

# MANURE NITROGEN APPLICATION WORKSHEET INSTRUCTIONS

A manure sample and a soil sample must be analyzed for nutrient content (to include total nitrogen, inorganic nitrogen and phosphorus) to successfully complete the Manure Nitrogen Application Worksheet.

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*Enter the name of your operation and the field identification number/description at the top of the worksheet.*

## **-Crop Nitrogen Requirements-**

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- A. Enter the name of the crop that will be grown in the field.
- B. Enter the yield goal that you anticipate from this crop in bushels per acre (bu/acre), hundred weights per acre (cwt/acre), or tons per acre (tons/acre).
- C. Go to table 1 and locate the nitrogen multiplication factor for the crop you will be planting. Multiply this number by the yield goal you listed in row **B** to calculate the crop nitrogen requirement in pounds per acre.  
  
Enter the amount of total nitrate nitrogen in pounds per acre that is present in the soil at the 0-2 foot depth. You obtain this number from your soil test report. You may need to adjust this value if you are required to take deep soil samples. If you are required to obtain soil samples from 2 to 4 feet, reduce the nitrogen recommendation an additional four pounds for each five pound nitrogen increment above 30 pounds. Example: If there were 50 pounds of nitrogen in the 2-4 foot depth, you would subtract an additional 16 pounds from the nitrogen recommendation.
- D. Go to table 2 and locate the appropriate legume nitrogen credits in pounds per acre for your situation.
- F. Enter the amount of nitrogen that will be applied from commercial fertilizer in pounds per acre. Enter zero if there will be no commercial nitrogen applied.
- G. Subtract rows **D**, **E**, and **F** from row **C** to calculate how much additional nitrogen in pounds per acre the crop will require based on a nitrogen application rate.

## **-Nitrogen Available from Manure-**

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*Indicate the type of manure you will be applying, liquid or solid.*

- H. Enter the amount of total nitrogen that is contained in the manure in pounds per 1,000 gallons or pounds per ton. Obtain this number from the manure test report.
- I. Enter the amount of inorganic nitrogen that is contained in the manure in pounds per 1,000 gallons or pounds per ton. This number should also be included on the manure test report.
- J. Go to table 3 and locate the percent of inorganic nitrogen retained by the soil after manure is applied. Use the number that correlates with the manure application method that you use for your operation.
- K. Multiply rows **I** and **J** to calculate how much inorganic nitrogen will be immediately available to the crop in pounds per 1,000 gallons or pounds per ton.
- L. Go to table 4 and locate the mineralization rate of the manure that you will be applying. Enter the multiplication factor.
- M. Subtract row **I**, the inorganic nitrogen, from row **H**, the total nitrogen, and then multiply that number by row **L**, the organic nitrogen mineralization rate, to calculate how much organic nitrogen will be immediately available to the crop in pounds per 1,000 gallons or pounds per ton.
- N. Add rows **K** and **M** together to calculate the total amount of nitrogen that is immediately available to the crop in pounds per 1,000 gallons or pounds per ton.

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**-Manure Application Based on Nitrogen-**

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- O. Divide row **G** by row **N** to calculate the appropriate manure application rate based on nitrogen in pounds per 1,000 gallons or pounds per ton. *Note: If the manure test results are in pounds per 1,000 gallons you must multiply by 1,000 to get gallons per acre.*
- P. Enter the number of acres in the field that are available for manure application.
- Q. Multiply rows **O** and **P** to determine the quantity of manure in gallons or tons that needs to be applied to meet the nitrogen requirements of the crop. *Note: Calculations for applying this amount of manure is based solely upon the nitrogen requirements of the crop and does not take into account other important plant nutrients.*

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**-Crop Phosphorus (P<sub>2</sub>O<sub>5</sub>) Requirements-**

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**NOTE: The crop phosphorus requirements section is a tool to understand the excess amount of phosphorus that may be land applied if manure is applied based on the crop nitrogen need. The NRCS SD-CPA-8 (<http://www.sd.nrcs.usda.gov/intranet/SouthDakotaForms.html>) manure application calculation worksheet is available to use if you have a DENR water pollution control permit for concentrated animal feeding operations and phosphorus requirements have to be implemented to comply with the permit.**

*Check the appropriate box, Bray or Olsen, to indicate what type of phosphorus test was used to determine the phosphorus content of the soil. This information should be included on the lab results sheet.*

- R. Enter the amount of phosphorus contained in the soil. You obtain this number from your soil test report and the number should be in parts per million (ppm).
- S. Enter the recommended phosphorus application rate in pounds per acre from the South Dakota Fertilizer Recommendation Guide – EC 750 - or go to table 6 to calculate the recommended phosphorus application rate. Choose the equation that matches the type of phosphorus test used by the lab, Bray or Olsen. This information should be indicated on the soil test report.
- T. Enter the amount of phosphorus (P<sub>2</sub>O<sub>5</sub>) in pounds per 1,000 gallons or pounds per ton that is contained in the manure as indicated on the manure test report. This value is usually listed as phosphate on your manure test report. In some cases, the manure test report will list elemental phosphorus. Multiply the elemental phosphorus value by 2.29 to obtain the P<sub>2</sub>O<sub>5</sub> equivalent.
- U. Go to table 5 and determine how many pounds of phosphorus (P<sub>2</sub>O<sub>5</sub>) will be removed from the field due to crop harvest. Multiply this number by the yield goal number that you entered in row **B** and enter the results here in pounds per acre. This number is for informational purposes and will help you evaluate your long-term nutrient management plan.
- V. Multiply row **O** by row **T** to calculate how much phosphorus (P<sub>2</sub>O<sub>5</sub>) in pounds per acre will be applied to the field based on a nitrogen application rate. Divide this number by 1,000 if you are dealing with liquid manure. *Note: The amount of phosphorus applied to a field will typically exceed the recommended phosphorus application rate when manure application rates are based on nitrogen. Review the numbers in this section to help identify if phosphorus should be of concern in this field. The over application of phosphorus may lead to water quality problems in area lakes and streams.*

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**-Record Keeping-**

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- W. Record the manure application rate that was used in the manure application process.
- X. Enter the date when manure was applied to the field.
- Y. Enter the time period when manure was applied to the field.