

Agricultural Research Stations
Annual Report
Calendar Year 2019
M. Peters, ARS Director

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Executive Summary

The Agricultural Research Stations had a very successful 2019. 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. Over 1100 research projects were completed while servicing over 300 Principal Investigators. Additionally, almost 32,000 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 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. Use of social media is one example where stations are expanding their reach.
- 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.
- The station budget models rely heavily on revenue generation to meet fiscal demands. Several years of depressed commodity pricing has had the stations creatively finding ways to make budgetary benchmarks. Many times the solution has been to defer capital equipment replacements, but at some point these items will need replacements purchased.
- Aging infrastructure at all stations is an ongoing balancing act. Campus maintenance funding for ARS was fully reestablished in 2019, but many structures are reaching their end of life usefulness.

- Many stations, but particularly those stations located close to the Madison job market, feel continual pressure of staff turnover. Proposed pay plans and discretionary compensation funds have helped alleviate some of this pressure, but retaining employees in the entry level positions has been difficult at times.
- Several units comment on the difficulty the weather is creating in meeting research demands. Additionally, many stations have repeatedly had infrastructure damage from extreme weather events.
- The stations have been proactive in addressing concerns raised during the recent USDA Civil Rights review. Vast improvements have been made in station accessibility, and these improvements will continue into 2020.
- Stations recognize the importance of having certified organic acreage available for research, and are looking to grow their portfolios in this area.
- The research stations are still a valuable asset for CALS and UW Madison. They are prepared to meet the demands of CALS faculty in 2020 and beyond.

General ARS Challenges

- Climate change is placing real pressures on the art of conducting research. Documented climate changes and weather events have narrowed the windows in which station staff and researchers are able to get into the fields and complete their work. This is placing pressure on the stations to accommodate precision needs, and many times leaves the stations and researchers doing work in less than optimal field and environmental conditions. Future investments in the station infrastructure need to be carefully planned so the improvements help alleviate some of these climate change demands. Additionally, it is the hope that the stations are a relevant venue for future climate change research.
- Campus budget models of using centralized service assessments to revenue generating accounts is making the operation of agricultural based facilities difficult. Commodity sales do not allow for passing along the costs of centralized service assessments. It is the hope that dialogue regarding different budget models can continue.
- Access to consistent high speed data networks continues to be a struggle in meeting today's research needs.
- Ensuring we maintain the right size and scope of animal research units will be an ongoing discussion for the foreseeable future. Being able to ramp these units up and down as investigators switch focus will be integral in meeting our continued mission.

Research Projects and PI's using Ag Research Stations
Cropping Year 2019
Compiled by Jane Cahoon
January 9, 2020

Station	Field Crop Research	Fruit Crop Research	Animal Research	Natural Resources/ Turfgrass	Campus PI's	Total PI's
ARLINGTON	300		60		40	45
HANCOCK	180				25	37
USDFRC	4		10		1	5
KEMP				43**	22	39
LANCASTER	36		8		13	13
MARSHFIELD	53		22		16	18
OJ NOER				56	4	4
PENINSULAR	25	7			7	12
RHINELANDER	2				2	2
SPOONER	26	2			11	17
WEST MADISON	79	4	13	6	41	41
GREENHOUSES*	250 - 450				70	70
TOTALS	955-1155	13	113	105	252	303

* It is estimated that 250-450 projects occur in the Greenhouses each year.

**Projects: DNR = 5, UW Non-CALS = 7, UW CALS = 18, Federal = 2, Other UW System = 4,
Other = 7

2019 TOURS/SEMINARS ON AG RESEARCH STATIONS
Compiled by Jane Cahoon
January 9, 2020

<u>Station</u>	<u>Field Days</u>	<u>Tours</u>	<u>Instruction</u>	<u>Seminars/ Meetings</u>	<u># of People attending</u>
ARLINGTON	3	128	7	53	8300
HANCOCK	6	10		37	1950
USDFRC		15			275
KEMP		14	18	40	4989
LANCASTER	5	6		4	425
MARSHFIELD	1	36		120	6200
OJ NOER	3	11		3	1002
PENINSULAR	1	5	2	4	1895
RHINELANDER		4	1	5	450
SPOONER	1	1	1	5	490
WEST MADISON	6	15	20	46	5080
GREENHOUSES		3	2	4	380
TOTALS	26	248	51	318	31436

Arlington Agricultural Research Station 2019 Annual Report

1. Notable station achievements:

Recent Wisconsin legislative action created a research pilot program for industrial hemp and the federal farm bill deregulated and recognized industrial hemp as a crop. This resulted in the Arlington station becoming a hub for hemp research for UW. Researchers planned a collaborative effort and examined varieties, row spacing, fertilization, weed control, and diseases on oil-seed hemp. A large-scale field for harvesting evaluation was planted as well as an organic study. Research will continue in the future.

2019 was the wettest year on record at the station. This caused research and field activities to happen in small, intense time frames. The farm crew responded to the need and worked many evenings and weekends when the weather was suitable. Despite planting, growing, and harvest challenges, crop yields were similar to 2018. We raised enough haylage and grain for the animal units and feed mill needs, but were short on dry hay and straw.

Land clearing was completed on the former forestry research fields on the south end of the station, bringing an additional 22 acres back into production. We also continuing to “even out” the 33 acres that was cleared on the north side of the station two years ago.

Projects were completed by station staff at the Blaine Dairy to expand the calf hutch research area and at the Beef Nutrition facility for a new study being funded by ABS.

The dairy manure lagoon which was constructed in 2016 has been very beneficial to the station. There was no opportunity to haul manure in spring because of the cold and wet weather. The large lagoon capacity allowed us to get by until wheat was harvested in summer. It also provides the opportunity to hire a custom hauler in fall to put more manure and excess nutrients on neighbor’s fields. The custom operator uses a dragline which saves wear and tear by tankers on the roads.

2. Outreach/instruction activities:

Over 8,300 Station visitors, including from: China, Brazil, Ukraine, India, and Mongolia

2019 Arlington ARS Tours, Field Days, Seminars, Courses			
Month	Group Name	Event	Participants
1/7-8/2019	BSE-Brian Luck	Ag Leader/SMS Training	55
1/12/2019	Deforest Cub Scouts Pack 35	Ag Station Overnighter	56
1/26/2019	Bristol Blazers 4H	Model Horse Show	70
2/9/2019	Lodi Vet Equine	Client dinner & demonstration	250
2/19/2019	Insight FS	Applicator Training	80
2/21/2019	Ag Systems	Service School	50
2/26-27/2019	Ag Systems	2019 Customer Service Training	50
3/4-6/19	Case IH	Customer Dealer Training meeting	50
3/6/2019	Madison College	Tour & Soil Sampling	21

3/9/2019	WI Sheep Breeders	Annual education seminar and meeting	125
3/12/2019	Mid States	Equipment Sprayer Clinic	80
3/21/2019	UW PAT	Field & Veg Applicator Training	72
3/23/2019	WI Livestock Breeders	WLBA Annual Meeting	55
4/6/2019	Col. Co 4-H Cottontails	Rabbit Fun Show	94
4/18/2019	Holman High School	Tour- Swine, Blaine, Sheep, Beef	10
4/25/2019	Belleville FFA	Tour- Swine, Blaine, Sheep, Beef	15
4/26/2019	Wisconsin State FFA	Livestock Judging Contest	200
4/28/2019	UW Saddle & Sirloin	Badger Bonanza Lamb Show	100
5/6,9/2019	DATCP	PAT Exam	150
5/14-16/2019	Stray Voltage Training	Stray Voltage Investigators training	35
6/4/2019	CALS Conference Services	CALS Animal Consortium	80
6/4/2019	Poynette 4th Graders	Sheep and Dairy Farm Tours	100
6/5/2019	UWEX Dairy Team	Annual planning meeting	25
6/11/2019	WI Crop Improvement	Inspectors Meeting	20
6/11/2019	Marquette Co Master Gardener	Weed Class	20
6/26/2019	Sullivan, IN FFA Tour	Entire Farm Tour	11
7/1-2/2019	Valentin Picasso	International Kernza Conference	110
7/15/2019	WI Crop Improvement	Small Grains Field Day	15
Aug	Madison College Vet Tech	Tour & Teaching at Beef farm	20
8/14/2019	Legend Seeds Inc	Dealer Kickoff meeting	25
8/14/2019	Karate America	Farm Tour	84
8/15-16/2019	Zoetis	Meeting	70
8/17/2019	Samoyed Association	Annual Picnic	50
8/21/2019	Columbia County UWEX	Corn Growers meeting	15
8/28/2019	Agronomy/Soils	Agronomy/Soils Field Day	250
8/29/2019	Erin Silva	Organic Field Day	100
Sept	Humane Training	Teaching Tour At Beef Farm	55
9/5/2019	WI Soybean Assn	Board meeting and tour	35
9/21/2019	Animal Science	Badger Production Sheep Sale	100
9/24/2019	UW Extension	Ag 101 Field Training	17
10/4/2019	Legislative Budget Office	Farm Tour	6
10/12/2019	WI Sheep Breeders	Board meeting	13
10/16/2019	DATCP	Fall Field Conference	40
10/18/2019	Valentin Pacasso	Forage Class tours	10
10/23/2019	Zoetis	SmartBow Launch	50
10/29/2019	BSE-Brian Luck	BSE Boot Camp	20
10/30/2019	Professional Dairy Producers	Herdsperson work shop	100
Nov	UW Campus Students	Teaching Tour At Beef Farm	8
11/7-8/2019	Lodi Vet Equine	Equine Podiatry Conference	100
12/4/2019	Rock County Farm Bureau	FFA Youth Ag Summit	98

3. Research Activity:

300+ Crop-related research projects with over 40 PIs supported

60+ animal research projects with 30 PIs supported

The feed mill also provides feed for trials on campus and Vet Medicine.

4. Change:

A staff departure has led us to rethink the long-term process used to calculate Animal Cost Recovery (ACR). The current process has many things calculated by hand and pieces of paper touched three or more times and by multiple individuals. A streamlined

process will use a new version of Quickbooks to track the expenditures while keeping the quarterly reports and billing in a familiar format. This will lead to greater efficiency, less chance of error, and timelier billing.

