MINNESOTA DEPARTMENT OF AGRICULTURE

Minnesota
Agricultural Fertilizer Research and Education Council (AFREC)
2015 LEGISLATIVE REPORT[1]

Nitrogen fertilizer treatments being applied to cultivated wild rice plots conducted by the UM-NCROC (Grand Rapids, MN). This project is funded as a partnership between AFREC and the Minnesota Cultivated Wild Rice Council

[1] 2013 Legislation: Chapter 114, Article 1, Section 3, Subdivision 5. No later than February 1, 2015, the commissioner shall report to the legislative committees with jurisdiction over agriculture finance. The report must include the progress and outcome of funded projects as well as the sentiment of the council concerning the need for additional research funds.

Table of Contents

Cover Photo: Colin Nordquist, a student intern is hand-applying nitrogen to wild rice research plots at the U of M North Central Research and Outreach Center (NCROC) in Grand Rapids. Minnesota is the number one producer of cultivated wild rice with approximately 15,000 to 20,000 acres grown annually. Nitrogen management is extremely challenging for this crop due to flooded conditions where wild rice thrives. Researchers and producers are experimenting with different combinations of aerially-applied urea and pre-plant applications of slow release products. The Minnesota Cultivated Wild Rice Council and AFREC have teamed up to make this research possible. Photo courtesy of Raymie Porter, wild rice breeder, NCROC.

Please direct any questions regarding this report or other AFREC inquiries to:

Bruce Montgomery
Bruce.Montgomery@state.mn.us
Phone: 651/201-6178
625 Robert St. N., St. Paul, MN
www.mda.state.mn.us

Pursuant to Minn. Stat. § *18E, Chapter 1512.0100 – 1512.1100*,

The cost of preparing this report was approximately $1,250

Executive Summary

As application technology, climate patterns, plant genetics, new crops and other agricultural changes emerge, fertilizer recommendations and associated strategies need to evolve to ensure that Minnesota farmers can maximize fertilizer use to increase efficiencies and profits. To meet that challenge, Minnesota became the twelfth state in the nation to establish a soil fertility program funded by fertilizer sales. Since 2008, the Agricultural Fertilizer Research and Education Council (AFREC) has funded over $3.6 million for soil fertility research and associated educational programs.

This council is responsible for identifying research needs and allocating funding. AFREC has twelve appointed positions representing Minnesota organizations. Statutes specifically designate the following Minnesota organizations and representative positions: Corn Growers (1), Soybean Growers (1), Crop Production Retailers (2), Grain and Feed (1), Wheat Growers (1), Certified Crop Advisors (1), Farmers Union (1), Farm Bureau (1), Irrigators Association (1), Potato Growers (1) and the Sugar Beet Industry (1).

The council has demonstrated its ability to identify common soil fertility research goals across the diversity of the state with multiple cropping systems and move forward with critical decision-making and funding selection. AFREC continues to refine and articulate its priorities to bring high quality research and education projects to the table for consideration. This type of program does not work without significant support and dedication by the University of Minnesota. U of M staff has dedicated significant energy and technical expertise for their projects, as well as administrative support for grants and budgets.

The MDA invests substantially into the program and provides technical support, report reviews, administrative assistance, and contracting responsibilities. Collectively these activities require approximately 1 FTE (full time equivalent). Staff continues to strive to fully support the council and program as well as the larger emerging partnership across industry, land grants, commodity research councils and other potential research entities.

While AFREC is now one of the largest fertilizer programs in the country funded by tonnage fees, future needs are significant. Based on the first six funding cycles, there are generally three times more funding requests than available funds. As AFREC begins to set its sights on the development of advanced technology and large statewide projects, the need for additional coordination and funding opportunities with industry and commodity groups will become even more important.

Introduction

This report summarizes the major accomplishments of the Minnesota Agricultural Fertilizer Research and Education Council (AFREC) since its origin and provides updates through June 30, 2014. This report does not include updates from the August 2014 meeting, nor the recent “Request for Proposal” cycle or associated allocations that occurred in late 2014 through January, 2015. Updates or changes to legislative or council membership are updated as of January 2015 and found on page 11 of this report.

The program is responsible for advancing soil fertility research, technology development and education. It is vital to ensure that Minnesota farmers are maximizing their fertilizer investments while minimizing environmental impacts. AFREC manages the program and affiliated funding. It consists of twelve (12) members who are either farmers or agricultural professionals, such as crop retailers or consultants.

AFREC members are responsible for identifying research needs from their respective organizations, fund projects that have statewide benefit, and allocate funds in a cost effective manner.

The program officially began on January 1, 2008 and its associated funding mechanism evolved over several legislative sessions. Since then, AFREC has provided more than $3.6 million to fund 49 projects. All AFREC funds are allocated as competitive bids through a Request for Proposal (RFP) process.

Long term funding is generated from a fertilizer tonnage fee. Collection of this fee began on July 1, 2009. Minnesota farmers pay an additional 40 cents per ton across all fertilizer products. Simply calculated, Minnesota farmers invest approximately $0.05[1] per cropland acre/year into the program. Funds from the fertilizer tonnage fee became available to AFREC starting on July 1, 2011. The Minnesota legislature established a maximum spending ceiling of $800,000 per year.

Staff members from the Minnesota Department of Agriculture (MDA) assist the council with administrative duties such as:

- Meeting facilitation
- Communications assistance
- Request for Proposals/grant application administration
- Finance/budgeting of the associated grants
- Ex-officio representation
- Legal counsel

Although AFREC funds are available to any organization, a majority of grants are allocated to the University of Minnesota (U of M) and affiliated Research and Outreach Centers. The value added importance to the U of M to fund fertility research cannot be overstated.

Legislative Background

Minnesota ranks fifth in U.S. agricultural production with annual exports totaling more than $8 billion. Sound soil fertility plays an important role in our agricultural productivity and helps to protect our environment. As Minnesota meets increased demand for food, feed, fiber and fuel, AFREC has supported much-needed fertility research while creating successful partnerships among commodity groups that benefit our farming future.

