

Minnesota Wheat Research and Promotion Council

RESEARCH PROPOSAL GRANT APPLICATION

1. NAME AND ADDRESS OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE Name: Regents of the University of Minnesota Address: Sponsored Projects Administration 454 McNamara Alumni Center, 200 Oak Street SE Minneapolis, MN 55455-2070		
2. TITLE OF PROPOSAL <p style="text-align: center;">Wheat Yield, Quality, and Plant Health Parameters from Starter Applications of MicroEssentials in Northwest Minnesota</p>		
3. PRINCIPAL INVESTIGATOR(S) <p style="text-align: center;">Nancy Jo Ehlke</p>	4. PI #1 BUSINESS ADDRESS Department of Agronomy and Plant Genetics 411 Borlaug Hall 1991 Upper Buford Circle St. Paul, MN 55108-6026	
PI# 2 Name:		
PI# 3 Name:		
5. PROPOSED PROJECT DATES (calendar years) 01/01/11 – 12/31/12 <small>Note: Research Reports are Due November 15th of Each Year</small>	6. TOTAL PROJECT COST <p style="text-align: center;">\$ 13,000</p>	7. PI #1 PHONE NO. 612-625-1791
8. RESEARCH OBJECTIVES: (List objectives to be accomplished by research grant) <ol style="list-style-type: none"> 1. To compare MicroEssentials with a standard phosphorus fertilizer applied as a starter fertility treatment when seeding spring wheat. 2. To evaluate spring wheat yield and quality from MicroEssentials, MicroEssentials plus ESN coated nitrogen, and the standard recommended fertility treatments. <p>Attach a 2-page detailed discussion of importance of the proposal to wheat profitability; how study complements previous research in area; procedures to be used; and competency of the research group in achieving research objectives. (Please keep the proposal concise, only 2 pages will be provided reviewers).</p>		
Signature Of Principal Investigator	Date	Phone Number
Signature Of Authorized Representative	Title	Date
Address Of Authorized Representative Kevin McKoskey, Branch Mgr., McNamara Bldg. Suite 450, 200 Oak St Minneapolis MN 55455-2070		Phone Number

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RESEARCH PROJECT PROPOSAL

(2-pages maximum)

Project Title: Wheat Yield, Quality, and Plant Health Parameters from Starter Applications of MicroEssentials in Northwest Minnesota

Importance: Spring wheat is a major crop for farmers in northwest Minnesota. According to 2009 data compiled by the Minnesota Agricultural Statistics Service, Roseau County ranked 6th in spring wheat planting (78,100 acres) in the Northwest District and Lake of the Woods ranked 1st (9,000 acres) in the North Central District. Perennial ryegrass is a relatively new grass seed crop raised in northwest Minnesota. Production estimates indicate over 16,000 acres of perennial ryegrass will be harvested in 2011. The primary method of establishing perennial ryegrass is to under seed it with spring wheat. Seeding perennial ryegrass under wheat protects the plants during the winter by catching snow with the wheat stubble. However, perennial ryegrass seed yields in the subsequent year following wheat may be negatively impacted due to excessive plant growth and crop residue from the wheat crop. This project will evaluate spring wheat growth and development, yield, and seed quality parameters from in-furrow fertilizer treatments using new fertilizer technologies to improve profitability.

Background: The soils of northern Minnesota are variable, in large part, to the activity of glaciers during the last ice age. The soils formed from the activity of glacial Lake Agassiz have a pH level in the range of 7.8 to 8.4. At high soil pH levels, the availability and uptake of certain essential elements necessary for plant growth and development is restricted. For example, phosphorus becomes less available for uptake by plant roots as soil pH levels increase.

New formulations of phosphate fertilizers that increase phosphorous uptake by roots up to 30% have been developed (MicroEssentials - The Mosaic Company). An increase in phosphate uptake by wheat is theorized to improve plant growth and development which may lead to increased wheat yields, improved quality, and ultimately profitability.

A new formulation of nitrogen called ESN is a time released coated urea product (Agrium Company). ESN can be applied broadcast or in furrow only at nitrogen rates up to three times the current safe rate of urea. The polymer coated, time released formulation supplies nitrogen to the crop throughout the entire growing season and reduces nitrogen loss through volatilization, denitrification, and leaching.

Relationship To Past Projects: This is our research group's first request for funding. Producers are interested in obtaining unbiased data on the use of MicroEssentials and ESN in spring wheat and perennial ryegrass seed production systems under northern Minnesota's environmental conditions. This research is part of a larger research program investigating fertility requirements for grass seed cropping systems that integrate spring wheat into the production system.

Procedures: Treatment applications, data collection, data analysis and summaries will be conducted by the University of Minnesota to insure unbiased, scientifically valid research results. This research project will be primarily conducted by Mr. Donn Vellekson, Research Plot Coordinator, Department of Agronomy and Plant Genetics at the University of Minnesota and manager of the CFANS Magnusson Research Farm (located 6 miles northwest of Roseau, MN) under the supervision of the Principle Investigator. The Magnusson Research Farm is a 40 acre site that was gifted to the University of Minnesota to conduct research that will have a positive impact on crops produced in the area. The Farm is the northern most research site in Minnesota with unique environmental conditions that make this an attractive location for crop research. Results of this field research will be summarized for potential publication in regional publications (e.g. Prairie Grains Magazine) and scientific journals. Research findings from the large on-farm trials and the small plot trials will be presented at regional and local wheat growers and grass seed growers meetings.