5. Station goals for the coming year

High speed internet is non-existent around the station. Headquarters staff share two 3.0 Mbps connections. Slow internet hampers productivity and frustrates employees and researchers. A contract has been signed with Charter Spectrum to bring high speed fiber internet to Swine, Blaine Dairy, and Headquarters in early 2020. After this is hooked up, we will look at ways to expand internet to the Public Events Building and several of the smaller research units.

Record rainfall has led to several fields being too wet to farm, resulting in lost research and production. We are planning to install tile to areas on the west side of the station so they drain better and we can continue to use them.

6. Areas of concern and challenges

Many buildings 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, and septic are aging and maintenance costs continue to increase. Three water lines broke last winter, resulting in an extra \$4000 bill for the station.

The station does not have a large enough land base to entirely support research projects, raise crops for feed, and apply animal manure. This is especially true for new or expanding programs, like hemp and organics. The quantity of animal manure produced exceeds the current land capacity for sustainable application while supporting research. Soil test phosphorus levels on many fields are increasing into a range where applications will be limited. We have manure application agreements with several neighboring farmers. We also cash rent or have crop purchase agreements on approximately 366 acres from neighbors, costing \$127,000 per year. Competition for land is intense from several large dairy and grain operations in the immediate area. With the current state of the farm economy we need to be ready for opportunities, should they present themselves, to purchase or lease additional nearby land.

Existing forage bunkers only hold three of the four alfalfa cuttings and there is not enough space to place the needed number of feed bags. The bunkers were constructed in a wet area and tile drainage for leachate was incorrectly installed. Feed storage losses are greater than expected. New bunkers or a concrete feed pad with runoff collection is needed. Storage buildings for straw, hay, and equipment are also needed.

The feed mill was built in the late 1960s. While still functional, it is showing its age. The pneumatic feed transfer system has caused two customers to purchase commercial feed due to excess fines in the diet. A solution will have to be found about how feasible it will be to replace the current structure.

US Dairy Forage Research Center 2019 Annual Report

Leading the world in integrated dairy forage systems research

Number of Research Projects:

During 2019 we supported 4 USDA primary researchers, 1 UW researcher and various collaborating scientist. The collaborating scientist were from within USDA and UW along with visiting scientist from other institutions from around the world. These scientists performed 10 dairy research trials in various areas in support of the DFRC vision. These trials were using the facilities every month during 2019. There was an average of 104 animals on trial each month (43-185 monthly). This is a big improvement over last year and took advantage of the capacity we were not utilizing last year. One of these trials is ongoing from 2017 which started with newborn calves and will follow them through their first lactation. A subset (cannulated) of this group also provided epimural rumen samples at the start of their second lactation. DFRC conducted the first trial using our new herd of Jersey cows. This trial compared the production/feed efficiency between the Jerseys and a cohort of Holstein cows. In addition, we had various groups of heifers on trial 7 months of the year. Agronomic trials continue on 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 using N15 marked forages.

Outreach:

DFRC hosted 15 groups of visitors with a total of approximately 275 people. This was a very diverse set varying from local 4th graders and tech school students, Brazilian exchange students and a couple groups from USDA. These tours were led by UW and USDA staff and researchers. Areas of emphasis varied from where the food on grocery store shelves originates to potential careers to DFRC obtaining information on potential employees or interns.

DFRC took advantage of their membership in The Professional Dairy Producers (PDPW) industry organization by sending employees to a few of their sponsored training and information programs. Including their annual conference, an animal welfare presentation including a tour of a beef processing plant and a couple of hands on training and information classes.

Challenges:

As has been the case since my arrival in 2016 DFRC, along with the whole milk production industry, faces the challenges of lower milk prices and tightening labor markets. We struggled to stay fully staffed most of the year with the current staff filling in when necessary. We have improved efficiency creating space in each schedule to accomplish extra tasks at each position. Keeping the facilities/equipment maintained and operating as it ages continues to be a challenge.

The addition of a maintenance position under UW supervision has improved this aspect of daily operations.

Opportunities:

I and the staff believe that USDA has set a time frame for a new facility. Though it is at least 5 years down the road it gives us a time horizon on a greatly needed improvement. The next biggest opportunity I see is improving the production of the herd. This can be attained by spending more time fine tuning rations with the USDA nutritionist/researchers. They have agreed to include a time for ration review in each animal use meeting. The other area where we have a big opportunity is in feed inventory shrink control. Working with our feeders and USDA on bunker area repairs and handling and recording options we can reduce the waste of good feed lost to poor facilities.

Accomplishments and Goals:

DFRC was successful in maintaining our pregnancy rate over 30% even with a repro trial that dropped a couple of periods below 20%. For 2019 our herd SCC level remained at historical lows, with a yearly average of 150K. Our Jersey herd has grown to include about 60 head of mature, research ready cows and 55 replacements. We will be using our genomic information to increase the genetic level of our herd with selective culling and mating. We will also be working on employee retention and, through training, increasing the knowledge and performance of our team.

Research Activity:

Our dairy research continues to emphasize new opportunities for improving the efficiency of milk production and ways to improve effective use of our feed, water and land resources. Discovering why and how cows' ability and efficiency of utilizing rations with higher levels of cellulosic materials. Researchers are confirming that cows are very good at turning cellulosic material (non-human food sources) into milk at efficiency levels comparable to high starch (human usable food sources) diets. This is relevant to the growing population and making the best use of our land resources.

We saw increased use of our 4 environmental chambers this year. Most nutrition trials included a period at the end of the trial where each ration was evaluated for greenhouse gas emissions. Ongoing buccal swabbing of the whole herd to analyze microbial profiles and the relation to genomic information and the predictability of rumen function. Researchers are seeing a positive tendency to our ability to control the microbial profile in cows if we start early in their life.

The repro trial we did in cooperation with a UW researcher was described in the IACUC application as: *During the last six decades, fertility of lactating dairy cows inseminated following estrus detection has decreased at alarming rates. While the exact causes of low fertility are*

unknown, a decrease in circulating concentrations of progesterone due to high milk production has been related to the reduction in fertility following artificial insemination (AI) in lactating dairy cows.

Currently, there is no treatment available to increase fertility of cows inseminated following estrus. Previous studies have demonstrated that cows treated with human chorionic gonadotropin (hCG) between days 5 and 7 of the estrous cycle form an accessory corpus luteum (CL). Cows with two CL, an original and an accessory CL, have greater circulating concentrations of progesterone compared to cows with only one original CL as during a normal estrous cycle in cattle. PI's preliminary data (unpublished), indicated that cows forming an accessory CL following hCG had a longer estrous cycle.

Short term trials continue on heifers analyzing when their digestive systems develop certain protozoal and microbial populations. Once this is established feeding protocols could be developed to control these improving feed efficiency in the most expensive phase of rearing.

Future Research:

Trials that are planned for 2020 include:

- A follow-up trial to a canola meal study that showed a 10-pound increase in production over soybean meal.
- We have also cannulated more Jersey cows for an upcoming trial starting in early spring.
- Continued whole herd buccal sampling
- Ongoing epimural sampling of cannulated cows that have been on trial since day 1 of age.

CALS Research Greenhouses ARS Annual Report 2019

Encompasses:

- Walnut Street Greenhouse ~15K sq. ft. bench space
- King Hall (Soil Science) greenhouse ~ 2K sq. ft. bench space
- 2 greenhouses at West Madison station ~4600 sq. ft. bench space
- Eagle Heights research field ~3 acres

Staffed by:

- 2 full-time managers
- 1 full-time horticultural technician

Serves:

- **Campus-wide facility**
- **~70 UW faculty, ~55 active at a given time**
- **~230 users and ~140 projects at any given time**
(Federal and campus researchers, emeritus faculty, visiting scientists, technicians, post docs, graduate and undergraduate students.)
- ≥ 12 departments
- ≥ 5 additional organizations/groups
(Lakeshore nature preserve, GLBRC, WI Energy

Institute, etc.)

1. Notable Station Achievements:

Site and equipment improvements:

- Constructed seven 6'x16' auto watering systems for the West Madison greenhouse. The system is working well and has been reliable, has shown no disease or root rot issues. There are savings on daily watering labor, and the system cost a fraction of an off-the-shelf unit.
- Constructed 22 new wooden stake boxes to hold our heavily used bamboo stakes. We built these from scratch, stained and sealed them. They range from over six feet to about 2 feet. These boxes are a safer, better looking solution to storing bamboo stakes than an open upright barrel.
- Cleaned out the lower level of the Stock Pavilion storage area. Material filled 10 truckloads and was recycled or trashed.
- Purchased and installed large stainless steel trays for safely storing our pesticides.
- Revamped our pot storage area by building chain restraints to prevent tip over and clearly delineate different pot sizes.
- Paved the access road to our Eagle Heights research area.
- Purchased and installed a new ice machine.
- Overhauled heavily used pot washing machine in older section.
- Installed new electronic door locks at West Madison. Huge improvement in reliability and in resistance to freeze-up.



- Acquired about \$2000 in greenhouse benches from the botany department. (free)
- Acquired 5 HPS lights from the Biotron (free) About \$1000 value.
- Repainted and refurbished all the blue wooden benches in the older section and at West Madison.
- Purchased 5 LED lights for use and study. To be used at West Madison.
- Introduced improved N95 dustmasks for student use.

Notable services provided, investigations:

- Tested short plants and tall plants from seed to maturity on our new auto watering benches to see how they would perform and to see if water would move by capillary action to plants over 2 meters tall.
- At the request of our cranberry breeder, we tested over 12 pesticides to see if they had any phytotoxic effects on the plants. The results showed no phytotoxic effects.
- Tested and evaluated new pesticides for effectiveness and phytotoxicity. Plants were grown and then sprayed and evaluated. We tested: Kopa, Affirm, Palladium, Akari 5SC, Ovation SC, and Timorex Gold.
- Conducted Corn Media trial: This was the last of 4 trials to evaluate the best media to use in the greenhouses. Corn is demanding to grow in containers so if corn will do well everything else will also. We trialed four different media and chose Premier HP to use in all of our greenhouses. We purchase \$50,000 of bagged media each year.
- Conducted low phosphorus experiment with corn and soybean at West Madison.
- Conducted an oat-herbicide assay for Professor Werle.