During the 1990s and the 2000s, funding sources became limited for soil and crop fertility research in Minnesota. State appropriations that previously funded fertility research, education and extension programs began to dwindle. Interest in agronomy, soil biology and plant nutrient declined resulting in fewer college graduates from these academic disciplines. As a result of these concerns, in 2005 the Agricultural Nutrient Task Force (ANTF) was legislatively approved to study fertilizer-related issues such as:

- The need for research, education and training in the selection and application of agricultural fertilizer and soil nutrients in the state;

- The imposition of a fertilizer tonnage fee in Minnesota with designated use of proceeds from the fee.

The ANTF identified that there was a significant need for a dedicated fertilizer check-off program in Minnesota. The first legislative proposal was submitted in 2006. It contained language that would allow

[1] Calculated by the average tonnage sold from 2008-2012 (2.7million tons) times $0.40 cents/ton divided by Minnesota's 22 million acres of cropland.

voluntary fertilizer fees to fund the program and farmers would be able to request refunds. While agricultural and commodity groups saw the need and supported the initiative, projections showed that if five-to-ten percent of the producers requested a refund, the administrative costs to process refunds would potentially use an unacceptably large percentage of the funds. This legislation did not pass.

Program interest remained high into the 2007 legislative session. Eventually, a formal proposal was passed removing the controversial refund clause. Based on original recommendations from the ANTF in 2005, the Agricultural Fertilizer Research and Education Council (AFREC) officially began Jan. 1, 2008 (with a sunset date of Jan. 1, 2017). The council was originally established without a permanent funding mechanism however a one-time general fund allocation was provided to get the process started. Out of this $600,000 allocation, the Commissioner of Agriculture used a percentage of these funds to offset MDA administrative costs. The Commissioner also reported to the House and Senate Committees with legislatively-approved jurisdiction over agricultural finance. Legislative reports were submitted starting February 1, 2009 and recurring every two years.

Long-term funding was formally established in 2009 through a Fertilizer Inspection Fee at an increase of $0.40 per ton. New fees became available to AFREC for distribution on July 1, 2011 and AFREC was granted authority to spend up to $800,000 per year to support soil fertility research and associated educational activities. During the two-year transition period, the program was temporarily funded by using 57 percent of the existing Fertilizer Inspection Fee (Minnesota Department of Agriculture) as directed by Minnesota Laws Chapter 94, Article 1, Section 3, Subdivision 5.

AFREC Allocations and Financial Information

AFREC has funded a total of 77 individual awards so far, with an average award of approximately $47,000 each. In Table 1, there are 49 “new” projects and 28 “continuation” projects listed. Continuation of projects is an important option used by the council. It is common to receive project proposals and associated budgets spanning three-to-five years (maximum allowable). A common option used during the allocation process is to fund a project for one or two years. Researchers are encouraged to design projects that may take years to complete, recognizing that initially they will probably only secure a portion of the original request. Using this method, AFREC can fund a broader range of projects that can begin sooner. The council then provides some assurance by specifically placing a higher priority for partially-funded projects in the next RFP cycle.

AFREC receives updates from all the project investigators at the end of each growing season. If the council is not satisfied with the progress or scientific validity of the project, they can terminate funding. If a grantee does not provide the required quarterly updates and annual reports, the MDA can also terminate a contract if necessary. If there are problems, the MDA and AFREC work to cooperatively resolve issues before terminating a project. As of July 1, 2014, no contracts have been terminated early due to complications associated with the MDA or AFREC.

Table 1: General information on funding requests and awards from 2008-2014.

Fiscal Year	Amount Requested	# Applications	Amount Awarded	Funding Source	Total # Awards	# New Projects	# Continuations
2008	$1,241,390	19	$552,000	General Fund	9	9	0
2009	$0	0	0	None	0	0	0
2010	$1,535,291	15	$414,200	57% of Existing Inspection Fees	7	6	1
2011	$602,525	12	$262,346	57% of Existing Inspection Fees	9	8	1
2012	$2,134,642	26	$800,000	Increase in Tonnage Fees	16	10	6
2013	$3,081,241	18	$800,000	Increase in Tonnage Fees	19	9	9
2014	$4,702,680	28	$800,000	Increase in Tonnage Fees	18	**6**	**12**
Totals	**$13,378,553**	**118**	**$3,628,546**		**77**	**49**	**28**

MDA labor support to AFREC is summarized in Table 2. It should be noted that funds used to pay MDA staff are charged directly to the Fertilizer Inspection Fee. Administrative costs do not impact the AFREC funding level available for grants. Costs reported in Table 2 include MDA staff time to support AFREC planning, meetings, grant management, administering RFPs, communications or other administrative functions. Costs shown here do not include MDA labor costs from the Pesticide & Fertilizer Management Division (PFMD) director, legal counsel or support from the Commissioner's office and other MDA divisions.

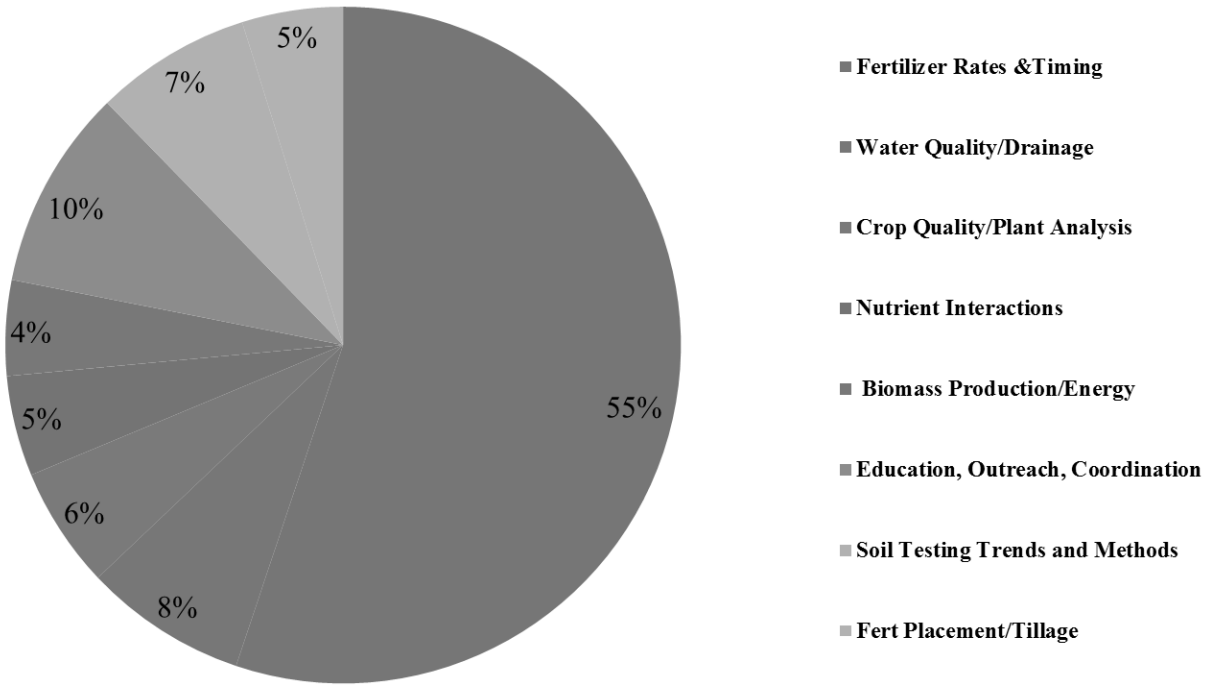
Table 2: AFREC awards and associated MDA labor support

