months of the year the scientist teams worked to establish new plots for future research work. Additionally, the Noer worked with the lab of Dr. Susan Paskewitz in the Entomology Department to provide critical grounds for their ongoing work in vector-borne diseases.

Once the growing season was completed and infrastructure was secured for winter, ARS went to work to hire the next superintendent of the Noer Station. Thanks to the work of an elite search and screen committee, we identified and hired David Marach in late December. David will start with CALS and ARS in 2024 and we look forward to seeing how his advanced turf management skills will help advance our research mission.

2. **Outreach/instruction activities:**
   In August, the Wisconsin Turfgrass Association returned to the Noer for their Summer Field Day. Over 200 attendees took advantage of learning seminars and visting with vendors about ways to improve services in the turfgrass industry.

   The Turfgrass Apprentice Program has classes being taught at the O.J. Noer three days a week from early November until mid-December.

3. **Station goals for the coming year**
   2024 will be an exciting year for the Noer as David Marach takes over leadership of the station and finds new ways to better serve our scientific and outreach communities.

4. **Areas of concern and challenges**
   - Equipment needs of a unique research station like a turfgrass unit will always pose challenges. We are grateful for the industry support of the Noer that assists us with equipment donations and also helps us locate used equipment to best meet our research mission.
   - Out of date software system for managing the irrigation system will need replacement very soon.