2. Outreach/Instruction Activities:

- Hosted “Anthem” lighting technology company- mini seminar on LED Greenhouse lighting.
- Hosted Oregon Middle school program at the WSGH- young business people.
- Will host a tour for Short-Course students (December 2019)
- Hosted and organized a greenhouse lighting mini-conference with James Grozos from PL lighting LTD. 13 attendees.
- Hosted and organized a seminar with Carlin Sales and Proline biocontrol. 23 attendees.
- Utilized 300 hours of ‘volunteer’ labor from Nick Zander, James Mayhew, Tyler Rothmiller, and Kevin Nitzmiller.
- Attended active shooter training

3. Research Activity:

Currently, there are ~125 projects at Walnut Street, with another 10 at the West Madison greenhouses, and 5 at King Hall. However, it must be noted that while we have as many as 150 projects utilizing our space at one time, projects may last a matter of a few weeks, months, or years. We estimate that somewhere between 250 and 450 projects utilize space at our station each year.

4. Change Over Time:

The research greenhouses no longer have the capacity to satisfy the demands of the users. Often, researchers have to wait to be able to obtain greenhouse space and sometimes the

quality of space/environmental controls is not the quality that researchers desire (1960's greenhouses & equipment).

The demand for outdoor field research space has fallen off. We have one researcher who plans to use the Eagle Heights field during the next growing season, and we plan to reallocate our resources away from the field after they complete their work and retire.

5. Goals for Coming Year:

- Create pot washing how-to video for greenhouse volunteers.
- Continue to expand auto-watering bench space at West Madison. Expand auto watering to 25% of that greenhouse complex.
- Attend greenhouse trade show in Minneapolis.
- Attend AERGC conference in Minneapolis in July.
- Attend NECERA conference in Tucson Arizona in April.
- Clean out and organize second and third floors of Dairy barn storage.
- Continue to clean out and organize Stock Pavilion storage.

6. Areas of Concern and Challenges:

- Growing concern that we may not have enough space to accommodate all researchers. With the Biotron closing, will that increase our occupants further? We already occasionally have to turn people away or put them on a wait list.
- Concern over quality of space. The “old section” of houses was built in the late 1950's, early 1960's, and does not have the more precise, complex controls that many modern experiments require. It also lacks the safety of overlapping controls; entire projects can be lost if the single air conditioning unit breaks, instead of the 4 units present in the larger “new section” rooms. Renovations were originally planned in the 2011-2013 biennium budget – if we want to serve researchers' needs, and create a space for high-quality, consistent and repeatable experiments, this renovation needs to be a priority.
- Lighting technology is changing – our mercury vapor lights are being phased out. Soon, the replacement parts we use (ballasts, capacitors, ignitors) will no longer be produced. We do not believe replacing ALL our lights is financially feasible, nor is there a proven, viable lighting technology to replace them with (LED's have been somewhat unreliable in greenhouse performance to date.) We are currently addressing this by buying a stockpile of parts that should last several years, and hoping technology/reliability improves before we are forced to change to something else.
- Storage. Many of the storage spaces we manage (Dairy Barn, Stock Pavilion, etc.) end up with users leaving things until they die, retire, move away, etc. We need to be able to limit this behavior, and get users to remove their own items in a timely manner. In some cases, having access to a moveable dumpster(s) may be helpful.
- Physical Plant restructuring of their work request system has led to some confusion and delays in getting mechanics to fix equipment issues.

**Annual ARS Accomplishment Report and Goals Statement
Felix Navarro/Troy Fishler- Hancock Ag Research Station (HARS)**

1. Station administration and management:

a. Employees (20): 3 Permanent Academic Staff (Troy Fishler, Amber Gotch, Felix Navarro), **7 University Staff: FTE** (Paul Sytsma, D. Peterson, Sue Miles, Sam Perez^{*,**}), **0.875FTE** (S. Grimmenga, Jerry Pierce), **0.75 FTE** (Douglas Klabunde), **Less than 0.5 FTE** (N. Miller, LuAnn Borotrager, S. Castillo^{*}), **8 Summer Students** (Rheya Heiden, Madelyn Henriksen, Esmeralda Landeros, Jera Lopez, Gabriella Mathis, Erica Pronchinske, Suzanna Viau, and Kordell Woyak). **3 Finite Term University Staff:** Justin Wilcox, Tiffany Buchholtz and Colton Roberts. **Disciplinary actions:** Not needed, we observed sustained improvement on performance. **Actions that improved staff morale:** regular and special meetings, annual reviews, staff participation in events outside HARS. Discretionary compensation (DCF) benefited four staff (Grimmenga, Peterson, Pierce and Fishler), and Miles was awarded a title change. Thanks ARS!

b. Financial Management

HARS 101 Budget for FY19 (\$508,868) was executed and we finished FY19 in a balanced situation. We reported negative balance for salaries (\$29,089); this was offset by savings on supplies and expenses due to donations of pesticides and by sales credits. Donation of pesticides, fumigants and sprout inhibitors during 2019 totaled \$26,742. We appreciate Amanda Gevens and Russ Groves' collaboration on getting these donations. Thanks Amvac-Vapam, Nelsons' Vegetable Crop Systems, CPS and others. Antigo seed growers donated potato seed for \$2,629 in seed. For FY2020 CALS-ARS appropriated \$499,578 to our 101 funds.

Cost reductions and revenue enhancement: By combining research funds from Navarro, CALS Internship in collaboration with Yi Wang and fee for service research generated we hired eight summer students and helped fund four university staff. We appreciate the collaboration with Paul Bethke's storage research grant providing \$35,458 that during the last two years used to cost-share part of Tiffany Buchholz' salary. During FY19, HARS field research revenues including 136 fee for service revenues, including grading fees (\$12,542) and 133 grants totaled \$98,825. Corn, soybeans and potato crop sales income was \$86,424), researchers chargeback was \$44,274 using 125 acres. Companies crop chargebacks (\$17,112). For FY20, Navarro current field research revenues including 136 fee for service revenues and 133 grants totaled \$208,292. For FY19, the SRF had income due to services for \$124,816. In addition, it executed the **Wisconsin Potato and Vegetable Growers Association, SRF Committee appropriation for \$25,000 maintenance fund**. This has helped to do required maintenance work at the SRF and help us balance our budget. For FY19 the SRF does not have full bulk bins occupancy due to reduced occupancy from Potatoes USA, McCain and UW researchers.

c. Resource Management

Equipment acquisition or renovation:

- CASE IH program met many of the immediate needs for equipment. We continue to have concerns about our vulnerability about not having a tractor early in April and keep looking at a future need to replace equipment such as our Spray Coupe pesticide sprayer, and equipment not available under the CASE IH program.
- During the Spring of 2019 we receive two BCS rototillers, one paid for by USDA Yiqun Weng Cucumber Breeding Program and another with Navarro funds. These pieces of equipment will help the cucumber and potato variety and farm activities such as garden maintenance and cutting alleys.
- We purchased a potato and vegetable sample washer as a part of a demonstration project with DATCP. The potato grader was extended to better singulate potatoes. Our Garden cabin renewal finished with much success.
- The Storage Research Facility Tarp House was finished, Tarp House completed (end walls, garage doors, and electricity hooked up. This shed will house several important equipment including the bin loader and unloader and several others.
- Established a lean-to on the southwest corner of facility; it will be used for off-season storage of crates, macrobins and bulk research bin bulkheads.
- Resurfaced the three remaining SRF bulk research storage bins still containing the original weaker gauge corroded sheet metal with new industrial gauge corrugated sheet metal and polyurethane spray foam insulation.
- Acquired a newer HunterLab Colorimeter (used for color quantification of finished chips) from the Endelman Lab to replace our older model HunterLab D25LT.
- Fishler submitted and received a WPVGA grant securing partial funding to pay annual licensing fees for Medius Ag Inc.'s VDM (Variety Data Management) software which will help increase the accuracy and efficiency of the UW's potato variety research data collection and analysis. We have been working with the Medius Ag software engineers in customizing the software to best suit the needs of the UW's storage research program.
- Secured a YSI 2700 instrument from Yi Wang's lab to replace our YSI 2700 that was being used as a backup to our newer YSI 2900 prior to it breaking down. Utilizing parts from our decommissioned one, we arranged to repair her YSI 2700, get it up and running again, so we could use it as a backup until we are able to source another YSI 2900 in fall of 2020. At that time, she plans to reclaim her instrument back to her lab.
- In 2019, the SRF was responsible for managing storage evaluations on the following potato research samples: Agres Trial (46 YSI sugar samples/46 test fry), Nachurs Trial (93 YSI sugar samples/93 test fry), Wang Water Efficiency Post-Harvest Storage Trial (80 test fry). Simplot In-Season Chemical Maturity Trial (224 YSI Sugars), Endelman French Fry Trial (28 test fry). Potatoes USA NexGen Chipper Box Bin Trial (9 YSI sugar samples and 9 test fry every month throughout duration of storage season), Potatoes USA NexGen Chipper Bulk Bin Trial (3 YSI sugar samples every week and 3 test fry every other week throughout duration of storage season), USA SNAC Chipping Trial (56 YSI sugar samples/56 test fries; every month throughout duration of storage season). Fee for Service YSI sugars for Mortenson Brothers

Farms Inc. (27 samples each week throughout duration of storage season). Pressure Bruise Evaluation Trial (91 varieties evaluated 3 times throughout storage season at the 3, 6, and 8-month timepoints. Black Spot Bruise Evaluations (34 varieties evaluated for susceptibility of black spot bruise defect). Bethke USDA “Scale of Storage” Validation Trial (6 YSI Sugars and 6 test fries each month throughout duration of storage season). Conducted numerous raw grades, YSI sugar and test fry evaluations on insurance claim samples throughout the months of September through December each year

Research and Demonstration Plots Support

In 2019 UW researchers and 12 companies had > 180 projects from 25 faculty in 135 research acres. Researchers are using the PIRF system to request field research projects. We link PIRFs to access to researcher’s database. including crop management, weather and irrigation data.