	FY 2008	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	Totals
AFREC Grant Awards	$552,000	$414,200	$262,346	$800,000	$800,000	$800,000	$3,628,546
MDA Labor Costs	$ 48,000	$49,550	$69,975	$64,150	$64,971	$ 57,750	$ 354,396
Indirect on Labor	---	$10,846	$10,846	$9,943	$10,071	$ 8,951	$ 47,491
MDA Staff w/Indirect	$ 48,000	$57,230	$80,821	$74,093	$75,042	$ 66,701	$ 401,888
% MDA Support	8.7%	13.8%	30.8%	9.3%	10.4%	8.3%	11.1%

Eight (8) research categories for projects funded by AFREC:

1. Fertilizer rates and timing;
2. Water quality and/or drainage research;
3. Crop quality and plant analysis as impacted by soil fertility;
4. Nutrient interactions in a high yielding environment;
5. Fertilizer recommendations for crops used in biomass production and energy;
6. All education, outreach and project coordination;
7. Soil testing trends and methods; and
8. Fertilizer placement and interactions with tillage.

Figure 1: Distribution of AFREC funds by soil fertility topic areas (2008-2014)



With today's high-yield genetics, updated soil fertility recommendations are critical to Minnesota farmers. This has been a top AFREC priority and, as a result, 55 percent of funding has been directed toward verification of fertilizer recommendations. As originally identified by the Ag Nutrient Task Force (ANTF), limited validation research was conducted during the past few decades due to limited financial resources. Previously, securing funds for this type of research was difficult. Another complicating factor is that basic calibration/correlation research is often not published in peer-reviewed academic journals. As a result, researchers striving for publications typically avoided this type of research. Fortunately, AFREC funding has revitalized this type of research since it is vital information for local farmers and agricultural professionals.

It is anticipated that after appropriate verifications and modifications are completed, more emphasis will be directed toward other research topics including advanced technologies to apply fertilizer on a very prescriptive basis.

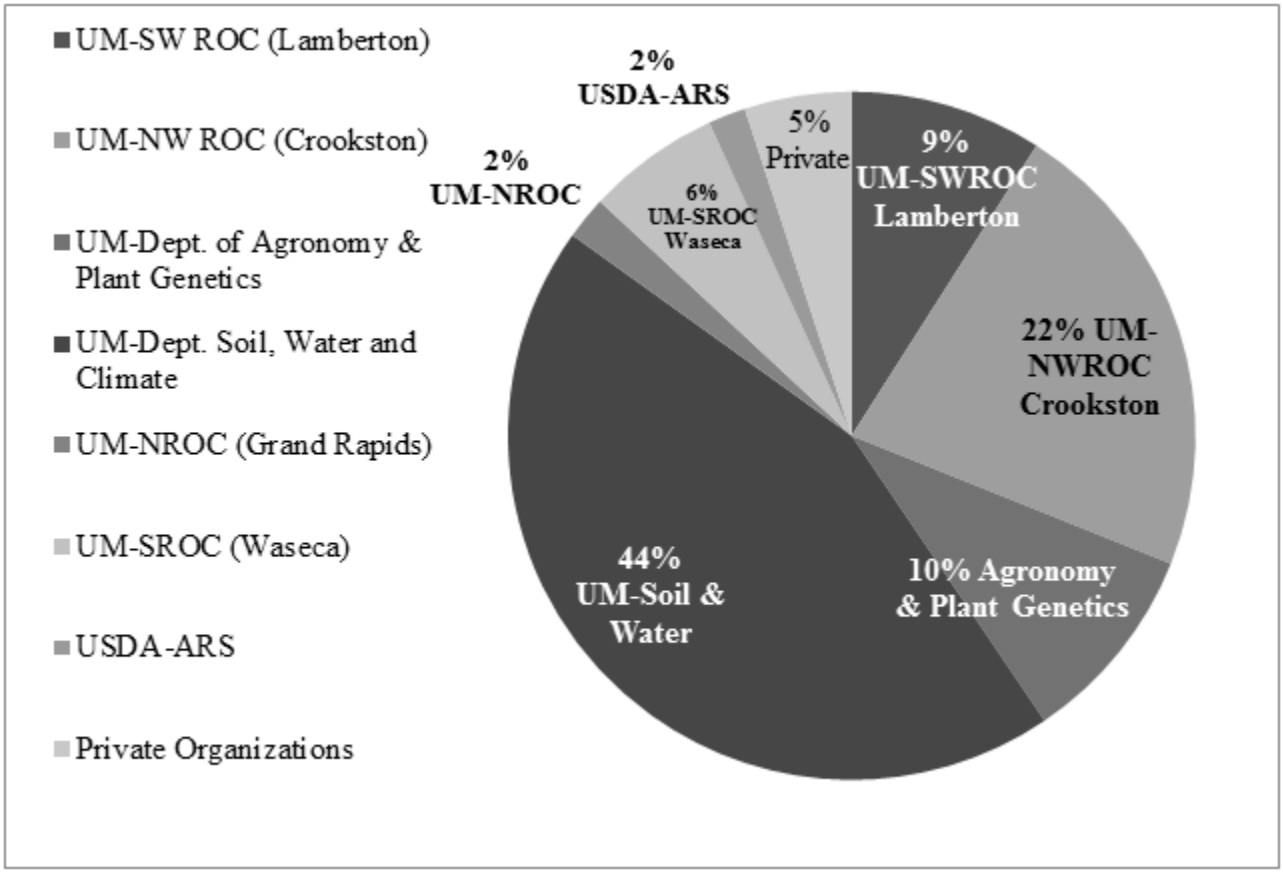
Early in the development of the AFREC program, the value of education and outreach was emphasized. As a result, all projects are required to have a small companion education/outreach component (those contributions are not reflected in Figure 1). In addition, AFREC has arbitrarily

