



PROGRESS REPORT

PROJECT TITLE: Historical Assessment of Improvements in Management Practices Associated with Corn Production

PROJECT NUMBER: 4137-18SP

REPORTING PERIOD: January – April, 2018

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1.) PROJECT ACTIVITIES COMPLETED DURING THE REPORTING PERIOD. (Describe project progress specific to goals, objectives, and deliverables identified in the project workplan.)

The main progress of the project to date has been with data acquisition. Fifty years' (1970-2010 in ten year increments) worth of regional corn and soybean production data (acres planted, yield per ac, total production) have been acquired. Data for fertilizer use (N, P, K) on corn, soybean, and wheat were compiled from 1964-2010. Temperature and precipitation data have been organized for the same period on a regional scale. Scanned inventories of cattle, swine, and poultry have been manually digitized that represent every 5 years since 1970. These data have been used to determine manure generation over the last 5 decades. Planting densities have been determined for the last 50 years, and have been compared to a previous analysis dating back to the 1930s. Common Land Unit data were used to analyze current landuse of lands enrolled in CRP that were set to expire. Data available for tillage practices (transect tillage surveys) on corn were summarized for the time period between 1989 and 2006. Finally, phone interviews with members of the Minnesota Department of Agriculture have been completed that provided guidance for acquiring historic pesticide use data.

2.) IDENTIFY ANY SIGNIFICANT FINDINGS AND RESULTS OF THE PROJECT TO DATE.

Some example results are shown below. Fertilizer N applied to corn (Fig. 1) has, on average, increased slowly since 1970, from about 100 lb/ac to 120 lb/ac. These average rates are consistent with University of Minnesota fertilizer N guidelines. Fertilizer P applied to corn has, on average, leveled off since 1984 at about 50 lb/ac.

Corn yield has increased substantially since 1970, with the largest increases occurring in western and northwestern Minnesota counties (Fig. 2). Since corn yield has increased faster than N fertilizer rate, fertilizer N use efficiency (NUE) has decreased significantly over this period.

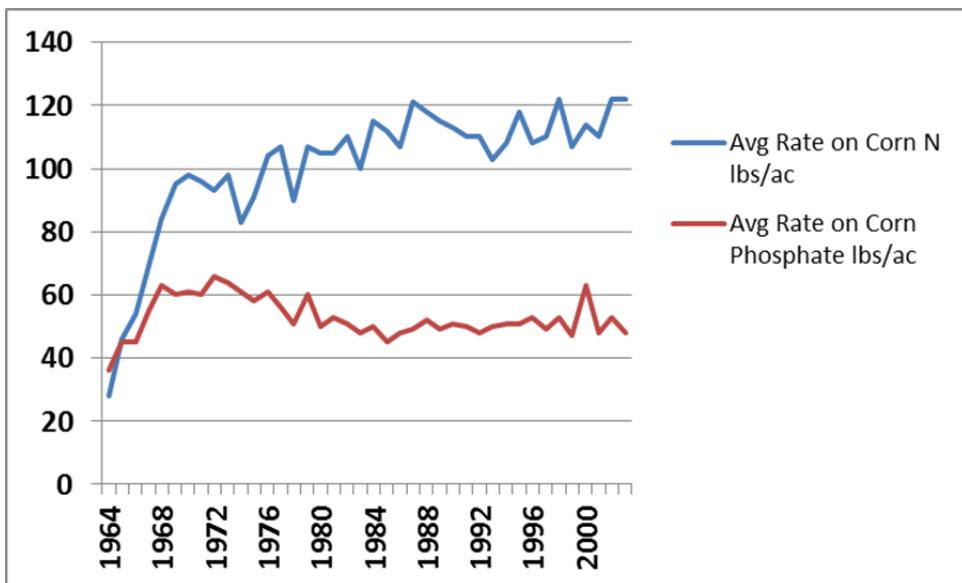


Fig. 1: Trends in average N fertilizer rate (lb/ac) and P fertilizer rate (lb/ac) applied to corn in Minnesota since 1964.

