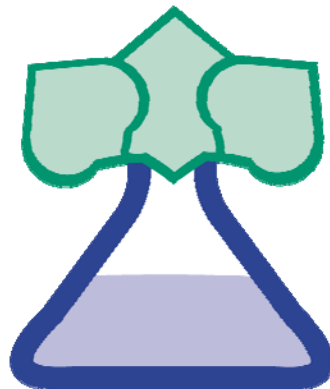


# Fertilizer Guidelines



## Olsen's Agricultural Laboratory

210 East 1<sup>st</sup> Street / PO Box 370

McCook, NE 69001

(308) 345-3670 / FAX (308) 345-7880

[www.olsenlab.com](http://www.olsenlab.com)

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## NITROGEN FERTILIZER RECOMMENDATIONS

Nitrogen fertilizer recommendations should be made on the basis of a subsoil nitrate test. For soil samples that are submitted without subsoil samples, assumptions are made for the amount of subsoil residual nitrate as indicated below. The following information is used for making nitrogen fertilizer recommendations at Olsen's Agricultural Laboratory.

1. Crops with recommendations based on a nitrate test for a sample taken to a depth of 24 inches.

barley	grass (dryland)	safflower
beans, field	millet	sunflowers
cane	oats	wheat
flax	rye	

- a. If no subsoil sample is tested, it is assumed that the residual  $\text{NO}_3\text{-N}$  test is 10 lbs/A (or 2 ppm) for a depth of 8 - 24 inches.
- b. If a subsoil sample is taken to a depth which is different than 24 inches, multiply the  $\text{NO}_3\text{-N}$  in the soil sample (surface sample plus subsoil sample) by the appropriate factor below before calculating the nitrogen fertilizer recommendation:

<u>Soil depth, inches</u>	<u>factor</u>
24 or less	1.00
25 - 36	0.90
37 or more	0.80

2. Crops with N recommendations based on a nitrate test for a sample taken to a depth of 36 inches.

corn	onions	sorghum
cotton	potatoes	soybeans
grass (irrigated)		

- a. If no subsoil sample is tested, it is assumed that the  $\text{NO}_3\text{-N}$  is 25 lbs/A (or 3 ppm) for a depth of 8 - 36 inches.
- b. If a subsoil sample is taken to a depth which is different than 36 inches, multiply the  $\text{NO}_3\text{-N}$  in the soil sample (surface sample plus subsoil sample) by the appropriate factor below before calculating the nitrogen fertilizer recommendation:

<u>Soil depth, inches</u>	<u>factor</u>
24 or less	1.33
25 - 36	1.00
37 - 48	0.90
49 - 60	0.80
61 - 72	0.70
73 or more	0.60

3. Please refer to Sugar Beets on page 8.
4. Subsoil samples are not necessary for making nitrogen fertilizer recommendations for alfalfa.

### Alfalfa

Soil NO <sub>3</sub> -N lbs/A	New Seeding -----lbs/A Recommended-----	Established Stand
0 - 10	40	0
11 - 30	20	0
31 or more	0	0

- a. Seed should be properly inoculated before planting alfalfa.
- b. Established stands of alfalfa may respond to N fertilizer if roots are poorly nodulated. If root production is being experienced, check the root system for the presence of nodules.

### Barley

Grain or feed: lbs N/A = (Yield Goal, bu/A x 1.40) - NO<sub>3</sub>-N to 24 inches

Malting: lbs N/A = (Yield Goal, bu/A x 1.00) - NO<sub>3</sub>-N to 24 inches

### Beans (dry edible)

lbs N/A = (Yield Goal, bu/A x 2) - NO<sub>3</sub>-N to 24 inches

- a. N recommendation should be used for dry edible beans, excluding kidney beans. Apply an additional 20 lbs N/A for kidney beans.
- b. Decrease N recommendation by 30 lbs/A if seed is inoculated before planting.
- c. Apply 50% of the nitrogen fertilizer at sidedress or pod-filling stage of maturity.
- d. Increase N recommendation by 30 lbs/A if soils are sandy.