allocated approximately 10 percent of the annual budget to “stand alone” educational/outreach projects during each RFP cycle. Together the actual funding spent on education/outreach across all projects is nearly15 to 20 percent of the entire AFREC budget.

Since AFREC has been operating, approximately 94 percent of funding has been awarded to the University of Minnesota (U of M) which includes U of M Research and Outreach Centers. This is not surprising since land grant university systems are prominent in providing fertilizer recommendations and supporting information. The USDA-Agricultural Research Service staff frequently work in partnership with U of M staff as cooperators but typically do not directly compete as principal investigators.

As previously mentioned, AFREC has expressed interest in bringing more projects and partnerships from the private sector. Approximately five (5) percent of AFREC awards have been managed by private groups.

Figure 2: Distribution of 2008-2014 AFREC funds by organization



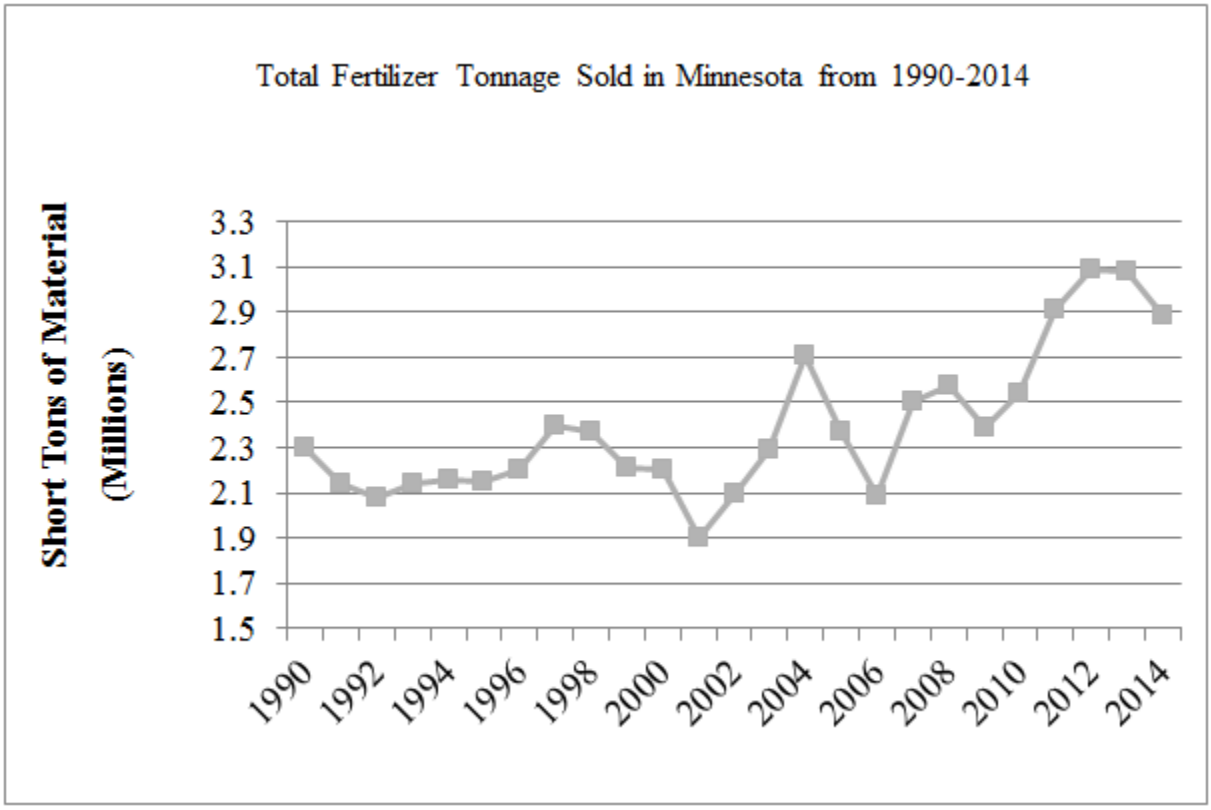
Future Funding and Fertilizer Sales

Due to the way AFREC funding was established by the Minnesota legislature, the council will have access to the full $800,000 (maximum funding ceiling) whenever state fertilizer sales reach 2,000,000 tons annually. Sales have only been below this level once in the last twenty-four (24) years (Figure 3). However, due to the required indirect costs, as well as MDA administrative costs (support staff, overhead, technical support and legal counsel), this project realistically needs to operate at 2.53 million tons per year to generate funds to cover all costs for both AFREC and the MDA.

Recent fertilizer sales have been strong from 2011 through 2014 easily exceeding the 2.53 million ton threshold. This is due to a number of reasons: 1) corn acres at record highs; 2) higher than average profit margins; 3) tendencies for increased sales of lower fertilizer analysis products (such as urea displacing anhydrous ammonia); and 4) increased sales of micronutrients (such as zinc and sulfur). Interestingly, trends in the macro-nutrient sales (nitrogen, phosphorus and potassium) have been very flat over this 22 year period despite steadily increasing yields.

Based on long-term sales, AFREC should have access to the full $800,000 in future years. However, the RFP cycles have shown that grant proposals exceed available funds almost three-fold (Table 1). During the past six RFP cycles, AFREC has received $13.4 million worth of requests for the $3.6 million in available funds. Funding requests have steadily increased over recent years.

