

# Nutrient Management Tables

University of Minnesota

Source: Fertilizer Guidelines for Agronomic Crops in Minnesota (BU-06240-S Revised 2011)



**Ratio=Cost per pound of actual N divided by expected corn price. Example: \$.60 per pound/ \$6.00 per bushel = 0.10 ratio**

**Table 18. Guidelines for use of nitrogen fertilizer for corn grown on soils considered to be highly productive.**

N Price/ Crop Value Ratio	Corn/Corn (lb. N/acre)		Corn/Soybeans (lb. N/acre)	
	MRTN	Acceptable Range	MRTN	Acceptable Range
0.05	155	130 to 180	120	100 to 140
0.10	140	120 to 165	110	90 to 125
0.15	130	110 to 150	100	80 to 115
0.20	120	100 to 140	85	70 to 100

**Table 19. Guidelines for use of nitrogen fertilizer for corn grown on soils considered to have medium productivity potential.**

N Price/ Crop Value Ratio	Corn/Corn (lb. N/acre)	Corn/ Soybeans (lb. N/acre)
0.05	130	100
0.10	120	90
0.15	110	80
0.25	100	70

**Table 20. Suggested nitrogen guidelines for corn grown on non-irrigated loamy fine sands with less than 3% organic matter.**

N Price/ Crop Value Ratio	Corn/Corn (lb. N/acre)	Corn/ Soybeans (lb. N/acre)
0.05	100	70
0.10	90	60
0.15	80	50
0.25	70	40

**Table 24. Phosphate suggestions for corn production in Minnesota.\***

	Soil Test P (ppm) / P205/ acre to apply (lb./acre)									
	VERY LOW		LOW		MED		HIGH		VERY HIGH	
	0-5		6-10		11-15		16-20		21+	
	0-3		4-7		8-11		12-15		16 +	
EXPECTED YIELD bu./acre	Broadcast	Band	Broadcast	Band	Broadcast	Band	Broadcast	Band	Broadcast	Band
< 100	60	30	40	20	25	20	10	10-15	0	10-15
100-125	75	40	50	25	30	20	10	10-15	0	10-15
125-150	85	45	60	30	35	25	10	10-15	0	10-15
150-175	100	50	70	35	40	30	15	10-15	0	10-15
175-200	110	55	75	40	45	30	15	10-15	0	10-15
200-225	130	65	90	45	55	30	20	10-15	0	10-15
225-250	145	75	100	50	60	30	20	10-15	0	10-15
250 +	160	80	115	60	70	35	25	10-15	0	10-15

\*Use one of the following equations if a P205 guideline for a specific soil test value and a specific expected yield is desired:

$$P205 \text{ rec} = [0.700 - (0.035 \times \text{Bray P ppm})] \times \text{Expected Bushel Yield}$$

$$P205 \text{ rec} = [0.700 - (0.044 \times \text{Olsen P ppm})] \times \text{Expected Bushel Yield}$$

No phosphate fertilizer is suggested if the soil test for P is higher than 25 ppm (Bray) or 20 ppm (Olsen).

**Table 25. Potash suggestions for corn production in Minnesota.\***

	Soil Test K (ppm) / K2O/ acre to apply (lb./acre)									
	VERY LOW		LOW		MED		HIGH		VERY HIGH	
	0-40		41-80		81-120		121-160		160 +	
EXPECTED YIELD bu./acre	Broadcast	Band	Broadcast	Band	Broadcast	Band	Broadcast	Band	Broadcast	Band
< 100	100	50	75	40	45	30	15	10-15	0	10-15
100-125	120	60	90	45	50	30	20	10-15	0	10-15
125-150	145	75	105	55	60	40	20	10-15	0	10-15
150-175	165	85	120	60	70	40	25	10-15	0	10-15
175-200	185	90	135	70	80	50	25	10-15	0	10-15
200-225	210	105	155	80	90	55	30	10-15	0	10-15
225-250	235	120	165	85	100	60	30	10-15	0	10-15
250 +	235	130	180	90	110	65	35	10-15	0	10-15

\*Use the following equation if a K2O guideline for a specific soil test value and a specific expected yield is desired:

$$K2O \text{ rec} = [1.166 - (0.0073 \times \text{Soil Test K ppm})] \times \text{Expected Bushel Yield}$$

No potash fertilizer is suggested if the soil test for K is 175 ppm or higher.

Figure 2. The fall soil nitrate test should be used for nitrogen recommendations in the counties that are shaded.

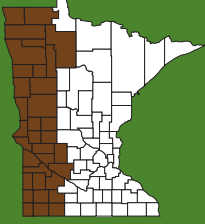


Table 23. Residual N credit values based on the concentration of NO<sub>3</sub>-N measured before planting in the spring from the top two feet of soil (not to be used when fall applied commercial N was used)

Soil NO <sub>3</sub> -N (ppm)	Residual N Credit (lb. N/acre)
0.0 - 6.0	0
6.1 - 9.0	35
9.1 - 12.0	65
12.1 - 15.0	95
15.1 - 18.0	125
18.0 +	155

Table 21-22. Nitrogen credits for different previous crops planted prior to corn.