### Cane (Dryland)

NO <sub>3</sub> -N to 24 inches, lbs/A	lbs N/A Recommended
30 or less	70
31 – 60	50
61 – 80	30
80 or more	0

### Corn - grain

$$\text{lbs N/A} = \frac{(0.90)(\text{Yield Goal, bu/A})}{1 - (0.0008)(\text{Yield Goal, bu/A})} + 50 - \text{NO}_3\text{-N to 36 inches}$$

- a. Table of N recommendations for corn on page 9.
- b. Minimum N recommendations for soils with surface and subsoil samples.

Yield Goal Bu/A	NO <sub>3</sub> -N to 36 inches, lbs/A	
	350 or less	351 or more
	-----lbs N/A Recommended-----	
100 or less	25	0
101 – 130	50	0
131 – 180	50	0
181 or more	50	0

Decrease N recommendation by 45 lbs/A if previous crop was soybeans and the yield exceeded 30 bu/A. If the soybean yield was less than 30 bu/A, do not decrease the N recommendation for corn.

### Corn - popcorn

N recommendations for popcorn are the same as the N requirement for corn grain.

### Corn - seed corn

N recommendations for seed corn are the same as for dent corn with a yield goal of 100 bu/A.

### Corn - silage

Multiply the corn silage yield goal (tons/A) by 7 to convert to an equivalent grain yield. Calculate the N recommendation using the same equation as for corn.

### Cotton

Short Staple: lbs N/A = (Yield Goal, bales/A x 70) - NO<sub>3</sub>-N to 36 inches

Long Staple: lbs N/A = (Yield Goal, bales/A x 100) - NO<sub>3</sub>-N to 36 inches

Note: Yield goal, bales per acre = lbs per acre/480

Flax

lbs N/A = (Yield Goal, bu/A x 3) - NO<sub>3</sub>-N to 24 inches

Grass

Dryland: lbs N/A = (Yield Goal, T/A x 30) - NO<sub>3</sub>-N to 24 inches

If no yield goal is given, assume a yield goal of 2.0 T/A. Maximum dryland yield goal = 2.5 T/A.

Irrigated: lbs N/A = (Yield Goal, T/A x 45) - NO<sub>3</sub>-N to 36 inches

If no yield goal is given, assume a yield goal of 4.0 T/A.

Grass Seed

lbs N/A = (Yield Goal, lbs/A x 0.17) - NO<sub>3</sub>-N to 24 inches

- a. Yield Goal = 150 lbs/A in low rainfall area to 750 lbs/A in high rain fall area.
- b. The maximum yield goal for dryland grass seed is 450 lbs/A. The minimum yield goal to be used for irrigated grass seed production should be 450 lbs/A.

Meadow Hay

lbs N/A = 100 lbs/A - residual NO<sub>3</sub>-N in surface sample

Yield goal = 4 Tons/A

Millet

lbs N/A = (Yield Goal, bu/A x 1.5) - NO<sub>3</sub>-N to 24 inches

Oats

Grain: lbs N/A = (Yield Goal, bu/A x 1.0) - NO<sub>3</sub>-N to 24 inches

Oat Hay: (Yield Goal, T/A x 17.5) = equivalent grain yield goal, bu/A.

Oats - alfalfa (nurse crop)

N recommendations are same as oats.

Onions

lbs N/A recommended = 200 - residual NO<sub>3</sub>-N to 36 inches

Peanuts

Soil NO <sub>3</sub> -N, lbs/A	lbs N/A Recommended
15 or less	20
16 or more	0

- a. N recommendations based on surface sample only.
- b. Seed should be properly inoculated before planting.

### Potatoes

lbs N/A = (Yield Goal, sacks/A x 0.55) - NO<sub>3</sub>-N to 36 inches

Minimum N recommendation is 75 lbs/A regardless of soil test.

### Rye

lbs N/A = (Yield goal, bu/A x 1.60) - NO<sub>3</sub>-N to 24 inches

N recommendations for rye that will be used for pasture in the fall and winter months should be increased by 40 lbs N/A.