Figure 3: Minnesota fertilizer tonnage sales from 1990 through 2014



A tangible outcome since the formation of AFREC has been stronger communication and coordination within the major commodity groups and the fertilizer industry. Never before did all interested parties have reason to convene and discuss mutual challenges, shared goals and a united response. While AFREC plays an important role in funding, it serves an equally important role to bring commodity groups, crop production retailers, researchers and the MDA together to discuss soil fertility issues.

Many of Minnesota's larger commodity groups fund substantial research related to genetics, disease and weed control, new technology and soil fertility research. There have been significant strides in coordinating soil fertility research across these various funding pools. Collectively, these dollars may dwarf AFREC funding. While attempting to address the entire collection of soil fertility issues across the state, it is likely that there will never be enough funds to address all of them. Continued coordination across all of these funding sources is critical.

In 2014, the MDA funded a contract with a coordinator to ensure that AFREC research priorities are clearly defined. This coordination originally started as an AFREC-funded project in 2012. The research

coordinator is aware of projects being funded by the various commodity groups, as well as projects by other land grants and private industry. Dean Fairchild, retired research director from the Mosaic Company, serves in this capacity and as a direct result of his contributions AFREC has been rewarded with diverse and robust projects.

Publications and Resources

AFREC-funded research has resulted in the development of nutrient management tools, resources, articles and publications that include:

Extension Bulletins Funded by AFREC (revisions or new)

- Fertilizing Alfalfa in MN (AG-FO-03814-C)
- Fertilizing Wheat (AF-FO-3814-C)
- Fertilizing Barley in Minnesota (AG-FO-03773-C)
- Fertilizing Edible Bean in Minnesota (AG-FO-06572-B)
- Fertilizing Soybean in Minnesota (AG-FO-03813-C)
- Plant Analysis Sampling and Interpretation (FO-3176-B)
- Managing Iron Deficiency Chlorosis in Soybean (AG-FO-08672-A)
- Lime Needs in Minnesota (AG-FS-05956-C)
- Fertilizer Guidelines for Agronomic Crops in Minnesota (BU-06240-S)
- Liming Materials for Minnesota Soils (FS-05956)
- Understanding Nitrogen in Soils (AG-FO-3770-B)
- Sulfur in Minnesota Soils (AG-FO-00794-B)

The Farmer Magazine, 2014: A series of articles based on AFREC research were placed by Broadhead Corporation, a full service marketing communications agency.

- May: U-M Research Shows Major Sulfur Response in Corn
- August: Fertility Focus: Five Tips for Testing New Products
- September: Nutrient Management for Alfalfa
- October: Nitrogen Application for Fall
- November: Phosphorus as Nutrient Often Underestimated
- December: Nitrogen Fertilizer and the Linkage to Water Quality

AFREC researchers developed a Nutrient Management home page with current fertilizer recommendations, soil testing information, and nutrient calculators: http://www1.extension.umn.edu/agriculture/nutrient-management/index.html

AFREC meeting minutes and general information can be found on the MDA website: http://www.mda.state.mn.us/chemicals/fertilizers/afrec/meetinginfo.aspx

Council Membership (updated January 2015)

AFREC Board	AFREC Board	EX-Officio	Peer Review	MDA/PFMD Staff
MN Soybean Growers Larry Muff, Chair larrym@hickorytech.net Paul Meints, Alternate paul@mnsoybean.com	**MN Grain and Feed** Laura Lemke mgfa@usinternet.com Robert Zelenka, Alternate mgfa@usinternet.com	**U of M-Extension** Dean Beverly Durgan bdurgan@umn.edu	**John Deere** Tom Doerge, PhD Agronomist Doerge.thomas@johndeere.com	Greg Buzicky, Director greg.buzicky@state.mn.us Bruce Montgomery, Fertilizer Manager bruce.montgomery@state.mn.us
MN Farm Bureau Larry Larson larrylarsona36@gmail.com	**MN Wheat Growers** Brian Jensen brianj@ruralaccess.net Mark Jossund, Alternate mbjossund@cableone.net	**Dave Frederickson,** MDA Commissioner dave.frederickson@state.mn.us	**AFREC** Dean Fairchild Research Coordinator dean.fairchild@gmail.com	Russ Derickson, Advisor russ.derickson@state.mn.us Luan Johnsrud, Assistant Luan.johnsrud@state.mn.us
MN Farmers Union Dan Benson dbenson@westtechwb.com Gary Wertish, Alternate gwertish@mvtvwireless.com	**Sugar Beet Industry** Mark Bloomquist Mark_bloomquist@smbsc.com	**Minnesota House** Rep. Rod Hamilton, Chair Ag Finance rep.rod.hamilton@house.mn	**OSTARA** Dan Froehlich, PhD VP-Agronomy dfroehlich@ostara.com	Kris Wenner, Contracts kris.wenner@state.mn.us
MN Crop Production Retailers (Seat 1) Dan Froehlich dfroehlich@ostara.com Jeff Like, Alternate likej@helenachemical.com	**MN Crop Production Retailers** (Seat 2) Mike Minnehan mminnehan@wfsag.com Bill Bond, Alternate bill@mcpr-cca.org	**Minnesota Senate** Sen. David Tomassoni, Chair, Ag Committee http://bit.ly/1wgwD9r	**U M Soil-Water-Climate** Gary Malzer Professor Emeritus malze001@umn.edu	Christi Powers, Editor christi.powers@state.mn.us
Cert. Crop Advisors Paul Groneberg pgroneb@runestone.net Rick Gilbertson, Alternate rgilbertson@charter.net	**Potato Growers** Paul Gray pngray@frontier.net Tom Hammer, Alternate Tjfarmshome@aol.com			
MN Corn Growers Brian Thalman thalmannseeds@gmail.com Adam Birr, Alternate abirr@mncorn.org	**MN Irrigators Assoc.** Grant Anderson andersongrant.ga@gmail.com Jim Anderson, Alternate jim.anderson105@msn.com			

