**USU Extension Grant – Final Report**

**Project Leaders:** Earl Creech, Grant Cardon, James Barnhill, Jody Gale, Clark Israelsen, Boyd Kitchen, Mark Nelson, Mike Pace, Ron Patterson, and Chad Reid

**Project Title:** Nitrogen (N) fertilizer needs of first- and second-year corn grown after alfalfa

**Beginning date and project duration:** June 1, 2015 through May 30, 2016

**Total Requested:** $10,000

**Project Objectives:** Crop response to N fertilizer can vary due to climate, geography, soils, pest problems, field history, and other factors. Preliminary studies in Cache County suggested that we may be able to update USU N fertilizer recommendations for first-year corn grown after alfalfa, resulting in substantially less fertilizer being applied and significant cost savings to growers. The initial observations were from a single Utah county, and how the results would translate throughout the state was unknown. The objective of this project was to test the N fertilizer response of first- and second-year corn after alfalfa at locations across the state to ensure the validity and promote adoption of the new N fertilization recommendations.

**Project Results:**

Studies were conducted at farms in 8 Utah counties (Box Elder, Beaver, Cache, Iron, Weber, Sevier, Uintah, and Weber) during the 2015 growing season. Growers in each county were contacted by the county Extension agent and agreed to host a trial on their farms. Fields in which the experiments were located were in alfalfa production in 2013 (second-year sites) or 2014 (first-year sites) and were planted to corn in 2015. Four rates of N fertilizer (0, 50, 100, and 200 lbs N/acre) were applied broadcast as NH4NO3 to plots measuring four rows (10 ft) wide by 40 ft long. Treatments were arranged in a randomized complete block and replicated four times. Fields were sampled for soil fertility, stand count, corn yield and corn quality as described in the proposal and treatment effects were compared statistically.

While there was a fair amount of variability between sites at different location around the state there was no statistical difference in yield at any of the sites over the rates of N application studied. This strongly suggests that Utah growers are able to reduce N fertilizer application much more than the traditional 50 unit per acre credit, or perhaps even eliminate it all together. If half of Utah corn is grown on acreage in its first year after alfalfa, this change in management practice, alone, could result in a cost savings of $6.3 million (42,000 acres x 200 unit N/acre x $0.76 unit) to Utah farmers annually. Additional study is being undertaken to test the potential for reducing N inputs in the second year after alfalfa. Common practice is to rotate out of alfalfa for two seasons to break disease and pest cycles in each rotational crop. It is possible that further savings to the grower can be realized by reducing or eliminating the need to fertilize in the second rotational crop year.

Results were disseminated at winter crop school events (Cache, Weber/Davis/Morgan, Sevier, Beaver, and Iron Counties) and field tours at each study location. Results were also presented at other meetings and conferences, including the New Mexico Forage Conference. A USU Extension fact sheet entitled “*The Potential for Reducing N Fertilizer Inputs for Corn Production in the First Year Following Alfalfa*” was published in 2015. Thanks to the preliminary data obtained from this project, funding was secured through the Utah Department of Agriculture and Food fertilizer program ($61,000) to carry on this work for the next two years (2016-2018) and to fund the assistantship of a new MS student (Bailey Schaffer).