### Safflower

lbs N/A = (Yield Goal, lbs/A x 0.06) - NO<sub>3</sub>-N to 24 inches

### Sorghum - grain

lbs N/A = (Yield Goal, bu/A x 1.2) + 30 - NO<sub>3</sub>-N to 36 inches

- a. Table of N recommendations for grain sorghum on page 9.
- b. Minimum N recommendations

Yield Goal bu/A	NO <sub>3</sub> -N to 36 inches, lbs/A	
	350 or less	351 or more
60 or less	20	0
61 – 80	20	0
81 – 125	40	0
126 or more	40	0

### Sorghum - forage

Multiply the forage sorghum yield goal, Tons/A, by 20 to convert to an equivalent grain yield. Calculate the N recommendation using the grain sorghum equation. Yield goal range is 2 – 10 T/A.

### Sorghum - silage

Multiply the sorghum silage yield goal, Tons/A, by 6 to convert to an equivalent grain yield. Calculate the N recommendations using the grain sorghum equation. Yield goal range is 10 – 25 T/A.

### Soybeans

lbs N/A = (Yield Goal, bu/A x 1.5) - NO<sub>3</sub>-N to 36 inches

- a. Decrease N recommendation by 30 lbs/A if seed is inoculated before planting.
- b. Apply 50% of the nitrogen fertilizer at sidedress or pod-filling stage of maturity.
- c. Increase N recommendation by 30 lbs/A if soils are sandy.

## Sugar Beets

lbs N/A recommended = (9)(YG) - (30)(%OM) - (Residual NO<sub>3</sub>-N, lbs/A)(CF)

OM = Organic Matter  
YG = Yield Goal  
CF = Conversion Factor

### Conversion Factor

0 – 12" = 2.50  
13 – 24" = 1.67  
25 – 36" = 1.43  
37 – 48" = 1.25  
49 – 60" = 1.10  
61 – 72" = 1.00  
73" plus = 1.00

- Subtract 25 lbs N/A if the previous crop was dry edible beans.
- Avoid planting sugar beets the first year after alfalfa.
- Avoid application of manure to sugar beets because of the release of nitrates from the mineralization of manure late in the growing season.

## Sunflowers

lbs N/A = (Yield Goal, lbs/A x 0.06) - NO<sub>3</sub>-N to 24 inches

## Wheat

Summer fallow wheat: lbs N/A = (Yield Goal, bu/A x 1.75) - NO<sub>3</sub>-N to 24 inches  
Apply an additional 20 lbs N/A for each 1% increase in protein desired above 11%.

Ecofallow wheat: N recommendations for ecofallow wheat (wheat followed by corn or sorghum the next year) are the same as for fallow wheat. The N recommendation for the following crop should be based on a soil test after the wheat has been harvested.

Continuous wheat: lbs N/A = (Yield Goal, bu/A x 2.0) - NO<sub>3</sub>-N to 24 inches  
The N recommendation is higher than for fallow wheat in order to accelerate the rate of straw decomposition and avoid nitrate tie-up by the straw.

Spring wheat: lbs N/A = (Yield goal, bu/A x 2.4) - [(OM -1) x 20] - NO<sub>3</sub>-N to 24"

Wheat Pasture: N recommendations for wheat that will be used for pasture in the fall and winter should be increased by 40 lbs N/A. Apply 2/3 of the N fertilizer prior to planting and the remaining 1/3 as a top dress application in the spring if the wheat will be harvested for grain.

Comments: The table of N recommendations for fallow and ecofallow wheat is on page 11. The N recommendations have been adjusted for yield goals of 60 bu/A or greater from the N recommendation computed using the above equations. Use the N recommendations found on the table for these yield goals.