Appendix I – Project Compendium

2008 AFREC Projects (April 1 start)

Project Title	Principal Investigator	Total AFREC Award	Year Originated	Multiple Awards?	Status as of 07/31/14	Active Project?
Zinc and Sulfur Fertilization for High Yield Corn Production	Jeff Vetsch	$30,197	New	No	Completed	No
Minimizing Nitrate Loss to Drainage by Optimizing N Rate and Timing for a C-C-5 Rotation	Gyles Randall	$35,860	New	No	Completed	No
Impact of Phosphorus Fertilization Strategies on Efficiency of Nitrogen Use by Corn Rotated with Soybean	Dan Kaiser	$96,721	New	No	Completed	No
Efficient Management of Nitrogen Fertilizer for Wheat Grown in Minnesota	Dan Kaiser	$77,431	New	No	Completed	No
Fertilizer Requirements for Native Perennial Plants Harvested for Biomass	Craig Sheaffer	$55,928	New	No	Completed	No
Drainage Control to Promote High Crop Yields and Diminish Nutrient Losses from Agricultural Fields in Minnesota	Jeff Strock	$87,338	New	No	Completed ($11,000 project money returned)	No
Tillage and Sulfur Management for Corn in Fine Textured Soils	Jeff Strock	$89,252	New	No	Completed ($3,696 project money returned)	No
Validating Top-Dressed K Fertilizer Recommendations in an Alfalfa-Corn Rotation	Michael Russelle	$64,273	New	No	Completed	No
Advancing Improved Management of Nitrogen in Minnesota with Best Management Practices (BMP) Publications	John Lamb	$15,000	New	No	Completed ($2,800 project money returned)	No
Total 2008 PROJECTS		**$552,000**				

2009: TRANSITIONAL YEAR: No projects funded in 2009 pending legislative approval of fertilizer tonnage fee

2010 AFREC Projects (April 1 start)

Project Title	Investigator	Award	Year Originated	Multiple Awards?	Status as of 07/31/14	Active Project?
Development of a Website for Nutrient Management Education Materials	John Lamb	$20,000	New	Title variation	Completed ($73 project money returned)	No
On Farm Assessment of Critical Soil Test P Values in Minnesota	Dan Kaiser	$97,802	New	Merged	Completed (refer to Critical Potassium…	Yes
Minnesota Long-Term Phosphorus Management Trials: Phase I:Build Period	Albert Sims	$127,991	New	Yes	Continuations 2012-2014	Yes
Nitrogen Update, Distribution and Utilization in Hard Red Spring Wheat Varieties	Albert Sims	$84,674	New	Yes	Continuation: 2012	Yes
Zinc and Sulfur Fertilization for High Yield Corn Production	Jeff Vetsch	$21,613	New	No	Completed	No
Enhancing Continuous Corn Production in Conservation Tillage with Starter Fluid Combinations and Placements	Jeff Vetsch	$38,108	New	No	Completed	No
Effect of Bioenergy Crop Residue Removal on Secondary and Micronutrients in Minnesota Soils	Deborah Allan	$24,012	New	Yes	Continuation: 2011	No
TOTAL 2010 PROJECTS		**$414,200**				

2011 AFREC Projects (April 1 start)

Project Title	PI	Total Award	Year Originated	Multiple Awards?	Status as of 07/31/14	Active Project?
Development, Updating and Publishing of Nutrient Management Bulletins	John Lamb	$15,500	New	Title variation	Completed	No
Optimal Utilization of Phosphorus, Potassium and Sulfur Fertilization in Corn-Soybean Rotations	Dan Kaiser	$66,555	New	Yes	Continuation: 2013-2014	Yes
Evaluation of Critical Potassium Levels in Minnesota Soils	Dan Kaiser	$47,044	New	Yes	Continuation: 2012-2013	Yes
Rate and Timing of P & K Fertilization in Corn-Soybean Rotations in Minnesota	Dan Kaiser	$43,027	New	Yes	Continuation: 2012-2013	Yes
Nutrient Update of Four Spring Wheat Varieties Grown Under Varying Nitrogen Stress	Dan Kaiser	$21,578	New	Yes	Continuation: 2012-2013	Yes
Potassium Fertilization Requirements for Intensively Managed Modern Alfalfa	Craig Sheaffer	$38,557	New	Yes	Continuation: 2012-2013	No
Wheat Yield, Quality and Plant Health Parameters from Starter Applications Microessentials NW MN	Nancy Ehlke	$7,500	New	No	Completed	No
Effect of Bioenergy Crop Residue Removal Secondary Micronutrients in Minnesota Soils	Deborah Allen	$22,585	2010	Yes	Completed	No
TOTAL 2011 PROJECTS		**$262,346**				

2012 AFREC Projects (start April 1)

Project Title	PI	Total Award	Year Originated	Multiple Awards?	Status as of 07/31/14	Active Project?
Nitrogen Update, Distribution and Utilization in Hard Red Spring Wheat Varieties	Albert Sims	$54,089	2010	Yes	Completed	No
Minnesota Long-Term Phosphorus Management Trials: Phase I:Build Period	Albert Sims	$156,214	2010	Yes	Continuation: 2014	Yes
Wheat Yield and Quality as Influenced by Coated Nitrogen (ESN) Timing, Rates and Mixtures with Urea	Nancy Ehlke	$24,141	New	No	On-track work plan ended 03.30.14 extension	No
Evaluation of Sulfur Mineralization and Availability in Soil-Manure & Sulfur Content in Plants	Daniel Kaiser	$74,801	New	No	Extension 03.31.14	No
Improving Predictability and Adoption of Alfalfa N Credits for Corn	Jeff Coulter	$44,842	New	Yes	Continuation: 12.31.14	Yes
Potassium Fertilization Requirements for Intensively Managed Alfalfa Varieties	Craig Sheaffer	$39,360	2011	Yes	Continuation: 2012-2013	No
Evaluation of Critical Phosphorus and Potassium Levels in Minnesota Soils	Daniel Kaiser	$79,354	2011	Yes	Continuation: 2012-2013 & 2014	Yes
Nutrient Uptake of Four Spring Wheat Varieties Grown under Varying Nitrogen Stress	Daniel Kaiser	$13,420	2011	Yes	Continuation: 2012-2013	Yes
Evaluation Fert Place/ Timing Continuous Corn 3 Long-Term Tillage Systems	Daniel Kaiser	$19,212	New	No	On-track work plan (12.30.14 extension)	Yes
Long-Term Soil Test Monitoring in Minnesota Cropping Systems	Daniel Kaiser	$26,360	New	No	Extension: 03.31.16	Yes
Evaluation of In-Furrow Starter Fertilizer Sources for Corn	Daniel Kaiser	$13,756	New	No	Extension: 12.31.14	Yes
Plant Analysis as Management Tool for Corn and Soybean Fields	Daniel Kaiser	$60,131	New	No	Extension ended 09.30.13	No
Enhanced Efficiency Nitrogen as Source for Sugar Beet Production	Albert Sims	$51,952	New	Yes	Continuation: 2013	Yes
Targeting the Right Audiences with Fertilizer Education: Knowing Who is Influencing Decision-Makers	Michael Schmitt	$40,518	New	No	Extended 03.30.14	No
Improvement and Development of Nutrient Management Outreach Materials	John Lamb	$61,850	New	Title variation	On-track work plan	Yes
AFREC Fertilizer Research Coordinator by MCPR	Dean Fairchild	$40,000	New	No	Completed	No
TOTAL 2012 PROJECTS		**$800,000**				