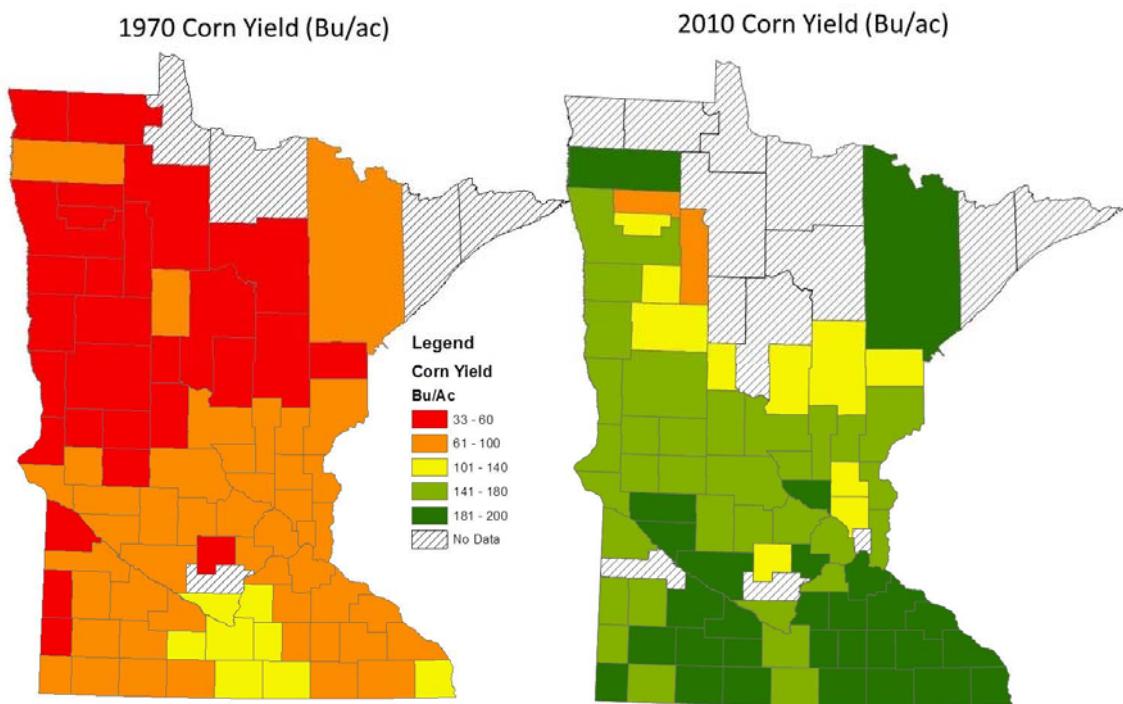


Fig. 2: Comparison between Minnesota county average corn yields (bu/ac) in 1970 vs 2010.

3.) CHALLENGES ENCOUNTERED. (*Describe any challenges that you encountered related to project progress specific to goals, objectives, and deliverables identified in the project workplan.*)

Although numbers for manure generation have been calculated, manure management procedures have been difficult to analyze in a quantitative way. Anecdotal evidence from multiple sources indicates manure management has changed drastically over the last 50 years, but quantifying this change with accurate or defensible numbers has been difficult.

The only other challenge faced has been regarding data inconsistencies. The dozens of data attributes acquired have been at several different spatial and temporal scales with varying start and end dates. Acquiring and inspecting as much data as possible will ensure our analysis is as detailed and relevant as it can be.

4.) FINANCIAL INFORMATION (*Describe any budget challenges and provide specific reasons for deviations from the projected project spending.*)

None.

5.) EDUCATION AND OUTREACH ACTIVITES. (*Describe any conferences, workshops, field days, etc attended, number of contacts at each event, and/or publications developed to disseminate project results.*)

None.