# NITROGEN FERTILIZER RECOMMENDATIONS

## CORN

Yield Goal, BU/A	RESIDUAL NO <sub>3</sub> -N, LBS/A																				
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210 - 360
80	120	110	100	90	80	70	60	50	40	30	25	25	25	25	25	25	25	25	25	25	20
90	130	120	110	100	90	80	70	60	50	40	30	25	25	25	25	25	25	25	25	25	20
100	140	130	120	110	100	90	80	70	60	50	40	30	25	25	25	25	25	25	25	25	20
110	150	140	130	120	110	100	90	80	70	60	50	50	50	50	50	50	50	50	50	50	20
120	160	150	140	130	120	110	100	90	80	70	60	50	50	50	50	50	50	50	50	50	20
130	170	160	150	140	130	120	110	100	90	80	70	60	50	50	50	50	50	50	50	50	20
140	180	170	160	150	140	130	120	110	100	90	80	70	60	50	50	50	50	50	50	50	20
150	190	180	170	160	150	140	130	120	110	100	90	80	70	60	50	50	50	50	50	50	20
160	210	200	190	180	170	160	150	140	130	120	110	100	90	80	70	60	50	50	50	50	20
170	220	210	200	190	180	170	160	150	140	130	120	110	100	90	80	70	60	50	50	50	20
180	230	220	210	200	190	180	170	160	150	140	130	120	110	100	90	80	70	60	50	50	20
190	240	230	220	210	200	190	180	170	160	150	140	130	120	110	100	90	80	70	60	50	20
200	250	240	230	220	210	200	190	180	170	160	150	140	130	120	110	100	90	80	70	60	20

If no subsoil sample is tested, it is assumed that the residual NO<sub>3</sub>-N test is 25 lbs/A (or 3 ppm) for a depth of 8 – 36 inches.

## MILO (GRAIN SORGHUM)

Yield Goal, BU/A	RESIDUAL NO <sub>3</sub> -N, LBS/A															
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150-350	360
40	70	60	50	40	30	20	20	25	25	25	25	25	25	25	25	20
50	80	70	60	50	40	30	20	25	25	25	25	25	25	25	25	20
60	90	80	70	60	50	40	30	25	25	25	25	25	25	25	25	20
70	100	90	80	70	60	50	40	50	50	50	50	50	50	50	50	20
80	120	110	100	90	80	70	60	50	50	50	50	50	50	50	50	20
90	130	120	110	100	90	80	70	50	50	50	50	50	50	50	50	20
100	140	130	120	110	100	90	80	50	50	50	50	50	50	50	50	20
110	150	140	130	120	110	110	90	60	50	50	50	50	50	50	50	20
120	160	150	140	130	120	110	100	80	70	60	50	50	50	50	50	20
130	180	170	160	150	140	130	120	90	80	70	60	50	50	50	50	20
140	190	180	170	160	150	140	130	100	90	80	70	60	50	50	50	20
150	200	190	180	170	160	150	140	110	100	90	80	70	60	50	50	20

If no subsoil sample is tested, it is assumed that the residual NO<sub>3</sub>-N test is 25 lbs/A (or 3 ppm) for a depth of 8 – 36 inches.

# NITROGEN FERTILIZER RECOMMENDATIONS

## SUGAR BEETS

Residual NO <sub>3</sub> -N in 4' Profile, lbs/A	ORGANIC MATTER %																				
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
	N to Apply, lbs/A																				
0	230	220	220	220	210	210	210	200	200	200	200	190	190	190	180	180	180	170	170	170	170
10	210	210	210	200	200	200	190	190	190	190	180	180	180	170	170	170	160	160	160	160	150
20	200	200	190	190	190	190	180	180	180	170	170	170	160	160	160	160	150	150	150	140	140
30	190	180	180	180	180	170	170	170	160	160	160	150	150	150	150	140	140	140	130	130	130
40	180	170	170	170	160	160	160	150	150	150	150	140	140	140	130	130	130	120	120	120	120
50	160	160	160	150	150	150	140	140	140	140	130	130	130	120	120	120	110	110	110	110	100
60	150	150	140	140	140	140	130	130	130	120	120	120	110	110	110	110	100	100	100	90	90
70	140	130	130	130	130	120	120	120	110	110	110	100	100	100	100	90	90	90	80	80	80
80	130	120	120	120	110	110	110	100	100	100	100	90	90	90	80	80	80	70	70	70	70
90	110	110	110	100	100	100	90	90	90	90	80	80	80	70	70	70	60	60	60	60	50
100	100	100	90	90	90	90	80	80	80	80	70	70	70	60	60	60	60	50	50	50	40
110	90	80	80	80	80	70	70	70	60	60	60	50	50	50	50	40	40	40	40	30	30
120	80	70	70	70	60	60	60	50	50	50	50	40	40	40	30	30	30	20	20	20	20
130	60	60	60	50	50	50	40	40	40	40	30	30	30	20	20	20	10	10	10	10	0
140	50	50	40	40	40	40	30	30	30	20	20	20	10	10	10	10	0	0	0	0	0
150	40	30	30	30	30	20	20	20	10	10	10	0	0	0	0	0	0	0	0	0	0
160	30	20	20	20	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