2. Outreach

Field days and Tours: 16 for about 1200 people. The conference room hosted 37 meetings or events for about 750 people. We maintained station website and facebook websites. CALS improved Station website (Thanks!).

3. Services to the University, CALS, HARS and Community

Collaborated with WPVGA, MWFPFA, Hancock Community Garden, Rural Youth Safety Day, Tri-County School Pumpkin Patch, donated potatoes more than 80,000 lbs of potatoes and vegetables to Second Harvest Foodbank 11 food pantries.

4. Professional Development Activities

National Potato Expo, Austin Tx, January 9-11 (Navarro).
WPVGA Growers Education Meeting, Stevens Point, February, Potato Association of America Meeting (Field and SRF Staff)
Potato Association of America Meeting, Winnipeg, July 28-August 1 (Gotch)
Potatoes USA NCP Selection Meeting, December 10-11 (Fishler, Navarro)

2020 Goal Statements

1. Maintained budgets with a positive balance while attending expense needs.
2. Carry out research and outreach activities to satisfy demand of researchers and industry.
3. Maintain a 100% record of successes on research projects as measured by not being significantly affected in a negative by station management and practices.
4. Achieve 85% or more of the goals set forth by HARS Staff in performance reviews.
5. Obtain DCF compensations and PBF compensation for staff if available.
6. Convert the old and unreliable R circular pivot to a Linear VRI Irrigation Systems.
7. Build two bleacher safe wagons as the Arlington models for our Station field days and tours.
8. Provide maintenance to Dorm House for radon remediation, by December 2019 inspection.
9. Add blacktop around the SRF including SRF parking lot for easier forklift operation.
10. Maintain upkeep to Storage Research Facility as problems are identified to maintain service.
11. Painting Vegetable Handling Shed, window replacement for Field Office and Main Office buildings, better roof insulation for main office building.

Kemp Natural Resources Station

2019 Annual Report

1. Notable Station Achievements

- Supported more than 8,200 user-days of diverse station activity and provided a record 4,989 person-nights of lodging;
- Generated outside donations, including:
 - \$10 thousand donation to implement the Hamilton Roddis Memorial Lecture Series; and
 - \$13 thousand in donations to support general station infrastructure improvements and programming.
- Completed several station improvement projects, including:
 - Re-roofed the Office, Kitchen/Dining Hall, Woodshed, Smokehouse, and Outhouse to stop leaking;
 - Painted Carpenters' Shop and Barn as a part of our painting maintenance rotation;
 - Installed AC and repaired air exchanger in Mead Hall to address humidity issues;
 - Added custodial laundry facilities to the Connor Forestry Center;
 - Installed new furnace and water heater in the Kitchen/Dining Hall;
 - Expanded patio furnishings in the Connor Forestry Center; and
 - Installed new overhead door on the Barn.
- Managed a significant water damage event in Mead Hall:
 - Kemp staff undertook the initial cleanup and demolition.
 - Outside contractors installed new drywall, carpet, hardwood floors, and insulation. The elevator, fire suppression system, and fire alarm system was also repaired.
 - Kemp Staff is completing the final trim and finish work in the basement.

2. Outreach & Instructional Activities, Including Hosted Conferences/Workshops

- **Outreach**
 - Conducted 12 outreach events as part of the Kemp Summer Outreach Series, attracting 304 attendees; this included: one event in partnership with the Minocqua Public Library (one other was cancelled due to inclement weather); the 2nd annual fungi education event with nearly 100 attendees; and Wisconsin Insect Fest in partnership with the UW-Madison Department of Entomology with over 60 attendees. Hosted 2 external outreach programs organized by UW-Madison and 2 external outreach programs by county and state agencies. In total, internal and external outreach activities provided for 689 person-nights of lodging;
 - Co-organized and implemented the sixth year of the Science on Tap outreach series (10 events), attracting 1,069 people;
 - Continue a monthly radio program called Field Notes that airs on local public radio station WXPB. Program is a joint venture of the Kemp and Trout Lake research stations and it has been very well received. The WXPB weekly listening audience is approximately 13,000 people weekly;
 - Hosted an environmental field day for 55 local 6th grade school students;
 - Hosted 2 separate groups of university/college students for day visits, 34 students total;
 - Organized the 2019 Hamilton Roddis Memorial Lecture, attracting 720 people; and
 - Prepared 2 issues of *Kemp's Point*, the semi-annual station newsletter that is distributed to over 800 households.

- **Instruction**
 - Supported 18 field classes, involving 8 UW-Madison departments and 4 UW System universities. Provided 1,117 person-nights of instructional lodging.
- **Conferences/Workshops**
 - Hosted 29 conferences & workshops with overnight lodging and 14 day-use only conferences & meetings
 - Provided 463 person-nights of conference related lodging;
 - Hosted 621 day-use only conference & meeting attendees.

3. **Research**

- Supported 43 research projects, involving 39 principal investigators from 13 UW-Madison academic departments and 8 extramural universities/agencies; this includes 5 UW-Madison lab retreats during which participants contributed to additional projects;
- Provided a record 2,720 person-nights of research lodging;
- Hosted the Science in the Northwoods Conference where 100 researchers gathered to present on the research they are conducting in northern Wisconsin;
- Attracted 4 new researchers to the station; and
- Facilitated an incredibly 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**

- Staff and appointments remained steady.

5. **Goals for the Coming Year**

- Maintain high levels of research, instruction, outreach and conference/workshop activity;
- 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;
- Increase Kemp Station's lodging use by 5%;
- Increase Kemp Station's Connor Forestry Center use by 5%; and
- Foster Kemp Station's relationships of current and new donors.

6. **Areas of Concern & Challenges**

- Avoiding the field station death spiral. Researchers have told us we have now hit a fee tipping point, where they are considering no-cost alternatives such as nearby UW Trout Lake. Fee increase could drive away Kemp users; and
- Address \$150k in station maintenance projects, including replacing remaining roofs, replacing decayed structural logs, painting buildings, and replacing sliding patio doors.

Lancaster Ag Research Station

ARS Annual Report

1. Notable Station Achievements-

-Continuation of successful row crop weed management program for Rodrigo Werle of Agronomy and Dan Smith of the nutrient management program. Herbicide resistant weeds are an important and popular topic in the agronomic area. Dr. Werle's program is growing including his work at Lancaster ARS that includes 8 different research projects and multiple graduate students. In addition to producing publishable results from the research they are connecting with surrounding producers and industry professionals by having 3 different programs with 125 total visitors to the station. Continued research and outreach programs are planned for 2020.

-Establishment of pasture weed management and increase in other forage management projects for Mark Renz of Agronomy. Dr. Renz has been a long time user of Lancaster ARS, but increased his presence in 2019. Several new projects were started and pasture weed management field day was held with support for the event from industry.

-Exploring more formal cooperation between UW Lancaster ARS and UW Platteville. There has always been some cooperation and interaction between the 2 groups, but with no formal meetings or discussions on what could be done. In late June a joint meeting was held between both groups that included a tour of both our facility and the UW Platteville Pioneer Farm. This meeting led to a cooperative demonstration project for UW Platteville's beef production class and hopefully will lead to other cooperative opportunities with research, teaching, and management of the 2 farm operations.

2. Outreach/Instruction Activities-

Tours – 6 total – approximately 50 attendees

Field Day – 5 total – 180 attendees

Seminars and Courses – 4 total – 75 attendees

3. Research Activity –

Agronomic Crop Projects – 36 total projects including areas of corn, soybeans, forages, small grains, cover crops, soil conservation, and fertility. 13 different faculty members from 6 different departments.

Beef Cattle and Grazing Projects – 8 total projects including cow/calf genetics, cow/calf reproduction, nutrition, animal welfare during heat stress, silvopasture, pasture weed management, and grazing plant species performance. 8 different faculty members from 3 different departments including a cooperating researcher from the USDA DFRC.

4. Change –

Shrinking Beef and Forage related Research Faculty- With a vacant beef extension specialist related position, and the retirements of forage related researchers (Dan Undersander and Ken Albrecht) there has been decreased activity in beef and both grazing and other forage research at Lancaster ARS. This trend continues with the upcoming retirement of Dan Schaefer of the Animal Science Department. These 4 positions had been very active users of Lancaster ARS over the last 20 plus years and their absences are felt. Relationships are being built with newer faculty such as Valentin Picasso Risso and Joao Dorea and incoming faculty hires, such as the new livestock welfare position, provide opportunity for new station users. Hopefully some additional faculty hires in the beef and forage management will provide active users for Lancaster and other UW Ag Research Stations for years to come.

Outside interest in performing research on station – Additional outside interest beyond UW Madison in performing research in both agronomic and beef areas. Regular contacts are being received from other universities such as UW Platteville and UW River Falls as well as other private companies that are looking for a location to perform their research. Our priority is to maintain support of UW Madison CALS faculty members research programs. In certain instances, we are able to link up non-UW Madison researchers with a CALS faculty member to help facilitate additional work that can be performed at Lancaster. At this current time both can be accomplished although situations are continually reevaluated as conditions change.

Combination of Animal and Dairy Science Departments – The merger of the two livestock departments in CALS are bringing about changes with the beef herd located at Lancaster ARS. Changes in department structure and staffing has already occurred and more are in process. Meetings on both the department side and Ag Research Stations are continuing to help plan and outline how the new arrangements for the livestock program in CALS will be. As this is an ongoing process not all details are known and what changes and effects there will be for Lancaster ARS.

5. Station goals for 2020 –

-Continue to attract additional research to maintain our activity level. This may be from existing and traditional faculty and others maybe from new faculty. We have already been able to establish plans for additional projects for faculty members like Mark Renz of Agronomy and Carrie Laboski of Soil Science. As mentioned above we will also look for alternative arrangements to perform additional projects for non-UW Madison faculty members when appropriate.

-Removal of 2 old storage structures – Lancaster ARS has 2 old wooden dairy barn structures that are subsiding quickly and need to be removed. The addition of the new machine shed structure allows for storage of larger equipment to replace these 2 buildings. Additional storage

for plot and other small equipment is still needed. Potential renovation of the foundation of 1 of these old structures could provide space to fulfill these needs.

