Final Report

Project Title: Smart Rate Technology: Improving Fertilizer Use Efficiency
NRCS Agreement Number: 68-0211-8-154

Project Director: Eric Kirk, Helena Chemical Company, PO Box 399, Stayton, OR 97383, kirke@helenachemical.com

Project Collaborator: Jake Kraus, Helena Chemical Company, PO Box 355, Hazelton, ID 83335, krausj@helenachemical.com

Project Introduction

The main objective of the project was to reduce the Phosphorus and Nitrogen fertilizer applications in various cropping systems by using Smart Rate Technology. The project started in September of 2008 and ended in August 2011.

Project Activities

A Veris machine which measures Electrical Conductivity (EC) of soil was used to delineate management zones on over 15,000 acres in southern Idaho over the 3 years of the project. Guided (GPS) soil sampling was done within each of these zones to determine their respect nutrient levels. Recommendations on each of these zones where then made based on soil testing lab recommendations, specific field knowledge and current field conditions. GIS software was then used to create recommendation files that were imported into field computers in our application equipment. Variable rate application of fertilizer was then applied with varying amounts of nitrogen, phosphorus, potassium, sulfur and in some cases micronutrients. Crops in the program include alfalfa, sugar beets, barley, dry beans, and potatoes.

Results

Overall this project was a huge success and far exceeded our expectations of its adoption from our grower customer base. We have EC mapped over 15,000 acres in 8 counties in southern Idaho since the start of the project. This represents over 50 growers and over 150 fields. These numbers greatly exceed our stated project goals of 8,000 acres and working with 15-20 different growers. Nearly all growers that gave the program a try in either 2009 or 2010 added more fields in 2011 to result in the highest year yet with over 7,000 acres in the program. Of the acres that were EC mapped and zone soil sampled, over 14,000 of those acres have had fertilizer variable rate applied on them. We had a few cases where the grower chose to a do a straight rate application.

From an agronomy perspective the results of this project was also very successful which is likely a big reason we had more adoption than we could have ever predicted. The EC mapping does a very good job of breaking out the different areas of fertility within most fields in the Magic Valley of Idaho. In most cases the differences were due to pockets and regions of high calcareous soils within these fields. These high calcareous soils tend to register lower EC

mapped values than the areas of much lower amounts of excess lime. Because of this the high calcareous areas often would have significantly different levels of fertility. In the majority of cases, it would have higher levels of phosphorus and potassium than the other parts of the field which could likely be due to the lower yields these areas often achieve and thus a build-up of nutrient levels due to less crop removal. We also found it was beneficial to add higher rates of elemental sulfur in these higher calcareous soils to help remove some of the excess calcium while lowering sulfur rates in the less calcareous areas.

In most cases there was an overall fertilizer reduction in nitrogen, phosphate, and potassium using this smart rate technology. Even in cases where we didn't see a reduction, there was little doubt we were applying a rate of fertilizer that was closer to what the soil and crop really needed. Generally speaking 80-90% of the time we see a reduction of phosphate and potassium across the different EC zones when compared to a conventional application. Approximately 20-30% of the time we see as reduction in nitrogen. On top of these fertilizer reductions, our crop advisors and the participating growers in the program believe this smart rate technology is helping their crops product higher yields.

Potential for Transferability

There is little doubt this smart rate technology has an excellent potential to be transferred in main stream crop production in southern Idaho as well as other crop producing areas. Our large increase in adoption of the practice over a 3 year period provides an excellent example of this potential. In fact at one of our locations it has now become a common practice and now represents over 25% of the total acres they custom apply fertilizer on annually.

Conclusion

It's pretty easy to conclude this project did an excellent job of creating a spark with many of our employees and their customers to initially try out this technology and in some cases make it a standard practice today. In fact, we now have 3 grower customers that have their entire farm in this program. This smart rate technology makes sense and has many benefits environmentally, agronomically, and often most important, economically.

Funding Received and Expended

The federal funding received for the project was $37,500. The total expenditures for the project was $75,000 since the grant was funded at a 50% cost share. Financial reports were submitted multiple times throughout the course of the project. The Report of Goods and Services form was completed on a quarterly basis and progress reports were submitted every 3-6 months based on requests.