lbs N/Acre Recommended = (9)(Yield Goal, T/A) – (30)(%OM) – (Residual NO<sub>3</sub>-N)(Conversion Factor)

Assumptions:

1. Yield Goal = 25 T/A
2. Residual NO<sub>3</sub>-N in 4' depth after conversion factor has been applied.  
 e.g. Residual NO<sub>3</sub>-N soil test to 4' = 80 lbs/A  
 Conversion Factor = 1.25  
 Residual NO<sub>3</sub>-N in 4' profile after conversion = (80 lbs/A)(1.25) = 100 lbs/A

# NITROGEN FERTILIZER RECOMMENDATIONS

## WHEAT

Residual NO <sub>3</sub> -N, lbs/A	YIELD GOAL, BU/A									
	30	40	50	60	70	80	90	100	110	120
0	50	70	90	110	120	140	160	180	190	210
10	40	60	80	100	110	130	150	170	180	200
20	30	50	70	90	100	120	140	160	170	190
30	20	40	60	80	90	110	130	150	160	180
40	10	30	50	70	80	100	120	140	150	170
50	0	20	40	60	70	90	110	130	140	160
60	0	10	30	50	60	80	100	120	130	150
70	0	0	20	40	50	70	90	110	120	140
80	0	0	10	30	40	60	80	100	110	130
90	0	0	0	20	30	50	70	90	100	120
100	0	0	0	10	20	40	60	80	90	110
110	0	0	0	0	10	30	50	70	80	100
120	0	0	0	0	0	20	40	60	70	90
130	0	0	0	0	0	10	30	50	60	80
140	0	0	0	0	0	0	20	40	50	70
150	0	0	0	0	0	0	10	30	40	60
160	0	0	0	0	0	0	0	20	30	50
170	0	0	0	0	0	0	0	10	20	40
180	0	0	0	0	0	0	0	0	10	30
190	0	0	0	0	0	0	0	0	0	20
200	0	0	0	0	0	0	0	0	0	10

If no subsoil sample is tested, it is assumed that the residual NO<sub>3</sub>-N test is 10 lbs/A (or 2 ppm) for a depth of 8 – 24 inches.