Previous Crop	1st year N Credit (lb. N/acre)	2nd year N Credit (lb. N/ acre)
Small Grains <sup>1</sup>	40	
Harvested alfalfa		
4 or more plants/ft <sup>2</sup>	150	75
2 to 3 plants/ft <sup>2</sup>	100	50
1 or fewer plants/ft <sup>2</sup>	40	0
Red clover	75	35
Group 1 Crops <sup>2</sup>	75	
Group 2 Crops <sup>3</sup>	0	
Edible beans	20	
Field peas	20	

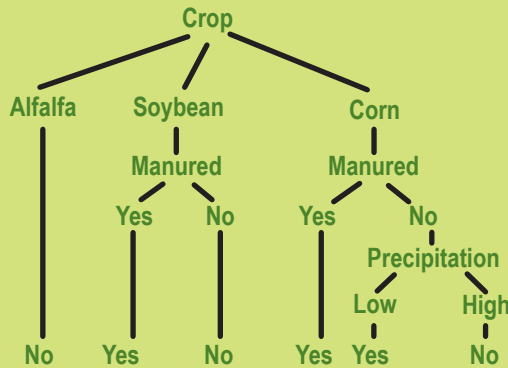
<sup>1</sup>Use this credit if any small grain stubble in southeastern MN counties was tilled after harvest; if there was no tillage, use guidelines for crops in Group 2.

<sup>2</sup>Group 1 Crops: Alsike clover, birdsfoot trefoil, grass/legume hay, grass legume pasture, fallow.

<sup>3</sup>Group 2 Crops: Barley, buckwheat, canola, corn, grass hay, grass pasture, oat, potato, rye, sorghum-sudan, sugar beet, sunflower, sweet corn, triticale, wheat. (Use guidelines for crops in Group 2 if corn follows small grain in the remainder of the state.)

Figure 3.

Flow chart decision-aid for determining the probability of having significant residual NO<sub>3</sub>-N in the soil.



Fall Soil Nitrate Nitrogen Test 0-24 inches  
N Rate = (Table 18 value for corn/corn) - (0.60 x Soil Test Nitrate lb./A)

Sulfur fertilizer rate suggestions for corn production in Minnesota

Soil Texture	Banded Rate	Broadcast Rate
Sand, Sandy Loam, Loamy Sand	12-15 lb./acre	25 lb. /acre
Fine Textured Soils <3.0% O.M. (top 6-8 inches)		10-15 lb./acre
Fine Textured Soils Corn following corn with high residue		10-15 lb./acre

Table 27. Zinc suggestions for corn production in Minnesota.

Zinc soil test (ppm)	Zinc to apply - lb. Zn/acre	
	Broadcast Rate	Banded Rate
0.0 - 0.25	10	2
0.26 - 0.50	10	2
0.50 - 0.75	5	1
0.76 - 1.00	0	0
1.01 +	0	0

Table 52. Phosphate fertilizer suggestions for soybean production in MN.

Expected Yield	Phosphorus (P) Soil Test (ppm) *					
	Bray	0-5	6-10	11-15	16-20	21+
bu. /acre	Olsen	0-3	4-7	8-11	12-15	16*
		P <sub>2</sub> O <sub>5</sub> to Apply (lb./acre)*				
Less than 30		50	30	0	0	0
30-39		60	40	0	0	0
40-49		70	50	0	0	0
50-59		80	60	0	0	0
60+		90	70	0	0	0

\* Use one of the following equations if a phosphate suggestion for a specific soil test and a specific expected yield is desired:

$$P_{205} \text{ rec} = [1.752 - (0.0836 \times \text{Bray P ppm})] \times \text{Expected Bushel Yield}$$

$$P_{205} \text{ rec} = [1.752 - (0.1114 \times \text{Olsen P ppm})] \times \text{Expected Bushel Yield}$$

Table 53. Potash fertilizer suggestions for soybean production in Minnesota.

Expected Yield	Potassium (K) Soil Test (ppm) *				
	0-40	41-81	81-120	121-160	161+
bu. /acre	K <sub>2</sub> O to apply (lb./acre)*				
Less than 30	55	30	15	0	0
30-39	65	40	20	0	0
40-49	80	50	20	0	0
50-59	100	60	30	0	0
60+	110	70	30	0	0

\* Use one of the following equations if a potash suggestion for a specific soil test and a specific expected yield is desired:

$$K_{20} \text{ rec} = [2.2 - (0.0183 \times \text{Soil Test K ppm})] \times \text{Expected Bushel Yield}$$

## Nutrient Management Related Websites

U of M Extension Nutrient Management: <http://www.extension.umn.edu/nutrient-management/> **NEW!**

Iowa Nitrogen Rate Calculator: <http://extension.agron.iastate.edu/soilfertility/nrate.aspx>

Ag Fertilizer Research and Education Council (AFREC): <http://www.mda.state.mn.us/chemicals/fertilizers/afrec.aspx>

Best Management Practices for Nitrogen Use In MN: <http://www.mda.state.mn.us/nitrogenbmps>

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