2013 AFREC Projects (April 1 start)

Project Title	PI	Total Award	Year Originated	Multiple Awards?	Status as of 07/31/14	Active Project?
Improving Predictability and Adoption of Alfalfa N Credits for Corn Part II	Jeffrey Coulter	$20,076	2012	Yes	On-track work plan; ends 12.31.14	Yes
Enhanced Efficiency Nitrogen as Source for Sugar Beet Production	Albert Sims	$111,242	2012	Yes	On-track work plan; ends 12.31.15	Yes
Potassium Fertilization Requirements for Intensively Managed Alfalfa Varieties	Craig Sheaffer	$39,985	2011	Yes	Completed	No
Evaluation of Critical Phosphorus and Potassium Levels in Minnesota Soils	Daniel Kaiser	$62,129	2011	Yes	On-track work plan; ends 12.31.15	Yes
Enhancing Continuous Corn Production in Conservation Tillage-Starter Fluid Fertilizer Combos & Placements	Jeff Vetsch	$15,000	New	No	Completed	No
Optimizing Use of Polymer-Coated Urea for Irrigated Potato Production and Effect on Nitrate Leaching	Carl Rosen	$59,735	New	No	On-track work plan; ends 12.31.15	Yes
Optimal Utilization of Phosphorus, Potassium and Sulfur Fertilization in Corn-Soybean Rotation	Daniel Kaiser	$45,500	2011	Yes	Extension: 12.31.15	Yes
Effects of Nitrogen Application Timing on Corn Production and Soil Quality	Paulo Pagliari	$27,050	New	Yes	Continuation: 12.31.15	Yes
Nutrient Uptake of Four Spring Wheat Varieties Grown under Varying Nitrogen Stress	Daniel Kaiser	$33,443	2011	Yes	Extension: 12.31.15	Yes
Advancing Intensive Management of Corn Systems in Minnesota	Jeff Coulter	$39,443	New	Yes	Continuation: 2014	Yes
Evaluation of Solvita Test to Estimate Mineralizable Nitrogen in Minnesota Soils	Deborah Allen	$29,315	New	Yes	Continuation: 2014	Yes
Phosphorus Availability Relationship to Sorption Maximum & Strength	Paulo Pagliari	$16,000	New	Yes	Continuation: 2014	Yes
On-Farm Research Coordinator	Carl Rosen	$52,875	New	No	On-track work plan; 09.30.14	Yes
A New Biomass Alfalfa-Corn Rotation for Energy Production and Soil Protection	John Lamb	$26,424	New	Yes	Continuation: 2014	Yes
Efficient Nitrogen Fertilization for Cultivated Wildrice Varieties	Raymond Porter	$49,953	New	Yes	Continuation: 2014	Yes
Development Web Nutrient Calculator and Mobile App for Corn: Revision of *2006 Fertilizing Corn Bulletin*	John Lamb	$25,350	New	Title variation	Extension: 2015	Yes
Development and Testing of Potassium Management Algorithms for Corn	Ron Potok	$36,000	New	No	Completed	No
Rate and Timing of P and K Fertilization in Corn-Soybean Rotation in Minnesota	Daniel Kaiser	$29,166	2011	Yes	Continuation: 2013-2014	Yes
Evaluation of Variable Rate Nitrogen Technologies for Corn in Minnesota	Jeff Vetsch	$80,784	New	No	On-track work plan: ends 03.31.16	Yes
TOTAL 2013 Projects						