## PHOSPHORUS FERTILIZER RECOMMENDATIONS

Crop	Yield Goal	Soil Phosphorus (Bray P1), ppm				
		0 – 5 (VL)	6 – 15 (L)	16 – 25 (M)	26 – 30 (H)	31+ (VH)
		lbs P <sub>2</sub> O <sub>5</sub> /Acre Recommended				
Alfalfa	<6 T/A	60	40	20	0	0
(established stand)	6 – 7 T/A	80	60	30	0	0
	8+ T/A	100	80	50	20	20
Alfalfa	<6 T/A	120	80	40	20	0
(new seeding)	6 – 7 T/A	160	120	80	40	20
	8+ T/A	200	160	120	80	40
Barley (grain & feed)	All	75	50	25	0	0
Barley (malting)	All	75	50	25	0	0
Beans – dry	All	50	30	20	0	0
Cane	Dryland	40	30	20	0	0
Corn – grain	<101 bu/A	50	30	20	0	0
	101 – 130 bu/A	75	50	25	0	0
	131 – 180 bu/A	100	60	30	15 BAND	15 BAND
	181 – 225 bu/A	125	80	40	20 BAND	20 BAND
	226+ bu/A	150	100	50	25 BAND	25 BAND
Corn – popcorn	All	75	50	25	0	0
Corn – seed	All	75	50	25	0	0
Corn – silage	<15 T/A	50	30	20	0	0
	15 – 19 T/A	75	50	25	0	0
	20 – 26 T/A	100	60	30	15 BAND	15 BAND
	27 – 32 T/A	125	80	40	20 BAND	20 BAND
	33+ T/A	150	100	50	25 BAND	25 BAND
Cotton	All	100	50	25	0	0
Flax	All	50	30	20	0	0
Grass (forage & seed production)	Dryland	40	30	20	0	0
	Irrigated	80	60	30	0	0
Grass (new seeding)	Dryland	80	60	40	20	0
	Irrigated	160	120	80	40	20
Meadow Hay	All	60	40	20	0	0
Millet	All	75	50	25	0	0
Oats	All	75	50	25	0	0
Oats – Alfalfa (nurse crop)	Dryland	120	80	40	20	0
	Irrigated	160	120	80	40	20
Onions	All	100	75	50	25	0
Peanuts	All	100	75	30	0	0
Potatoes	All	240	180	120	60	30
Rye	All	75	50	25	0	0
Safflower	All	50	30	20	0	0
Sorghum – grain	<61 bu/A	40	30	20	0	0
	61 – 80 bu/A	60	40	20	0	0
	81 – 125 bu/A	80	40	20	0	0
	126+ bu/A	100	60	40	20	20
Sorghum – silage	<11 T/A	40	30	20	0	0
	11 – 13 T/A	60	40	20	0	0
	14 – 21 T/A	80	40	20	0	0
	22+ T/A	100	60	40	20	20
Soybeans	All	50	30	20	0	0
Sugar Beets	All	125	100	75	40	0
Sunflower	All	50	30	20	0	0
Wheat – ecofallow	All	100	75	50	25	0
Wheat – continuous	All	75	50	25	0	0
Wheat – fallow	All	75	50	25	0	0

< = Less than    VL = Very Low    L = Low    M = Medium    H = High    VH = Very High

## PHOSPHORUS FERTILIZER RECOMMENDATIONS

Crop	Yield Goal	Soil Phosphorus (Bicarbonate P), ppm				
		0 – 3 (VL)	4 – 10 (L)	11 – 16 (M)	17 – 20 (H)	21+ (VH)
		lbs P <sub>2</sub> O <sub>5</sub> /Acre Recommended				
Alfalfa	<6 T/A	60	40	20	0	0
(established stand)	6 – 7 T/A	80	60	30	0	0
	8+ T/A	100	80	50	20	20
Alfalfa (new seeding)	<6 T/A	120	80	40	20	0
	6 – 7 T/A	160	120	80	40	20
	8+ T/A	200	160	120	80	40
Barley (grain & feed)	All	75	50	25	0	0
Barley (malting)	All	75	50	25	0	0
Beans – dry	All	50	30	20	0	0
Cane	Dryland	40	30	20	0	0
Corn – grain	<101 bu/A	50	30	20	0	0
	101 – 130 bu/A	75	50	25	0	0
	131 – 180 bu/A	100	60	30	15 BAND	15 BAND
	181 – 225 bu/A	125	80	40	20 BAND	20 BAND
	226+ bu/A	150	100	50	25 BAND	25 BAND
Corn – popcorn	All	75	50	25	0	0
Corn – seed	All	75	50	25	0	0
Corn – silage	<15 T/A	50	30	20	0	0
	15 – 19 T/A	75	50	25	0	0
	20 – 26 T/A	100	60	30	15 BAND	15 BAND
	27 – 32 T/A	125	80	40	20 BAND	20 BAND
	33+ T/A	150	100	50	25 BAND	25 BAND
Cotton	All	100	50	25	0	0
Flax	All	50	30	20	0	0
Grass (forage & seed production)	Dryland	40	30	20	0	0
	Irrigated	80	60	30	0	0
Grass (new seeding)	Dryland	80	60	40	20	0
	Irrigated	160	120	80	40	20
Meadow Hay	All	60	40	20	0	0
Millet	All	75	50	25	0	0
Oats	All	75	50	25	0	0
Oats – Alfalfa (nurse crop)	Dryland	120	80	40	20	0
	Irrigated	160	120	80	40	20
Onions	All	100	75	50	25	0
Peanuts	All	100	75	30	0	0
Potatoes	All	240	180	120	60	30
Rye	All	75	50	25	0	0
Safflower	All	50	30	20	0	0
Sorghum – grain	<61 bu/A	40	30	20	0	0
	61 – 80 bu/A	60	40	20	0	0
	81 – 125 bu/A	80	40	20	0	0
	126+ bu/A	100	60	40	20	20
Sorghum – silage	<11 T/A	40	30	20	0	0
	11 – 13 T/A	60	40	20	0	0
	14 – 21 T/A	80	40	20	0	0
	22+ T/A	100	60	40	20	20
Soybeans	All	50	30	20	0	0
Sugar Beets	All	125	100	75	40	0
Sunflower	All	50	30	20	0	0
Wheat – ecofallow	All	100	75	50	25	0
Wheat – continuous	All	75	50	25	0	0
Wheat – fallow	All	75	50	25	0	0

