



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 Investigation of Remote Sensing for Disease and Pest Tracking in Small Grains		
3. PRINCIPAL INVESTIGATOR(S) Madeleine Smith <hr/> PI# 2 Name: Ian MacRae <hr/> PI# 3 Name:	4. PI #1 BUSINESS ADDRESS University of Minnesota Northwest Research and Outreach Center 2900 University Avenue Crookston MN, 56716	
5. PROPOSED PROJECT DATES (calendar years) 1/1/2015 through 3/31/2016 <small>Note: Research Reports are Due November 15th of Each Year</small>	6. TOTAL PROJECT COST \$10,000	7. PI #1 PHONE NO. 218.281.8691
8. RESEARCH OBJECTIVES: (List objectives to be accomplished by research grant) 1) To use a multispectral radiometer to determine if wavelengths can be identified which are uniquely associated with different pathogens and pests prevalent in Minnesota.		
<small>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).</small>		
Signature Of Principal Investigator 	Date 1/16/2015	Phone Number 218.281.8691
Signature Of Authorized Representative 	Title Kevin McKoskey, Sr Associate Director Sponsor Projects Administration	Date 1/27/15
Address Of Authorized Representative Kevin McKoskey, Sr. Associate Director, Office of Sponsored Projects Administration 450 McNamara Alumni Center, 200 Oak Street SE, Minneapolis, MN 55455-2070		Phone Number 612.624.5599 Telephone 612.624.4843 Fax No.

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

Project Title: Investigation of Remote Sensing for Disease and Pest Tracking in Small Grains

Importance of this project to the profitability of wheat producers: Remote sensing technology has developed exponentially in the last few years, whether UAV mounted cameras or tractor mounted technologies. There is now a huge interest in using these technologies in the agricultural arena for pest and disease scouting of fields which saves growers time, and ultimately inputs, by being able to identify problem areas within fields and target control measures accordingly. This could ultimately lead to more efficient use of pesticides and save money in times where inputs do not need to be applied.

One of the problems with using this technology is identifying which pests or pathogens can easily be distinguished from other disorders such as nutrient deficiencies or water stress. This project represents a small pilot study to determine if wavelengths can be expanded and refined to determine diagnostic wavelengths for a number of different diseases prevalent in Minnesota. If so, this pilot project could form the basis for future UAV based projects on larger farm scale trials.

Procedures:

Plots at the Northwest Research and Outreach Center in Crookston, MN will be inoculated with a series of diseases (stem rust, leaf rust, bacterial leaf streak, Fusarium head blight) as well as un-inoculated plots. Recordings will then be taken at weekly intervals pre inoculation, as the crop develops, and post inoculation through to harvest. Readings will be taken using a spectral radiometer. Data will be analyzed to determine if there are diagnostic wavelengths for each of these diseases to allow ready, early identification.

While not a part of this project, equipment purchased by this proposal will be available to be used in future investigations of insect populations and other disease organisms as opportunities to pursue those project arise. Pursuing those stressors as part of this project is limited by personnel and time. The equipment will remain in the possession of the UMN-NWROC, but may be available for other projects as demands allow.

Timeline:

Mar-Jun – train students on equipment, establish plots and develop inoculum, calibrate equipment for field data collection

Jun-Aug 2015 – establish, inoculate and monitor plots, collect reflectance data, initiate data management

Sept – Dec – analyze and interpret data

Dec – mar – disseminate research findings through professional and extension meetings and publications

Regional linkage to other research activities:

If successful, this project may be widened to the larger UGPWPC funded by the MWRPC to assess disease patterns on a more regional scale.

List current or potential other funding sources for this project: An additional \$5000 will be provided by I. MacRae towards the purchase of the radiometer from existing funds.

Research Group: Madeleine Smith- Plant Pathologist
Ian MacRae- Entomologist

Relationship to past projects: None

Estimate the budget requirements:

We are requesting \$ 5000 for the purchase of a spectral radiometer and a further \$5000 for the hiring of a student to collect field data, ground truth plots, and assist in data analyses in the fall. This covers 14 weeks @ 20 hrs a week @ \$12/hour through the summer and 13 weeks @10.5hr/wk @ \$12/hr through Sept-Dec.

References:

Minnesota Wheat Research and Promotion Council

RESEARCH PROJECT PROPOSAL BUDGET

PROJECT TITLE: Investigation of Remote Sensing for Disease and Pest Tracking in Small Grains			
Principal Investigator(s) / Project Directors(s) Madeleine Smith	Funds Requested For		
	Year 1 (2015)	Year 2 (2016)	Year 3 (2017)
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	\$5000		
7. Secretarial - Clerical			
8. Technical, Shop and Other			
B. Fringe Benefits			
C. Nonexpendable Equipment (Planting and harvesting equipment use)	\$5000		
D. Materials and Supplies			
E. Travel			
F. Publication Costs			
G. Computer Costs			
H. All Other Direct Costs (Attach supporting data)			
TOTAL AMOUNT OF THIS REQUEST (per year)	\$ 10,000	\$	\$