6. Areas of concerns and challenges-

-Getting permission to deal with demolition of aging station facilities – At Lancaster ARS there are 2 aging former dairy barn structures with significant structural problems. We have been in process for the last number of years trying to get approval to take down and remove these structures. Multiple rounds of safety inspections and other general questions have taken place, but with no progress in getting approval to move forward. Maintenance has been minimal as these structures have been expected to deal with by now. At some point delayed action could lead to further structural issues and even safety implications.

-Dealing with weather related damage from 2018 and 2019- The past two years have had some of the highest amounts of annual rainfall on record. In addition to the large total amount of rainfall there have been several large individual rainfall events that have caused water runoff related damage. Our station road was repaired multiple times over the past two years including the need for outside contractor equipment for repairs on several occasions. There still is remaining erosion damage in crop fields and pasture areas that need to be repaired next year. Wet weather conditions throughout the fall didn't allow for enough time to complete additional repairs before winter. Some of these repairs will also require specialized equipment to be hired from outside contractors. Hopefully our weather patterns will return to more average conditions for the next few years to alleviate additional problems to what we already have encountered.

-Decreased faculty numbers in key areas of CALS such as Animal Science Department. Another long time station user from the Animal Science Department, Dan Schaefer, is set to retire at the end of 2019. Area of expertise in using Lancaster's resources such as the beef herd is becoming limited without the addition of new faculty members. Hopefully those positions will be able to be filled to allow for sustained activity with our herd. In a lesser extent there is similar need for new faculty that will use station land resources for other areas of research as well.

Marshfield Agricultural Research Station 2019 Annual Report

Notable achievements

- MARS selected for the 2019 Conservation Steward Award by the Wisconsin Land and Water Conservation Association.
- Obtained Midwest Forage Association grant to conduct a series of small trials focused on expanding the use of perennial grass systems in dairy production.
- Continued to make progress toward the goal of keeping “continuous living cover” on all acres all year round – perennial systems, cover crop systems, 60” row corn, etc.
- Implemented newly purchased GIS/guidance system for planting and fertilizer applications.
- Hosted the third iteration of Common Ground receiving high reviews from event attendees.
- Expanded organic crop trials.
- Upon appeal to the USDA-ARS, MARS received USDA Non Assistance Cooperative Agreement (NACA) funding \$60,000 for the study of comparisons of grass-based and alfalfa/corn silage forage systems for dairy cows in Central Wisconsin. This NACA funds labor and a study.
- Despite nearly 100% winter kill of alfalfa acres, MARS activates a backup plan to recover fields resulting in production of nearly all forage needs to make it through to next harvest season.
- Despite a very tough year for growing forages, successfully grazed 100 acres of pastures and received exemplary reviews from Marathon County staff on the condition of the pastures during and at the end of the season.

Outreach and instruction activities

- North and south campus MARS facilities utilized by universities, state and federal entities, tech colleges and K-12 students, extension, private industry, and the community. Forty-two groups totaling 851 people visited MARS north farm. The MARS South auditorium received 125 reservations, totaling 4146 users.
- Host site for the third annual Common Ground, an event in partnership with the watershed group Eau Pleine Partners for Integrated Conservation (EPPIC).
- Served as a lab/classroom for 7 area high schools high schools that offer advanced level instruction (Advanced Standing, Youth Apprenticeships, and Technical Credit) to students.
- Provided student work/internships/Youth Apprenticeship opportunities for 8 students.
- Hosted several onsite field classes for Mid-State Technical College as part of the college’s Agribusiness and Science Technology associate degree program.
- Hosted a series of agronomy, soil health and grazing workshops in collaboration with the local grazing network, no-till farmer group, and watershed group.
- Maintained an active social media presence. To date, MARS Facebook site shows 1059 likes and 203,000 page reaches. Launched an Instagram account (55 followers).

Research activity

- 53 field trials on 143 acres (including research pastures) involving 13 principle investigators.
- Livestock research involved 620 animals and 10 principle investigators.

- Notable livestock studies included a biomedical study comparing the micro flora community present in bacteria found in dairy cows and those present in the dairy farm workers; a study looking at a protein additive which may improve calf immune function; a paired watershed grazing study comparing intensities of grazing to that of conventional forage crop management; the study of an alternative silage cover system.
- Participated in a study to collect feed efficiency data on lactating cows to improve selection for feed efficiency. This was the first use of the Calan gate feeder system.
- Continued long term soil health trial (6th year).
- Third year of data collection observing crop yield and quality with interseeded cover crops.

Change

- Continued demonstrating forage alternatives to the typical corn silage and alfalfa for dairies; use of perennial grasses and annual grasses can make farms more profitable, and resilient in tough weather conditions. These practices may improve MARS crop budget.
- The agreement to raise dairy heifers for DFRC has been discontinued. All but 47 heifers destined for the DFRC have been dispersed. Dairy Science has lowered the heifer herd numbers in the ADH. Thus, MARS has seen a reduction in the number of heifer rearing days (resulting in a reduction in station revenue). The ADH herd is at 410 head; a 24% drop in the number of heifers MARS is raising for the ADH.
- The problematic manure system was funded for repair by USDA. The repair will simplify the manure evacuation system to reduce breakdowns, service calls, and constant minding of the original system.
- The decision was made to eliminate sand as a bedding for the dairy herd as a result of persistent manure system problems. Sand plagued the poorly designed manure system plumbing and constantly resulted in plugged pipes. Sand had been permanently engineered out of the USDA barns. Mattresses were installed in the dairy and bedding used in the USDA animal barns is exclusively organic material.

Goals for next year

- Participate as the opportunity presents itself, in research as part of the Dairy Innovation Hub.
- Work toward building a fundraiser team to raise money for the goal of constructing an administrative office building.
- Renovate the northeast quadrant of the USDA heifer barn to accommodate lactating dairy cow research (ventilation fans, better quality lying surface, comfortable stall dividers).
- Acquire a feed truck or vehicle to precisely feed out diets to cows on study in the Calan gates.
- Work together with the Animal Science/Dairy Science Department merger in collaboration of resources and for the collective good of the CALS livestock units.
- Purchase a drone for scouting fields and for outreach and engaging the public through social media.
- Continue long-term tillage x cover crop trial (year 7) and begin working with a couple interested scientists to explore publishing some data (Eric Young, Francisco Arriaga, etc.).
- Further explore the possibility of certifying some acres as organic and how to further integrate organic methods into the MARS crop program.

- Begin relocating red clover breeding nurseries to north farm, and install a permanent, high quality deer fence around the area.
- Explore possibilities of expanding pasture research program to lactating cows, and possibly even beef cattle.
- Begin drafting and implementing a plan for minimizing area of mowed lawn at both south and north sites, and how such areas can be used to demonstrate good land management practices.
- Consider building a public walking trail at MARS north; could be integrated into the lawn reduction exercise.
- Explore the idea and feasibility of constructing a small grain drying and storage facility at MARS to minimize the amount of grain being purchased from the co-op and to decrease the amount of expense and risk associated with growing grain in Central WI.

Areas of concern and challenges

- The absence of a professional administrative office continues to be a significant challenge. The temporary fix to this has been rental of a construction trailer for station managers. MARS has spent nearly \$40,000 in rent of this trailer since 2012 and continues to deal with deficiencies in adequate office space, meeting space, and filing space.
- The goal of acquiring net receipts from cash crops is a challenge. In 2019, 5450 bu of grain was sold as grain generating \$17,000. MARS did not meet FY19 net receipts and will not meet FY20 net receipt requirements via the sale of cash crops.
- The lack of a public meeting space has required MARS to use the shop for large meetings, presentations, dinners, and events. Using the shop for this purpose significantly obstructs work flow.
- The weather posed the greatest challenge to fieldwork and general operations. A wet 2018 fall, followed by record cold and prolonged winter, followed by a long cold spring resulted in widespread loss to alfalfa fields. MARS narrowly avoided feed runout and purchased corn, dry hay and baleage to backfill the feed shortage following uncooperative weather. To date, an additional \$60,000 will be spent on feed purchases to make up for loss due to weather. Weather events are forcing Central and north-Central Wisconsin to rethink how fields are managed and what feedstuffs are produced to operate a dairy farm.

2019 O.J. Noer Turfgrass Research Facility Annual Report

Achievements

In March it was agreed that ARS Staff would take over all maintenance of putting greens plots. This included daily mowing, all sprays, topdressing, aerification, fertilizer applications and hand watering. Funding was made available from the two key Principal Investigators hire additional staff to handle the workload. Due to the March shift in workload, the actual hire date of the extra staff was a month later than required. The hired TE then went back to school unexpectedly in September. In September, I hired a part time person to work 15 hours per week along with my one outside staff person. We successfully made it through the fall and saw improvement in the overall plot research capacities.