This fertility research integrates small plot replicated trials with large, replicated on-farm trials. The on-farm trials will be conducted at three locations in Roseau and Lake of the Woods Counties in a randomized complete block design with three treatments replicated three times at each site. The on-farm cooperators

selected to participate in this research utilize new technologies and advanced management practices to maximize wheat yields such as seed treatments, aggressive fertility rates, and fungicide treatments. The three starter treatments are: 1) the current starter fertilizer program [control of standard monoammonium phosphate (MAP)]; 2) MicroEssentials starter fertilizer; and 3) MicroEssentials starter fertilizer plus ESN. The applied ESN nitrogen will be in addition to the nitrogen applied to meet the producer's specific yield goal for wheat. Plot size will be 85 feet wide by 500 feet long to accommodate the production practices and the farmer cooperators equipment.

The small plot replicated trials will be conducted at the Magnusson Research Farm. The experimental design will be a randomized complete block with 4 replications. Wheat and perennial ryegrass will be seeded with and without a starter fertilizer. This starter fertilizer will be applied down the tube with the seed. These small plots will be managed similar to area wheat production fields and harvested for yield with a small plot combine. Sub-samples will be taken from each plot for wheat seed quality assessments.

The small plot fertility trials will have nine fertility treatments plus a control (no starter fertilizer) treatment for a total of ten treatments replicated four times for a total of 40 individual plots. We will evaluate three MicroEssential products: MES10 (12-40-0-10S), MES15 (13-33-0-15S) and MESZN (12-40-0-10S-1ZN). The standard rate of P₂O₅ and K₂O will be 30 units. Two treatments will have double the standard rate of P₂O₅ and K₂O. We will compare MAP fertilizer with MES 10, MES15 and MESZN with a 2X rate of MES10 and K₂O all applied in-furrow; a single broadcast soil incorporated MES10 treatment; and MES10 plus ESN at 20 and 40 units applied in-furrow to compare P₂O₅ treatments alone.

Data to be collected: Background soil fertility, plant emergence and vigor ratings, crop color rating, flag leaf tissue test, plant dry weights, crop yield, and crop quality parameters (test weight, protein).

The rationale for this research is to compare MicroEssentials alone and with ESN compared to a standard phosphorus fertilizer starter program in spring wheat. In addition to phosphorus, the MicroEssentials products contain sulfur and zinc which have been reported to be involved in protein synthesis and may increase protein levels in wheat. A coated urea product may offer the potential to improve wheat yield and quality (protein), especially if the product is not released into the soil solution until later in the plant developmental stages of the spring wheat. The combination of this coated urea and MicroEssentials offer the potential to improve both wheat yields and seed quality.

Research Group: Dr. Nancy Jo Ehlke (UM), Dr. Dave Grafstrom (Northland College), Mr. Donn Vellekson (UM), Minnesota Turf Seed Council

Regional Linkages To Other Research Activities: Spring and winter wheat variety trials are planted, maintained and harvested by field staff at the U of MN Magnusson Research Farm in collaboration with the University of Minnesota wheat breeding project. In Roseau in 2010, the spring wheat variety trial under normal and intensive management systems had 45 entries for a total of 270 plots, the winter wheat variety trial had 22 entries for a total of 66 plots, and 108 advanced breeding lines were evaluated for a total of 216 plots. The variety trials are managed by Donn Vellekson, Research Plot Coordinator. Herbicide screening, growth regulators, fungicide, and fertility trials are conducted to help meet the needs of producers in the region.

Fertility rate and timing trials are conducted annually in grass seed cropping systems at the CFANS Magnusson Research Farm. These research trials are a subset of numerous agronomic trials involving large plot, on-farm research and small plot trials investigating the fertility requirements of northwestern Minnesota cropping systems. Our current research activities include two small plot fertility trials involving 16 and 22 fertility treatments replicated four times on fall and spring planted perennial ryegrass respectively for a total of 152 plots plus 3 on-farm locations with treatments replicated 3 or 4 times for a total of 84 plots.

Additional Sources of Funding: The CFANS Magnusson Research Farm receives funding from the College of Food, Agricultural, and Natural Resource Sciences for operating costs and to partially support Donn Vellekson's salary. The Mosaic Company and Agrium have supplied the fertility products to be used in the conduct of this research and have provided nominal financial support as unrestricted gifts to support a portion of our research activities

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RESEARCH PROJECT PROPOSAL BUDGET

ORGANIZATION AND ADDRESS			
<p>Name: Regents of the University of Minnesota Address: Sponsored Projects Administration 450 McNamara Alumni Center, 200 Oak Street SE Minneapolis, MN 55455-2070</p>			
Principal Investigator(s) / Project Directors(s)	Funds Requested For		
Nancy Jo Ehlke	Year 1 (2011)	Year 2 (2012)	Year 3 (2013)
A. Salaries and Wages	\$	\$	\$
1. Co-principal Investigator(s)			
2. Senior Associates			
3. Research Associates - Post Doctorate			
4. Other Professionals			
5. Graduate Students			
6. Prebaccalaureate Students			
7. Secretarial - Clerical			
8. Technical, Shop and Other	3,212	3,212	
B. Fringe Benefits	1,288	1,288	
C. Nonexpendable Equipment (Planting and harvesting equipment use)			
D. Materials and Supplies			
E. Travel	1,500	1,500	
F. Publication Costs	500	500	
G. Computer Costs			
H. All Other Direct Costs (Attach supporting data) See Attached			
I. TOTAL AMOUNT OF THIS REQUEST (per year)	\$ 6,500	\$ 6,500	\$

