

## **Practice Specification Nutrient Management For Commercial Fertilizer (Code 590)**

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### **Nutrient Management for Commercial Fertilizer**

The Nutrient Management (590) practice, manages soil nutrients to meet crop needs by managing the rate, source, placement, and timing of plant nutrients and soil amendments while reducing environmental impacts. South Dakota State University (SDSU) recommendations and sampling guidelines will be followed.

Nutrient management may be used on any area of land where plant nutrients and soil amendments are applied. Sources of nutrients include, but are not limited to, commercial fertilizers (including starter and in-furrow starter/pop-up fertilizer), animal manures, legume fixation credits, green manures, plant or crop residues, compost, organic by-products, municipal and industrial biosolids, wastewater, organic materials, estimated plant available soil nutrients, and irrigation water. This specification is applicable to commercially applied fertilizer used to balance nutrients on cropland.

### **Soil Testing Requirement**

Soil test analyses results are required for each field where 590 is planned. Soil samples may be collected using a whole-field composite method, zone sampling or grid samples. Information on soil sampling can be found in SDSU's Recommended Soil Sampling Methods - FS 935. Soil tests for Nitrogen (N) recommendations may be sampled in the spring or fall but must be collected prior to N-application for each nitrogen requiring crop in the crop rotation. Soil test for Phosphorus (P) and Potassium (K) will be no older than two years old.

- Soil samples must be collected at 0-6 inches for N, P, and K.
- An additional soil sample must be collected at 6-24 inches for N.
- Fields identified as being susceptible to leaching must have soil samples collected to a depth of 4 feet. If a 4-foot sample cannot be obtained, use the alternative method and sample to a depth of 0-24 inches prior to any N application and again to the 0-24-inch depth within four weeks after fall crop harvest. (i.e. samples are taken both prior to planting and following harvest). Refer to Agronomy Tech Note 17 to determine if fields are susceptible to Nitrate leaching.

### **Additional Soil Testing Guidelines for Zone and Grid Sampling**

- Zones shall have soil samples collected (0-6 & 6-24-inches) for N requiring crops in each zone. Samples for N must be collected each year a N-using crop is planted. Zones shall have soil samples collected (0-6-inches) for P and K at least every 2 years in each zone.
- Grids shall have soil samples collected 0-6-inches for P & K in each grid. In the grid sampling year, if a N requiring crop is planned, the N soil sample must be collected to the 24-inch depth. This N soil sample can be a composite sample. Once grids have been established, it is recommended that N using crop soil samples (0-24-inches) be collected by management zone or be yield based. Grids shall have soil samples collected (0-6-inches) for P and K at least every 2 years in each grid.
- If a 6-24" soil test was not collected in the initial year, a 40 lb. N credit must be entered for the 6" – 24" N in the nutrient budget. In subsequent years, a 0-24" N test is required.

### **Yield Goal**

Identify realistic yield potentials for the crop(s) receiving nutrient applications. Describe method used to determine yield. Methods used to determine yield potential include:

- Average of the 3 highest multi-peril crop insurance crop yields plus 10 percent.
- Proven yields on a field-by-field or farm-by-farm basis for a continuous 3-year average yield plus 10 percent.
- NRCS Crop Yield Tables (Productivity Indexes and 5 years of SD Agricultural Statistics Service crop yield information) plus 10 percent.

When calculating yield goals for variable rate applications, the weighted average of the field should result in a yield similar to what would have been obtained using one of the methods identified above.

## Nitrogen Management Requirements

- Nitrogen budget utilizing SDSU EC-750 guidelines: (i.e.  $\text{Corn} = 1.2 \times \text{Yield Goal} - \text{Legume Credit} - \text{Soil Test Nitrogen} = \text{Application Rate}$ ).
- High leaching fields: No commercial N fertilizer allowed more than 45 days prior to planting except for incidental N in commercial phosphorus, manure, or organic by-product applications.
- To account for various agronomic calculation differences, an over application tolerance level of 30 lbs. of N is allowed annually; (examples of this could be an organic matter credit, N efficiency factor, legume credit, tillage system, etc.) When applied rate deviates from planned rate, document reason for over application.