Other achievements include:

- The final repairs from the flood of August 22, 2018 were completed. The repair or replacement of main building air conditioners, building well pump, new irrigation pump, new irrigation pump control station, four field satellites, other repairs as needed after flood damage control was completed by ServPro, and various re-grassing projects.
- After the flood last year, the putting greens had 65-70 percent turfgrass cover and moss infestation. By early summer the greens had completely recovered except the moss infestation. By the end of the year the moss was 90 percent gone.
- Installation of Charter hi-speed internet to replace old TDS DSL service was completed.
- Late July the O.J. Noer again hosted the Wisconsin Turfgrass Association annual field day. The event promotes the research from the turfgrass professors and highlights the work and projects of the Graduate and doctoral students. The attendance this year was 284. We felt the attendance was down due to the difficulty of accessing the O.J. Noer during the road construction project (discussed later).
- Continued the relationship with John Deere for the donation of a large area mower to improve the appearance of the overall grounds and improve efficiency, valued at \$80,000.00
- In June University Ridge Golf Course hosted the AmFam Senior PGA Golf Championship for a third year. Golf Channel used the O.J. Noer facility as their base of operation. This year work in coordination with AmFam and Golf Channel to stage all heavy equipment within the parking lot.
- During the AmFam Championship week the O.J. Noer houses Incident Command for the UW Campus Police. The lunchroom and conference room house the computer communication, Fire Command and store any and all equipment and vehicles. We also make available extra Utility Vehicles for their use.
- County Highway M was under construction the entire year. The access to the O.J. Noer was at times difficult. This construction caused many new challenges with driveway closures, erosion onto the property. As the project came to a close, work with the contractors to re-seed and grow-in the area disturbed at the front entrance is finally complete.
- The new road brought the Ice Age Trail Coalition to the Noer with a new trail pattern across the Noer. An agreement was finalized to establish a route for the path that will cause the least disruption to the Noer.
- The spring and fall of 2019 the University Ridge Golf Course bunker re-construction project required assistance from the Noer. Due to event scheduling at University Ridge Golf Course staging sand, gravel, bunker liners and a sprayable polymer was done in the Noer parking lot

and pesticide building. This project will continue into the spring of 2020 with repairs to be done at that time

Outreach/instruction activities:

- WTA Summer Field Day – 272 attendees
- Ag Teachers and Counselors Tour – 12 attendees
- Roadside maintenance seminar (Dr. Soldat and DOT)- 14 attendees
- Weedman technician training school – 13 attendees
- Seminar Sauk Trails Optimist – 15 attendees
- Taught three Pesticide DATCP Applicator Classes – 169 attendees
- Carlin Products Turf Seminar – 189 attendees
- Insight FS Turf Seminar – 95 attendees
- Fox Valley Extension Landscape Meeting (2 sessions) – 64 attendees
- Southwest Technical College Turfgrass Management Class – 4 hours 11 students
- CALS Emeritus Professor Brunch – 38 attendees
- Exacto Research Meeting – 8 attendees

Research Activity:

Soil Science demonstrated, evaluated, and compared four autonomous, electric robotic mowers to traditional mowing practices. These robotic mowers have the potential to substantially reduce greenhouse gas emissions and labor costs associated with maintaining lawns and other turf areas. We also collected data that is being used to develop a growth model for predicting the growth of creeping bentgrass. After more testing and validation, the model will be utilized for improving fertilization efficiency on golf courses.

Other Soil Science projects included:

- Evaluated dozens of fertilizers and fertilization strategies for turf
- Continued a long term study on potassium nutritional requirements that is changing the way potassium is applied to turfgrass worldwide
- Evaluated dozens of different grass species and cultivars for performance
- Continued trafficking study on NTEP Perennial Ryegrass trial
- Began to take data from a Kentucky Bluegrass NTEP (National Turf Evaluation Program)
- Added variables to evaluate A-List Kentucky Bluegrass Varieties for Midwest Region
- Investigated the use of wetting agents to better utilize water in putting green management
- Continued to look at clover and micro-clover as options for low input turf

The Plant Pathology program continued to update and modify the Smith-Kerns Dollar Spot prediction model, which was created at the University of Wisconsin and is used by turfgrass managers around the world to effectively manage an important disease using fewer fungicide inputs. In addition, the field portion of the study 'Alterations in ecological competition within the plant microbiome in response to repeated fungicide applications' was conducted at the OJ Noer in 2019. This study was a recipient of a UW Fall Research Competition Award and is investigating the impacts of repeated pesticide applications on the soil microbiome and how they may alter resistance to plant pathogen invasion. Lastly, a new assay to detect and quantify the dollar spot pathogen in the soil was tested at the OJ Noer. This project is being

funded by the United States Golf Association and, if successful, will provide important insights into the biology of this pathogen that will lead to more effective control using fewer fungicides.

Other Plant Pathology projects included:

- Tested different disease control products for disease control recommendations.
- Diagnosed over 300 turfgrass samples from around the country in 2019
- Continued testing if the use of Iron as a control for Dollar Spot. Added water volume and urea to the Iron research
- Looked at the uses of more environmentally friendly fungicides to control disease on bentgrass turf
- Tested fungicides for Brown Patch control on Fairways and putting greens plots

In May Dr. Chris Williamson left the UW-Entomology program. This has created a hole in the turfgrass program. The beginning of the new fiscal year Entomology also pulled funding for the O.J. Noer facility. Even though the funding had been removed the O.J. Noer continued to support Audrey Simard a Master Student under Dr. Williamson until December. Ms. Simard continued to work on her Masters doing a project evaluating the bioaccumulation of pesticides in turf and those effects of the honey bee population. She also continued the Honey Bee outreach program the Dr. Williamson began with assistance from Dr. David Hogg (emeritus) on six properties in southern Wisconsin.

Station goals for the coming year

- Keeping the Noer Protocols fair and followed
- Streamlined the process for hosting Golf Channel and Incident Command during the AM Fam Senior Championship
- Work toward refurbishing the irrigation system around the main building
- Develop an engineered plan to renovating the present irrigation system for bentgrass plots
- Continue to procure donations of seed, fertilizer, pesticide and as many additional supplies as possible
- Continue to assist researchers to install as many new projects as possible
- Create an outreach program to show the value of turfgrass in the local area with seminars to various groups like, Kiawana, Rotary and Master Gardener groups

Areas of concern and challenges

- Funding of non-budgeted expenses
- Keeping very old equipment running and all staff taking care of the equipment
- Labor for the extra workload
- Outside the box solutions for labor issues
- Keeping turfgrass alive with a very outdated and ill-designed irrigation system
- Final repairs from years of roadwork and University Ridge Bunker project

Peninsular Agricultural Research Station – 2019

Horticultural Technician: Daniel Kielar

Notable Station Achievements

Data collection continued this year in 3 fruit blocks as part of the NC 140 Cooperative Research Trial Plantings. Plantings include a 2014 Apple Rootstock, a 2015 Organic Apple Rootstock, and a 2017 High Density Tart Cherry. Block summaries of these trials are typically published at the halfway point and a final report at the completion of 8-10 years of data gathering. The findings are then published in the *Journal of American Pomological Society* and *Compact Fruit Tree* – Journal of the International Fruit Tree Association.

Station PI continued an irrigation performance study with funding from the WI Cherry Growers Association. We are evaluating the same Michigan State University clonal tart cherry rootstocks being tested in this 2017 NC 140 High Density Tart Cherry Trial. This study will contribute to the objectives of the NC 140 Research Project by examining stress-related interactions on tree growth and performance. A second study on high density dwarf tart cherry performance is being carried out simultaneously.

The Station provided research support for Plant Pathology's wine grape Black Rot disease susceptibility evaluations and the third season of testing a reduced fungicide spray program on the popular cold climate wine grape variety Marquette.

Extensive scouting and trap count logs continued in tart cherries for the invasive species Spotted Wing Drosophila. The information is shared within the state and between states as researchers and fruit growers attempt to control this pernicious insect. With the support of WI Cherry Growers Association, a new approach of soil-applied insecticides will be studied in FY 2020 in cooperation with Dr. Christelle Guedot in the Entomology Department.

Multiple forage cover crop trials were studied this year (2019) and one carryover final evaluation from the year before (2018) was completed. Follow-up evaluations of the 2019 plantings will be conducted in FY 2020, along with new studies answering direct on-farm questions in regards to forage quality, soil erosion control, and environmental impact.

Finally, the United States Department of Agriculture Potato Genebank Project continues to thrive at PARS. This includes utilizing 2 field research plots, acquiring a tuber freeze-drier unit, and tuber growth chambers for on-site testing and tuber production.

The Genebank hand pollinated 195 families of 20 plants each in the greenhouse for seed increase and performed 19,522 in vitro transfers to maintain fresh propagules of clonal stocks.

A total of 6,659 units of germplasm were sent as 183 domestic orders to requesters in 34 states and 3,383 units of germplasm as 14 foreign orders to 10 other countries.

Outreach /Instruction Activities

- Hosted Door County Master Gardener annual *Plant Sale* (750 visitor/customers).
- Hosted Door County Master Gardener annual *The Garden Door Open House* (150 attendees).
- Hosted 4 Door County Master Gardener *Tuesday in the Garden* educational programs (72 attendees).
- Door and Kewaunee County Extension Committee's annual meeting *2019 Peninsular Research Station Activities Report* (13 participants).
- Hosted Door County Extension/UW Plant Pathology *Vineyard Walk* (30 participants).
- Published *Winter Cherry Season newsletter* for commercial producers (50 copies).
- Presented *Cherry Pest Update* as invited speaker at the Annual WI Cherry Growers Dinner (45 participants).
- Provided 20 weekly seasonal PARS webpage *Commercial Fruit Pest Updates* for apple & cherry producers in cooperation with UW Extension.
- Coordinated commercial apple and cherry scouting program covering 230 cherry acres & 180 apple acres (5 producers), delivering over 100 seasonal pest reports.
- UW-Extension hosted *Fall Agronomy Field Day* (27 participants).
- Tours from both Green Bay and Lakeshore NWTC Agronomy classes (19 participants).
- Five community group tours of the Station (76 participants).
- Genebank staff attended regional and national potato genetics professional meetings giving research presentations.
- Genebank Project Leader served as Chair of the national Potato Crop Germplasm Committee.
- Staff publications can be accessed through the Genebank website.
- Estimate that outside authors report using PARS Genebank stocks in 129 peer-reviewed papers.
- PARS “drop-in” contact with homeowner and/or commercial growers NOT addressed by UW-Extension or Master Gardeners (30+).

Research Activity

- 2 Tart cherry: 2 PARS
- 3 Apple: 2 PARS, 1 Extension
- 1 Small grain: 1 Agronomy
- 2 Grape: 1 Plant Pathology, 1 UW-Extension
- 2 Potato: NRSP-6: 2 United States Potato Genebank
- 6 Forage cover crops: 6 UW-Extension
- 2 Native Pollinator: 2 PARS/U.S. Fish & Wildlife/UW-Extension

Change

A Station Superintendent will be hired in early 2020. The Facilities Manager is retiring March 2, 2020. The UW-Extension Door County agent is resigning December 2019 who was part of multiple studies at PARS the past 4 years.