2014 AFREC Projects (April 1 start)

Project Title	PI	Award	Year originate	Multiple awards?	Status as of 07/31/14	Active Project?
Advancing Intensive Management of Corn Systems in Minnesota	Jeffrey Coulter	$26,016	2013	Yes	On-track work plan	Yes
Minnesota Long-Term Phosphorus Management Trials Phase I: Build Period	Albert Sims	$110,844	2010	Yes	On-track work plan	Yes
Advancing Intensive Management of Continuous Corn on Irrigated Sands	Jeffrey Coulter	$26,167	New	No	On-track work plan	Yes
Optimal Utilization of Phosphorus, Potassium and Sulfur Fertilization in Corn-Soybean Rotation	Daniel Kaiser	$45,277	2011	Yes	On-track work plan	Yes
Efficient Nitrogen Fertilization for Cultivated Wildrice Varieties	Raymond Porter	$23,291	2013	Yes	On-track work plan	Yes
Further Development of Web and Print Extension Materials for Nutrient Management in Minnesota	Daniel Kaiser	$10,000	New	Title variation	On-track work plan	Yes
Rate and Timing of P and K Fertilization in Corn-Soybean Rotation in Minnesota	Daniel Kaiser	$40,000	2011	Yes	On-track work plan	Yes
Evaluation of Variable Rate Nitrogen Technologies for Corn in Minnesota (Weather Station)	Jeff Vetsch	$6,000	New	No	On-track work plan	Yes
Nitrate in Tile-Drain Water Relative to Time and Source of Nitrogen Application	Fabian Fernandez	$100,000	New	No	On-track work plan	Yes
Effects of Nitrogen Application Timing on Corn Production and Soil Quality	Paulo Pagliari	$65,199	2013	Yes	On-track work plan	Yes
Evaluation of Critical Phosphorus and Potassium Levels in Minnesota Soils	Daniel Kaiser	$51,634	2011	Yes	On-track work plan	Yes
Phosphorus Availability and Its Relationship to Sorption Maximum and Sorption Strength	Paulo Pagliari	$43,000	2013	Yes	On-track work plan	Yes
Control Over Fundamental Soil N Cycling Process in Minnesota Cropping Systems: Nitrification, Nitrosation	Michael Sadowsky	$63,614	New	No	On-track work plan	Yes
Connecting Minnesota Farmers to AFREC Soil Fertility Research	Troy Schroeder	$67,196	New	No	On-track work plan	Yes
Evaluation of the Solvita Test to Estimate Mineralizable Nitrogen in Minnesota Soils	Deborah Allen	$41,210	2013	Yes	On-track work plan	Yes
Optimizing Nitrogen Management for Processing Sweet Corn Production on Fine-Textured Soils	Carl Rosen	$24,146	New	No	On-track work plan	Yes
A New Biomass Alfalfa-Corn Rotation for Energy Production and Soil Protection	John Lamb	$36,406	2013	Yes	On-track work plan	Yes
Perennial Ryegrass Growth, Development and Seed Yield Influenced by Phosphorus Source Rate	Nancy Ehlke	$20,000	New	No	On-track work plan	Yes
TOTAL 2014 AFREC Projects		**$800,000**				
CUMULATIVE TOTAL of ALL PROJECTS		**$3,628,546**				

Appendix II – Historical Timeline

2005 Legislature directs the MDA Commissioner to assemble a task force to study agricultural nutrient topics. The Agricultural Nutrient Task Force (ANTF) met five (5) times between September 2005 and February 2006. The most significant issue that the ANTF worked on was the need to fund soil fertility research and education programs.

2006 ANTF reports its recommendations and fee structure to the Legislature (March 6, 2006). The proposed fertilizer check-off was to be refundable and calculated at 40 cents per ton. Legislation did not proceed primarily due to complications and high associated costs to implement refunds.

2007 Legislature creates the program and governing group called the Agricultural Fertility Research and Education Council (AFREC). Long-term funding was not included in the legislation but provisions were made for one-time funding of $600,000 to launch the program.

The unofficial AFREC team worked with MDA staff to issue its first “Request for Proposals” in the fall of 2007.

2008 AFREC is officially established on January 1, 2008 and establishes a mission statement and operating procedures. These outcomes were reported in the 2009 Legislative Report.

By-laws are approved on June 27, 2008. A schedule for membership rotations was also established.

AFREC and the MDA outline a general annual plan consisting of the following activities:

- SUMMER MEETING: Establish research priorities, conduct internal business discussion
- FALL: Issue the Request for Proposals (RFP)
- DECEMBER MEETING: Oral updates from all active projects
- JANUARY MEETING: Oral presentations on new proposals and funding allocations
- JANUARY-MARCH: Finalize work plans and grants
- APRIL: New projects begin.

Nine (9) projects are awarded $552,000 (General Fund) and contracts are executed April 1 in time for the 2008 cropping season.

2009 The Commissioner of Agriculture submits a Legislative Report to the House and Senate Committees with jurisdiction over agricultural finance.

The Legislature establishes a long-term funding mechanism. Beginning July 1, 2009, the Fertilizer Inspection Fee was increased by $0.40 per ton to support AFREC. Fee distribution began July 1, 2011.

Legislative changes are also made so the MDA has granting authority for up to five years. This allowed multi-year experiments for critical soil fertility research.

AFREC issues its second “Request for Proposals” in the fall of 2009.

2010 Seven projects are awarded $414,200 (MDA Fertilizer Inspection Fee as part of the transition period) and contracts are executed in early April.

AFREC issues its third “Request for Proposals” in the fall of 2010.

The Minnesota Crop Production Retailers hosts a half-day session dedicated to AFREC projects as part of the Crop Pest Management Short Course (December).

2011 Legislative Report is submitted on February 1, 2011. The MDA presents a short overview of the AFREC program to the Senate as part of Water Day.

Eight projects are awarded $262,346 (MDA Fertilizer Inspection Fee as part of the transition period) and contracts are executed April.

As of July 1, AFREC has full access to new funds generated by the increased tonnage fee (40 cents/ton).

AFREC issues its fourth “Request for Proposals” in the fall of 2011. This is the first RFP issued for the full $800,000 maximum funding cap.

Minnesota Crop Production Retailers (MCPR) hosts a half-day session for AFREC project review at the CPM Short Course at the Minneapolis Convention Center (December).

2012 Sixteen projects are awarded $800,000 and contracts are executed in early April. A research coordinator is hired with AFREC funds via a grant obtained by the Minnesota Crop Production Retailers (MCPR). Participation by the coordinator starts on April 1.

Research agenda is established through the new coordinator. Priorities are identified to include more industry participation to fund soil fertility research on minor acreage crops (>10,000 acres). AFREC begins to pursue solicitation for nitrogen variable rate technology development.

AFREC issues its fifth “Request for Proposals” in the fall of 2012.

2013 Allocations are made immediately after oral presentations on January 11, 2013. Eighteen (18) projects are funded with $719,216. AFREC holds back approximately $80,000 to reissue an RFP for variable rate nitrogen applications. Project is selected allowing the full $800,000 allocation to be awarded.

Legislative Report due February 1, 2013.

AFREC issues its sixth “Request for Proposals” in the fall of 2013.

Summer meeting and plot tours are held in August at the Northwest Research and Outreach Center in Crookston, MN.

2014 AFREC members meet on January 10, 2014 to hear oral proposal presentations. Eighteen (18) projects are funded using the full $800,000 allocation and contracts are executed in early April.

The MDA issues a “Request for Proposal” using non-AFREC funds for the AFREC Research Coordinator position.