## Phosphorus Management Requirements

- Use SDSU EC-750 Phosphorus budget guidelines for calculating rates: (i.e.  $\text{Corn} = \text{Olsen Soil Test} \times (0.7-0.044 \times \text{Soil Test Phosphorus}) \times \text{Yield Goal} = \text{application rate}$ ).
- If P application rates exceed SDSU guidelines, use P Index Assessment to determine if field being applied to is Low Risk. See SD Agronomy Technical Note No. 18.
- If site is Low Risk and soil test P is less than 25 ppm Olsen (35 ppm Bray-1), can apply P rate of crop removal in grain (ExEx 8009) or EC 750 formula, whichever is greater.
- Identify if P will be applied for current year's crop only or if nutrients being applied include second crop in rotation. Phosphorus can be applied for 2 consecutive crop years (corn and beans), commonly called a "2-year spread" when soil test P is less than 25 ppm Olsen or 35 ppm Bray-1.
- A over application tolerance level of 30 lbs. of  $\text{P}_2\text{O}_5$  is allowed annually when soil test P level is below 76 ppm Olsen (111 ppm Bray-1). The intent is to provide flexibility for various agronomic situations that may occur, (examples where this could be used = starter or apply just enough product to keep the machine running).
- Once a soil test P level of 25 ppm Olsen (35 ppm Bray-1) is reached, application rate should not exceed 30 lbs.
- When soil test P level is above 76 ppm Olsen (111 ppm Bray-1), **no** P will be applied.
- Bray P1 and Mehlich 3 are a 1:1 relationship, therefore if soil test P is reported using Mehlich 3, use Bray1 in the SD-JS-590.

## Potassium Management Requirements

- Use SDSU EC 750 formula to calculate the Potassium application rate (i.e.  $\text{Corn} = (1.1660-0.0073 \times \text{Soil Test Potassium}) \times \text{Yield Goal} = \text{Application rate}$ ).
- When soil test K is less than 200 ppm, can apply K rate of crop removal in grain or EC 750 formula whichever is greater. Once 200 is reached, tolerance rates only can be applied.
- Can apply K for 2 consecutive crop years (corn and beans), commonly called a "2-year spread" when soil test K is less than 200 ppm.
- To account for various agronomic calculation differences, an over application tolerance level of 100 lbs. of  $\text{K}_2\text{O}$  is allowed annually. When applied rate deviates from planned rate, document reason for over application.
- If Potassium is being used as a chloride source, application rates may be applied to meet the chloride nutrient requirement (see SDSU EC 750).

## Practice Certification

- The SD-JS-590 will be used to document nutrient balance for commercial fertilizer. For fields with manure applications, use CPA-8 or CPA-63. If both manure and commercial fertilizer are being applied to the same field, use the CPA-63.
- Producer must have records for every field on which 590 is planned. Records must include all test results, listing and quantification of all nutrient products, and application date.
- Producer must complete SD-JS-590 on at least 2 of the fields (if applicable) for each crop receiving fertilizer, can be hand-written or electronic and submitted to the NRCS office. NRCS office will

select the fields they want to review.

- For remaining fields in the conservation plan, Field office will need to review the soil test results and variable rate as-applied map(s) (flat rate applications may use aerial map) prior to certifying.
- Randomize fields being reviewed each year, (when possible).
- In the case of grid sampling, complete the first 15 consecutive grid points on the SD-JS-590 (most easily completed when prescription is written). Random or spaced grid points may be requested if consecutive points do not adequately reflect how field is being managed.
- Producer must maintain all records on each field for 5 years. NRCS may request to review records at any time during that 5-year period.
- If nutrient applications exceed the above listed requirements, work with producer/NRCS to create a nutrient management strategy for the following year.

### **Referenced Resources**

[Fertilizer Recommendations Guide - EC750](#)

[Quantities of Plant Nutrients Contained in Crops - ExEx8009](#)

[Recommended Soil Sampling Methods for South Dakota - FS935](#)

## Specific Site Requirements