Station Goals for the Coming Year

- Continue to support the latest stage of Plant Pathology faculty disease susceptibility and management research trials for northern wine grapes along with testing new reduced disease management strategies incorporating recent susceptibility and resistance findings.
- Continue efforts with Entomology faculty in efficacy testing of economically viable pest management strategies to control Spotted Wing Drosophila. We will also provide graduate student research project support and industry outreach efforts related to this pest.
- Encourage and support small grain variety trials and perennial grain research conducted by Agronomy faculty.
- Encourage and support graduate student research in Native Pollinators conducted by Entomology faculty.
- Continue to encourage apple hard cider research collaboration with Horticulture faculty. We are again seeking grant funding to support maintenance of PARS apple cider variety trials, laboratory juice quality, and finished cider evaluations.
- Long term NC 140 Dwarf Cherry Rootstock planting research for over the row tart cherry harvest feasibility.
- Continue to provide field prep, planting, and other support for forage cover crop studies being conducted by UW-Extension.
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Areas of Concern and Challenges

With the posting of the Superintendent position (Dec. 5, 2019 – Jan. 2, 2020) PARS plans to continue current research and pursue the direction of the new hire as he/she guides the Station moving forward. There is a myriad of possible research projects to facilitate with UW CALS departments. We will also continue outreach avenues through the PARS web page information and updates besides collaborating with Master Gardeners, Extension, and clubs & schools.

The concern and challenge for PARS is whether the open positions of Superintendent and (soon-to-be) Facilities Manager will be hired by the 2020 growing season. Plus, the loss of UW-Extension Agent Annie Deutsch will leave a large gap to fill regarding PARS/Extension cooperation. Direct areas Annie was responsible for include: primary Enviroweather contact person, apple replant study PI, primary Master Gardener contact person, grape study PI, and cider apple study PI, along with helping scout and harvest apples, grapes, and forage cover crops.

Finally, the retirement of UW Plant Pathologist Patty McManus leaves a gap for conducting plant pathology studies in tree fruits or grapes.

Rhineland Agricultural Research Station (RARS)

2019 Station Report

Full-time Staff: **Becky Eddy**-Program Manager, **Scott Woodford**-Ag Project Supervisor, **Sam Eddy**-AREO-Obj, **Kimberly Goodin**-Office Manager/Research Gardener, **Alexandria Zacharias**-Research Gardener

Seasonal Staff: **Rick Zarm & Matthew Langheim**-AREO-Entry, **Pamela Horneck**-Research Gardener

Summer Students: **Jaden Oleski & Emma Roberts**

Notable Achievements

1. The UW Potato Breeding Program is at the forefront of using genomics to improve the breeding process. Associate Professor Jeffrey Endelman from the Dept. of Horticulture was invited to give a presentation about this research at the following meetings/institutions in 2019: University of Illinois, James Hutton Institute (UK), Roslin Institute (UK), Wageningen University (NL), Montana State University, National Association of Plant Breeders.
2. 2019 publication based on research conducted with potato breeding germplasm developed and maintained at RARS:
Caraza-Harter MV, Endelman JB (2019) Image-based phenotyping and genetic analysis of potato skin set and color. *Crop Science*, doi:10.2135/cropsci2019.07.0445
3. The potato variety W9426-3R, originally developed at RARS, was accepted as a new invention by WARF (P190346US01) based on interest from a commercial partner who also has a strong interest in Rhineland developed specialty lines W15282-5R/RWfing, AW08112-4PY, and W14109-13Y
4. Due to sustained interest from the WI potato industry in the recent release W9133-1rus, originally developed at RARS, this variety was named 'Plover Russet' by the WPVGA/UW SpudPro committee in October 2019.
5. The red variety W8405-1R, initially selected at RARS, was officially named 'Red Prairie' in 2018 and Plant Variety Protection (PVP) filed November 2019. Plant Breeders Rights (PBR) will be filed in Canada as well. We anticipate good demand for this variety beginning next year in the US and Canada.
6. Based on its commercial potential for both french fry and fresh markets, the potato variety W13A11229-1rus, originally developed at RARS, was accepted for foundation seed production by the WPVGA/UW SpudPro committee in October 2019.
7. The UW Potato Breeding Program developed and applied a new real-time PCR (LAMP) protocol to improve the efficiency of testing for viral pathogens (PVY, PSTVd).
8. The UW Potato Breeding Program started to use remote sensing (drone with a five-band sensor) to characterize the growth and development of potato breeding clones. The goal is to develop prediction models for yield that can assist with the selection process. Images also allow for efficiencies in determining stand count, canopy coverage percentage, and plant height.
9. Diligently worked with David Brown from Sedgwick and Margaret Hoffman UW Risk Management for insurance claim submissions related to facility damages incurred February 2019.

10. Completed a timber sale that brought in \$59,510 of revenue, which was critical to offsetting higher-than-expected labor and supply expenses in FY19 associated with containment and eradication efforts for the viral pathogen PSTVd.
11. Worked with the WI DNR to amend our 1992 issued water permit from 1.25 to 1.65 million gallons. The amendment was necessary for years of low annual rainfall.
12. Delivered 500 cwt of potatoes to the Department of Corrections, generating approximately \$4,000 in revenue.
13. The Station received in-kind donations totaling \$15,550 in the form of labor, equipment, and product.

Outreach/Instruction Activities

1. Hosted Nicolet College Learning in Retirement Series *Potato Breeding 101 – A Tour of Wisconsin’s State Potato Breeding Program*. May 22, 2019.
2. Some outreach events at RARS were not scheduled in 2019 due to concerns about the potential spread of the viral pathogen PSTVd to other potato farms in the area.

Change

1. Developed a Station-wide sanitation policy. Continue to work creatively towards completing a new Station access road limiting on-Station traffic and relocating sanitation operations to an environmentally sustainable area. Working with US Forest Service to implement a collaborative phytoremediation research project in the areas where runoff will occur. We continue to be committed to environmental stewardship.
2. After extensive PSTVd research, developed action plans to purge material and suitably sanitize or discard pots, equipment, tools, vehicles, etc. Created and/or enhanced all field, greenhouse, storage, and lab Standard Operating Procedures (SOPs) with the goal to eradicate PSTVd.
3. Changed the greenhouse planting configuration to avoid damaging any plants where PSTVd went undetected.
4. Took drastic measures to purge PSTVd pathogen from potato breeding material by destroying all 2018 greenhouse produced minitubers. This measure left the program with no FY1 potato crop to maintain on our Tower field ground.

Research

1. In collaboration with WMARS, RARS conducted and completed a 2-yr trial funded by a Specialty Crop Block Grant on cut flowers grown under plastic vs. field. The study concluded:
 - i) Plants grown under plastic had the advantage over field grown both in production and quality, especially for a full-season flower like Zinnia.
 - ii) No chemical treatment effects found in any month, year, environment, or location.
 - iii) Biweekly harvests in the cut flower business are labor intensive.
 - iv) Even though the plants under plastic produced more marketable blooms than field grown, plants under plastic add a substantial management component that needs to be considered.
2. The UW Great Lakes Bioenergy Research Center (GLBRC) in collaboration with Michigan State University has implemented a range of perennial bioenergy systems to study production and

ecosystems services associated with cellulosic ethanol production. MSU utilizes drones to collect crop albedo data to assist in modeling energy balances. Drone data assists in determining accurate global warming impact values from the different GLBRC cropping systems with better accuracy. Visual and multispectral data is used to determine litter cover and biomass volume. Associate Scientist Gregg Sanford from the Dept. of Agronomy gave presentations about this research in 2019:

Project Highlights - MLE Productivity. 2019 GLBRC Environmental Sustainability Meeting. October 1, 2019.

Bioenergy Crop Yields on Marginal Lands. 2019 GLBRC All Scientist Meeting

3. Working with lead PI Professor Suman Banerjee and Systems Programmer Lance Hartung from the Department of Computer Sciences, UW–Madison on supporting and implementing “WiNEST: A County-scale Wireless Platform to Support Rural Broadband through Heterogeneity, and Dynamic and On-demand Infrastructures.” The WiNEST project proposes:
 - i) To develop, deploy, and operate a county-scale 5G-focused infrastructure for low-cost broadband services in Oneida County.
 - ii) An academic-government-industry collaboration including researchers and technology leaders at the University of Wisconsin–Madison and collaborating universities, civic partners across Oneida County, a farming and ecology-focused community of users, and industry partners including a local wireless ISP and a consortium of equipment manufacturers.

Station Goals:

1. Efficaciously complete RARS mission supporting existing research and facilitating new research.
2. Increase awareness of RARS and its role in potato variety development and the WI Potato Industry.
3. Continue to enhance RARS sanitation and testing protocols to mitigate and eradicate PSTVd.
4. Continue to ensure RARS remains a safe working environment, improving on-site safety programs.
5. Continue to build collaborations, welcome requests for Outreach/Teaching.
6. Continue to work on determining opportunities for improving efficiency and lessen inputs while remaining within our budget.
7. Continue to build on-farm sustainability for long-term success.
8. Utilize our website, social media, and events to increase awareness of Station activities.

Challenges:

1. Keeping the Station performing at an efficient and successful level while continuing to deal with the challenges of old facilities, an aging workforce, and a reduced budget.
2. Requiring all vendors/researchers/visitors to follow updated Station sanitation protocols.
3. Maintaining program efficiency and staff morale during times of low staffing.
4. Maintaining applied research interest with decreased number of research faculty.

Spooner Agriculture Research Station

2019 Report

Phil Holman, Superintendent

1. Notable station achievements:

The Spooner Ag Research Station hosted 24 agronomic or horticulture research trials for 15 different principal investigators. Eight of the trials were variety testing for the corn grain, corn silage, soybean, oats, and barley variety testing or development programs. Variety trial results are disseminated statewide through UWEX publications, internet sites and two state farm newspapers. Varieties were also tested in switchgrass and big bluestem for biomass production and non-GMO food-grade soybean testing for white mold resistance. Soil fertility trials were conducted in irrigated corn, corn after cover crops, corn after alfalfa and soybeans.

