

NDSU NORTH DAKOTA
STATE UNIVERSITY

GRANT APPLICATION TRANSMITTAL

**This page indicates university endorsement of the referenced proposal
and is intended to be submitted to the sponsor organization.**

Sponsor Organization: MN Wheat Research and Promotion Council

Project Title: *Spring Wheat Responses to Starter Fertilizer, Micronutrient and Root Inoculant*

Project Director: Amitava Chatterjee

Department: School of Natural Resource Sciences

Project Budget:

Total Direct Costs	\$ 32,850
F&A/In-direct Costs	\$
F&A/IDC Rate	%
Total Requested	\$ <u>32,820</u>

Authorized University Representative: Amy Scott

Title: Assistant Director for Sponsored Programs Administration

Address: North Dakota State University
NDSU Dept. 4000, PO Box 6050
Fargo ND 58108-6050

Phone: (701) 231-8045

Signature: Amy B. Scott

Date: 11-5-13

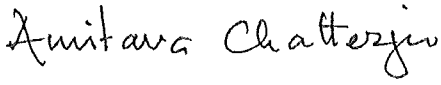

**Any future notifications regarding this proposal, including award notices, should be directed to
the authorized university representative at the address listed above.
Thank you.**

SPONSORED PROGRAMS ADMINISTRATION
NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | 701.231.8045 | Fax 701.231.8098 | ndsu.research@ndsu.edu

Shipping address: Research 1, 1735 NDSU Research Park Drive, Fargo, ND 58102

Minnesota Wheat Research and Promotion Council

RESEARCH PROPOSAL GRANT APPLICATION

1. NAME AND ADDRESS OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE Name: North Dakota State University Address: Office of Sponsored Programs Administration Dept #4000 PO Box 6050, Fargo, ND 58108-6050		
2. TITLE OF PROPOSAL Spring Wheat Responses to Starter Fertilizer, Micronutrient and Root Inoculant		
3. PRINCIPAL INVESTIGATOR(S) Amitava Chatterjee PI# 2 Name: PI# 3 Name:	4. PI #1 BUSINESS ADDRESS Soil Science (Dept. 7680), PO Box 6050 North Dakota State University Fargo ND 58108	
5. PROPOSED PROJECT DATES (calendar years) 2014-2017 <small>Note: Research Reports are Due November 15th of Each Year</small>	6. TOTAL PROJECT COST \$ 10,950/yr.*3 = \$32,850	7. PI #1 PHONE NO. 701-231-7858
8. RESEARCH OBJECTIVES: (List objectives to be accomplished by research grant) Determine spring wheat yield and nutrient uptake in response to addition of (1) starter fertilizer (10-34-0), (2) sulfur, (3) copper, (4) zinc, and (5) root inoculant (<i>Trichoderma</i> spp) with recommended dose of nitrogen, phosphorus and potassium fertilizers under field with poor micronutrient availability. <i>Due to wide variability in weather conditions of the Red River Valley, it is necessary to substantiate the outcomes. Particularly, application of micronutrients involves additional cost to growers and trial for three production year is minimum to test the hypothesis.</i> 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).		
Signature Of Principal Investigator 	Date 10/25/13	Phone Number
Signature Of Authorized Representative 	Title Amy Scott Assistant Director Office of Sponsored Programs Administration	Date 11-5-13
Address Of Authorized Representative Sponsored Programs Administration P.O. Box 6050, Dept 4000 Fargo, ND 58108-6050	Phone Number 701-231-8045	

Minnesota Wheat Research and Promotion Council
RESEARCH PROPOSAL GRANT APPLICATION
(2-pages maximum)

Project Title: Spring Wheat Responses to Starter Fertilizer, Micronutrient and Root Inoculant

Importance of this project to the profitability of wheat producers:

Light textured soils with poor availability of nutrients limit spring wheat yield (Franzen 2009). Adequate and efficient use of fertilizers have potential to increase the spring wheat yield and quality under poor soil fertility condition. Although, spring wheat is most responsive to nitrogen, micronutrient deficiencies should also be avoided. Specific roles of micronutrients, sulfur, copper, zinc and chloride are already recognized for spring wheat production (Rehm and Schmitt 1997^{a, b}). However, producers are doubtful about the contributions of these nutrients to spring wheat yield and protein content. Moreover, uptake of these nutrients is controlled by root growth. Root inoculants or microbial growth facilitate the nutrient availability to plants. Interaction of micronutrient fertilizers with root inoculants is not investigated yet under Minnesota soil conditions. These project will investigate the potential of balanced nutrient management program to increase spring wheat yield under poor soil fertile conditions.

