

Final Report

Project Title: Smart Rate Technology: Improving Fertilizer Use Efficiency

NRCS Agreement Number: 69-3A75-9-155

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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 November of 2009 and ended in October 2012.

Project Activities

A Veris machine which measures Electrical Conductivity (EC) of soil was used to delineate management zones on over 15,000 acres in the Central Valley of California 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 were 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, almonds, pistachios, walnuts, rice, tomatoes, and cotton.

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 10 counties in Central California since the start of the project. This represents over 40 growers and over 160 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 2010 or 2011 added more fields in 2012 to result in the highest year yet with over 8,000 acres in the program. Of the acres that were EC mapped and zone soil sampled, over 6,000 of those acres have had fertilizer variable rate applied on them. We had a few cases where the grower chose to 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 Central Valley of California. In most cases the differences were due to pockets and regions of high sodium and/or saline soils within these fields. These high sodium/saline soils tend to register

much higher EC mapped values than other areas of the field. Because of this the high sodium/saline areas often would have significantly different levels of fertility. In many instances, we would find overall lower fertility levels in these high sodium, saline areas of the field. In many cases, these high sodium/saline areas make up less than 15% of the field and thus can be treated at much smaller scale. If a soil sample was taken on the entire field the high sodium/saline soils can be often mixed in with the lower level areas causing the entire field to unnecessary be treated with Gypsum or elemental sulfur to reduce the high sodium or salinity.

Potential for Transferability

There is little doubt this smart rate technology has an excellent potential to be transferred in main stream crop production in Central California 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 several of our locations it has now become a common practice.

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 several 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. Performance Progress reports were submitted multiple times throughout the course of the project based on requests.