< = Less than    VL = Very Low    L = Low    M = Medium    H = High    VH = Very High

## POTASSIUM FERTILIZER RECOMMENDATIONS

		<u>Soil Potassium (1N ammomium acetate), ppm</u>				
Crop	Yield Goal	0 – 40 (VL)	41 – 80 (L)	81 – 125 (M)	126 – 200 (H)	201+ (VH)
		lbs K <sub>2</sub> O/Acre Recommended				
Alfalfa	<6 T/A	60	40	20	0	0
(established stand)	6 – 7 T/A	120	80	40	20	0
	8+ T/A	160	120	80	40	20
Alfalfa (new seeding)	<6 T/A	120	80	40	20	0
	6 – 7 T/A	240	160	80	40	20
	8+ T/A	300	200	100	60	40
Barley (grain & feed)	All	60	40	20	0	0
Barley (malting)	All	60	50	20	0	0
Beans – dry	All	60	40	20	0	0
Cane	Dryland	60	40	20	0	0
Corn – grain	<101 bu/A	80	50	25	0	0
	101 – 130 bu/A	100	70	40	20	0
	131 – 180 bu/A	140	100	50	25	0
	181 – 225 bu/A	180	120	60	30	0
	226+ bu/A	220	140	75	50	25
Corn – popcorn	All	100	70	45	20	0
Corn – seed	All	100	70	40	20	0
Corn – silage	<15 T/A	80	50	25	0	0
	15 – 19 T/A	100	70	40	20	0
	20 – 26 T/A	140	100	50	25	0
	27 – 32 T/A	180	120	60	30	0
	33+ T/A	220	140	75	50	25
Cotton	All	100	50	25	0	0
Flax	All	80	60	40	20	0
Grass (forage & seed production)	Dryland	40	30	20	0	0
	Irrigated	60	50	40	20	0
Grass (new seeding)	Dryland	80	60	40	0	0
	Irrigated	120	100	80	40	0
Meadow Hay	All	60	40	20	0	0
Millet	All	60	40	20	0	0
Oats	All	60	40	20	0	0
Oats – Alfalfa (nurse crop)	Dryland	120	80	40	20	0
	Irrigated	240	160	80	40	0
Onions	All	120	80	40	20	0
Peanuts	All	200	150	100	50	0
Potatoes	All	160	120	80	40	0
Rye	All	75	50	25	0	0
Safflower	All	60	40	20	0	0
Sorghum – grain	<61 bu/A	40	30	20	0	0
	61 – 80 bu/A	60	50	30	0	0
	81 – 125 bu/A	80	60	40	20	0
	126+ bu/A	100	80	50	25	0
Sorghum – silage	<11 T/A	40	30	20	0	0
	11 – 13 T/A	60	50	30	0	0
	14 – 21 T/A	80	60	40	20	0
	22+ T/A	100	80	50	25	0
Soybeans	All	80	60	40	20	0
Sugar Beets	All	120	80	40	20	0
Sunflower	All	60	40	20	0	0
Wheat – ecofallow	All	60	40	20	0	0
Wheat – continuous	All	60	40	20	0	0
Wheat – fallow	All	60	40	20	0	0