A major project this year at the Spooner Ag Research Station was the Julie Dawson "Seed to Kitchen" organic vegetable variety trial. Tomatoes, peppers, cucumbers, squash, melons, potatoes, onions, and carrots varieties were tested. These trials test not only vegetable yields but also harvest quality and the produce is further tested by chefs for taste and end use suitability. A notable side benefit of this 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. The demonstration garden is a focal point of activity and awareness within the community. A large field day is held each August that attracts 200-300 people.

SARS did have four station summer student interns or TE's. One student intern worked on the demonstration garden and two TE's and one CALS intern worked from spring through harvest for the Seed to Kitchen vegetable research project. The house at the sheep barn is very valuable for attracting and housing student interns or partial year employees.

2. Outreach/instruction activities:

SARS hosts many groups and individual visitors. I lead some groups and frequently presented information about SARS and SARS research to groups off station (# participants).

- SARS host for UWEX Twilight Garden Meeting (200)
- SARS host Seed to Kitchen Project Field Meeting for Fresh Market Vegetable Growers (10)
- Overview of SARS Pesticide Safety Equipment for Local PAT class (15)
- UW-River Falls Forages class tour and research education (30)
- Host site for Tractor Safety training utilizing SARS tractors and implements, teach 1 hour (8)

- Host location for DATCP Fresh Market Grower Food Safety Inspection Program (18)
- Office Location of Area UW-Extension Ag Agent for Burnett, Washburn and Sawyer Counties

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)

Lucia Gutierrez, Agronomy, Oats and Barley Variety Breeding Line Trial

Valentin Picasso, Agronomy, Evaluation of Intermediate Wheatgrass for Northern Wisconsin

Erin Silva, Plant Pathology, Organic Soybean Demonstration into Winter Rye

University of Illinois grad student Winter Rye Phenology project cooperation for Erin Silva
Organic Soybeans Project

Carrie Laboski, Soil Science, Irrigated Corn Nitrogen Rate Verification Trial

Carrie Laboski, Soil Science, Soybean Yield Response to pH Level (pH plot area)

Matt Ruark, Soil Science, Fall 2018 Seeded Cover Crop Impact on Corn Yield at Nitrogen Rates

Mike Casler, USDA Dairy Forage, 2019 Switchgrass Hardiness Evaluation

University of Illinois multistate Miscanthus Variety Hardiness Evaluation

Julie Dawson, Horticulture, Seed to Kitchen Vegetable Variety Trials

Mosiack Company, Boron/Potash Product Evaluation residual effect on Corn Yield

Kevin Schoessow, UW-EX Ag Agent & Area Master Gardeners, All America Display Garden

Jason Fischbach, Ashland/Bayfield UW-EX, Willow and Poplar Replant Demo

Jason Fischbach, Ashland/Bayfield UW-EX, Hazelnut Production Trial

Kevin Schoessow, UW-EX Ag Agent, Garden Demo of Wine Grapes

Farmer Led Council, Soil Quality and Cover Crops research area establishment

4. **Change:** (explanations in station achievements #1)

- More cash grain production rather than forage production
- Utilize grain storage on site to enhance grain sale price opportunities
- Removal of fencelines and a portion of the hybrid poplar to increase row crop acreage

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**

- Uncertain/limited university support financially
- Challenge of relying on student interns

2019 West Madison ARS Annual Report

This season had delayed plant development due to cold wet spring weather, and high summer humidity resulted in high plant disease, especially in vegetables. Luckily there wasn't one major single weather event like the flooding of 2018 but still the water table remains high in November and soils are saturated. Over 15" of snowfall across 7 events by mid-November (avg. = 1") and delayed corn grain harvest, prevented most fall tillage operations, and record cold air hastened winterizing and snow plowing. The University Research Park 1400' tower upgrade project started in October and restricted access on many days to reach our fields, compost pad, and to conduct research. The project left many fields in need of repair (ruts, compaction, crop destruction, metal debris, etc.).

1. Notable station achievements

According to my annual poll, 223 UW students, staff, post-docs, PIs, WCIC, etc. used the station/facilities this season and student training is significant with 67 undergraduates and 53 graduate students training in situ in 2019. The primary research was for plant breeding/research nursery activities and variety trials, and these projects were primarily with corn, small grains, and vegetables. Seventy Mexican corn landraces were screened for those that secrete mucilage, a gel that creates a home for N-fixing bacteria, and many were identified. Horticulture grew indigenous seed corn, amaranth, squash for seed production and eating as part of the Baldwin grant project; they also grew out tobacco for both seed and leaves that will be used for various Ojibwe ceremonies and as gifts on the Wisconsin Idea seminar tour. Beet breeding efforts identified varieties with extremely high or low geosmin (earthy-flavor compound) levels and consumer taste data found that both types are well-liked. A concrete pad was poured for a 90°F agronomy seed dryer unit donated from Corteva. Once the dryer is in place, electrical and gas will be hooked up. Storage space was reorganized by adding shelving and relocating emeritus' things to create more functionable work space for junior horticulture faculty; this will require lighting improvements before being satisfactory.

2. Outreach Instruction/Activities

The estimate of daily visitors/passersby that stopped in to ask questions and stroll through the gardens was 2,555 people. We established/maintained/displayed over 5,500 bedding plants and thousands of perennials in the gardens, providing a scenic backdrop for guided tours for several garden clubs, photographers, garden enthusiast, academic and youth groups that reached 152 people; hummingbirds, monarchs, and other pollinators frequented often, as well. UW instructional activities numbered 8 events and included BSE (student training), ARS Safety (training), FH King (composting demo), Master Gardeners (pruning workshop); reaching over 146 folks. Six field day events were offered: Barley Days was a busy 2-day event for breeders, bakers, brewers and researchers; we hosted a Vineyard Walk highlighting 'Petite Pearl' cultivar for wine; The Commercial Flower Growers of WI Field Day, and the annual Horticultural Open House were based in the display gardens and both attracted an enthusiastic crowd; and the Organic Vegetable Research Showcase and the Student Organic Seed Symposium were also popular with focus on varieties in field trials. These six field days reached 479 visitors. Collectively, the station's field days, tours (guided and self), instruction, and over 1,200 conference room users totaled over **4,573** people that were directly exposed to WMARS in 2019. Our website is also updated regularly with events and garden summaries.

3. Research Activities

We managed 110 acres for plant research with 28 PIs with 79 crop projects. We transported large farm equipment to/from campus for BSE classes, and provided feed for 15 additional Dairy and Animal Science faculty for teaching, research and livestock needs (13 trials, 6 classes). Three BSE and one ME faculty (Shinners, Luck, Sanford, Bower) used the station to teach their students to build and test prototypes and to learn tractor and equipment operation via driving demos during chopping corn silage and fall and spring tillage. Fruit research is focused on local grape production to promote tasty cold-hardy cultivars as well as raspberry work evaluating mulch to suppress spotted wing drosophila. West Madison maintains pollinator habitat (buffers, alfalfa, gardens) for leafcutter, bumble and honey bee research for Entomology and USDA researchers. The 30 acres of certified organic land continues to have intensive land use for research, and contains 'plants under plastic', i.e. hoopouses, and includes matching land rested in cover crops each season. Hazelnuts (445 plants put in to date) are being established by BSE and Bayfield Co. Extension to assess productivity. BSE faculty, Bohnhoff and Sanford worked on rehabilitating two over-the-row mechanical harvesters (a blueberry picker and an olive picker) for evaluation in the harvest of hazelnuts.

4. Change

Personnel – Mindy Breunig joined the staff as office manager as Theresa Christen retired. The ephemeral pond along the northeastern property boundary and perimeter in B400 was seeded down to a mix of native tall-grass prairie species in June. Hopefully with active transpiration and large root systems of these plants, flooding will be minimized.

5. Goals for the coming year

1) Continue Spring station user-orientation for improved communication/expectations among researchers and WM staff; 2) delegate public garden and hort research program managerial duties to Rodney Denu; 3) hire another ag research equipment operator for 2020; 4) update office filing and data exchange system.

6. Areas of concern and challenges

Well water is above 10 ppm threshold for safe drinking forcing us to provide alternative drinking water. Potable water RO machines are expensive to obtain and have very high annual maintenance and repair fees. Furthermore, very low water pressure from the well delays tank filling and irrigating.

Providing resources for maintenance of gravel roads, buildings/structures and facilities is expensive (i.e. Chemical Management Facility, the Dryer Facility, BSE/Genetics/Hort/ Agronomy shed) and it is unclear how much our budget can handle. The repair of washed out/eroded gravel roads is not covered by Risk Management nor is fence repair that happens when speeding cars inevitably skid off the road and go through some portion of our fence every winter (if no police report is filed, the station has to cover repair costs, or pay \$1,000 deductible to Risk Management). Aging equipment (forklift) and unexpected repair expenses are also difficult to budget. Added costs have been put on the station to clear snow from city sidewalks and mow each side of sidewalk around the perimeter of the Mandt farm (1.5 miles of area on south side of Mineral Point Rd). Though mowing costs can be estimated somewhat closely, snow

removal costs are unknown until after the winter season making it impossible to budget the costs. A single 6" snow event can cost \$768 to clear. We'll have to invest in sidewalk plowing equipment to manage this effectively.

Parking availability and traffic issues become challenging during peak summer research activities (daily harvest of veggies, corn pollination, greenhouse users, conference room rental, etc.) and during winter snow plowing. Likewise, handling the flurry of new, inexperienced seasonal workers becomes challenging in regards to traffic/parking, training on equipment, and dealing with a non-stop stream of people in and out of the office building displacing the WM farm crew from their breakroom.

Enforcing policies such as NO METAL and LEAVE NO TRACE policy at end of season with researchers is a constant battle. Further, getting researchers who borrow ARS equipment to take care of it, wash it after use, and return it in same or better shape seems fleeting. Weather patterns are condensing field work to a few days a week at most (and often on weekends) and intensifies equipment sharing. Fields are getting more and more compacted as a result of wet conditions/high water table.

Additional Concerns: Both work and storage space are in critical demand and the argument that it's "too far to drive to other ARS units" is frequently heard. From campus, it's only 10 minutes more to AARS than it is to WMARS. Better preparation and planning on campus before heading to the station (carpooling) would help. Space shortage is ongoing and sometimes navigating the "generational politics" is difficult to implement.