Final Summary

This project had two separate, but related on-farm research projects conducted on farm fields in northwest MN from 2017 to 2019. Both trials were conducted in wheat, one project was a variable rate nitrogen (VRN) and the other was a supplemental sulfur trial. A critical component of this field research was to develop a network of farmer cooperators and crop consultants willing to partner and collect field level agricultural research. In the three years of this project, the level of cooperation and partnership exceeded initial expectations. Further, these two projects have served as a springboard to increase the scope of agricultural research generated with full field level variability and experimental methods designed which allow commercial agricultural equipment to be used in all aspects of these field trials.

Outreach is an ongoing priority to disseminate project research results. Examples of these outreach activities include:

- On-farm Summit the day before the Prairie Grains Conference held at the Alerus Center in Grand Forks, ND. Over 175 people attended the 2019 on-farm summit. Research results were distributed at the conference. The 2019 and previous annual reports are available at mnwheat.org.
- Prairie Grains Conference is held every December at the Alerus Center in Grand Forks, ND. Over 400 people attend this conference and project results were shared at the small grains reporting sessions.
- Small Grains update meetings are held at several locations in northwest MN each January. Depending upon weather conditions attendance at these week-long meetings range from 350 to over 500 people.
- Prairie Grains Magazine is a publication circulated by the MN Wheat Growers. Articles have been written and submitted for inclusion in this popular press magazine.
- Each individual research trial provided the opportunity for the individual farmer and crop consultants to discuss on-farm research with neighbors

VRN Project

The concept of variable rate nutrient delivery is a topic that has been discussed for years in the agricultural community. The development of new technology is slowly moving VRN from a coffee shop only discussion into real world applications. This new technology will allow VRN to be not only applicable in “high value” crops but, will eventually have utility in most agricultural crops. This project allowed farmers and crop consultants to gain experience with VRN in wheat. As a result of this project, farmer interest in VRN in wheat is slowly gaining acceptance and even though this project is coming to an end, additional research will be conducted with VRN in wheat. Project results from 2017 to 2019 are available at the MN wheat website, mnwheat.org.

Sulfur

Plant tissue test taken in wheat that documented sulfur deficiencies was a major reason to develop this on-farm research project (see attached article on sulfur background). Further, University soil scientists indicated that the sulfur soil test was not a reliable indicator of plant available sulfur. The objective of this project was to determine if supplemental sulfur would improve wheat yields, or quality. This project collected data in 2017, 18 and 19. Weather conditions in the spring of 2017 and 18 were warmer than average. However, 2019 was cooler than average. One of the characteristics of plant available sulfur is, in cold soils, mineralization is slower than when soil temp are warmer. One of the confounding factors in the 2017 and 2018 is the warm soil conditions, most likely, had a higher rate of sulfur mineralization,

especially in soils with organic matter over 2%. In 2019, soil temps were cooler and as a result soil mineralization was, most likely, slower and if soils were low in available sulfur, the wheat plant responded to supplemental sulfur. Attached is a summary of sulfur trial results (Sulfur Summary Article). At the completion of 2019, this project will be discontinued as the results from this project have been summarized and recommendations when sulfur applications may be advantageous to the growth and development in wheat (see attached sulfur project summary). Project results from 2017 to 2019 are available at the MN wheat website, mnwheat.org.