Procedures:

This on farm trial will be conducted at Ada, Minnesota for three consecutive years. A single cultivar will be used with good yield and disease resistance. Standard plot preparation and plant protection measure will be observed. Following treatments will be applied in a randomized complete block design with four replications:

1. control (no fertilizer applied),
2. recommended NPK,
3. starter fertilizer (10-34-0) @ 3 gallon/ac with recommended NPK
4. sulfur @10 lb/ac (as ammonium sulfate) with recommended NPK
5. copper @ 5 lb/ac with recommended NPK
6. zinc @ 3 lb/ac with recommended NPK
7. copper + sulfur (as CuSO_4 matching the amount of Cu and S with treatment 4 and 5) with recommended NPK
8. zinc + sulfur (as ZnSO_4 matching the amount of Zn and S with treatment 5 and 6) with recommended NPK
9. copper + zinc + sulfur (as Cu SO_4 and ZnSO_4 matching the amount of Cu, Zn and S with treatment 4, 5 and 6) with recommended NPK
10. root inoculant (*Trichoderma* spp.) with recommended NPK
11. root inoculant+ (Trt. 9: copper + zinc+ sulfur) with recommended NPK

Initial soil samples of 0-2' depth will be analyzed for N, P, K, Ca, Mg, Cu, Zn, S and other basic soil chemical properties like, pH, EC, CEC and texture.

At harvest, crop and yield parameters (seed wt., count and grain protein) will be measured. Soil and grain samples will be analyzed for nutrient concentration for availability and uptake.

Regional linkages to other research activities: None

List current or potential other funding sources for this project: None

Research Group: Amitava Chatterjee (soil scientist-NDSU)

Relationship to past projects: None

Estimate the budget requirements:

Salary: \$5,150

Research Associate: \$3,000
Responsible for field operation

Undergraduate Students: \$1,000
Responsible for data collection and lab preparation of samples

Fringe Benefits: \$1,150.
Research Associate @0.35% \$1050
Undergraduate student@10% \$ 100

Non-Expendable Equipment: \$1,000

Rental fee for plant harvester \$1,000

Materials and Supplies: \$450

Flags, tags, fertilizer \$450

Travel: \$800

Approximately 1,230 miles (14 trips * 88 miles to Ada MN fields)*\$0.65/mile \$800
Travel to and from fields in Ada MN

All Other Direct Costs: \$3,550

Land rent \$400
Soil and plant analyses- (90 samples*\$35/sample) \$3150

References:

Franzen, D.W. 2009. Fertilizing Hard Red Spring Wheat and Durum. NDSU Extension Service, Fargo, ND. SF-712
Rehm, G., M. Schmitt. 1997^a. Copper for Crop Production. Minnesota Extension Service, University of Minnesota, MN. FS-6790-A
Rehm, G., M. Schmitt. 1997^b. Zinc for Crop Production. Minnesota Extension Service, University of Minnesota, MN. FS-0720-A

**Minnesota Wheat Research and Promotion Council
RESEARCH PROPOSAL BUDGET**

PROJECT TITLE: Spring Wheat Responses to Starter Fertilizer, Micronutrient and Root Inoculant			
Principal Investigator(s) / Project Directors(s) Amitava Chatterjee	Funds Requested For		
	Year 1 (2014)	Year 2 (2015)	Year 3 (2016)
A. Salaries and Wages	\$	\$	\$
1. Co-principal Investigator(s)			
2. Senior Associates			
3. Research Associates - Post Doctorate	3000	3000	3000
4. Other Professionals			
5. Graduate Students			
6. Prebaccalaureate Students	1000	1000	1000
7. Secretarial - Clerical			
8. Technical, Shop and Other			
B. Fringe Benefits @ 35%	1150	1150	1150
C. Nonexpendable Equipment (Planting and harvesting equipment use)	1000	1000	1000
D. Materials and Supplies	450	450	450
E. Travel	800	800	800
F. Publication Costs			
G. Computer Costs			
H. All Other Direct Costs (Attach supporting data)	3550	3550	3550
TOTAL AMOUNT OF THIS REQUEST (per year)	10950	10950	10950