< = Less than    VL = Very Low    L = Low    M = Medium    H = High    VH = Very High

<b>MAGNESIUM FERTILIZER RECOMMENDATIONS</b>						
Crop	Yield Goal	Soil Magnesium (1N ammonium acetate), ppm				
		0 – 25 (VL)	26 – 50 (L)	51 – 150 (M)	151 – 300 (H)	301+ (VH)
All	All	lbs MgO/Acre Recommended				
				25	10	0

### **CALCIUM FERTILIZER RECOMMENDATIONS**

No calcium fertilizer recommendations are made for any crops. Soils that are low in calcium will usually be acidic and will require an application of limestone. The limestone contains sufficient calcium to satisfy crop needs. The following table is used as a guideline for interpretation of calcium tests as determined by the 1N ammonium acetate method.

<u>Soil Calcium, ppm</u>	<u>Level</u>
0 – 750	Low
751 – 1,500	Medium
1,501 – 4,000	High
4,001 +	Very High

### **SODIUM SOIL TESTS**

Sodium is a nonessential element for plant growth. High levels of sodium will have a detrimental effect on soils causing poor aeration and penetration of water and roots. If a soil test exceeds 300 ppm Na, a gypsum requirement test should be determined. The following table is used as a guideline for interpretation of sodium tests.

<u>Soil Sodium, ppm</u>	<u>Level</u>
1 – 100	Low
101 – 300	Medium
301 – 500	High
501+	Very High

## SULFUR FERTILIZER RECOMMENDATIONS

Crop	Yield Goal	Soil OM, %	Soil Sulfur (Ca phosphate extractable), ppm				
			0 – 8	9 – 15	16+	0 – 5	6+
			lbs S/Acre Recommended				
Alfalfa (established stand & new seeding)	<6 T/A	1.3 – 1.5	10	0	0	-	-
		0.7 – 1.2	15	0	0	-	-
		0.1 – 0.6	25	10	0	-	-
	6 – 7 T/A	1.3 – 1.5	20	10	0	-	-
		0.7 – 1.2	30	20	0	-	-
		0.1 – 0.6	40	20	0	-	-
	8+ T/A	1.3 – 1.5	40	20	10	-	-
		0.7 – 1.2	50	30	10	-	-
		0.1 – 0.6	60	40	20	-	-
	Barley (grain, feed, & malting)	<71 bu/A	0.1 – 1.2	-	-	-	0
71+ bu/A		0.1 – 1.2	-	-	-	10	0
Beans – dry	All	0.1 – 1.2	-	-	-	20	0
Cane	Dryland	0.1 – 1.2	-	-	-	10	0
Corn – grain	All	1.3 – 1.5	10	0	0	-	-
		0.7 – 1.2	10	0	0	-	-
		0.7 – 1.2	20	0	0	-	-
		0.7 – 1.2	25	10	0	-	-
		0.7 – 1.2	30	20	0	-	-
		0.7 – 1.2	40	25	10	-	-
		0.1 – 0.6	20	0	0	-	-
		0.1 – 0.6	30	20	0	-	-
		0.1 – 0.6	40	25	0	-	-
		0.1 – 0.6	50	30	0	-	-
Corn – popcorn & seed corn	All	1.3 – 1.5	10	0	0	-	-
		0.7 – 1.2	20	10	0	-	-
		0.1 – 0.6	40	20	0	-	-
		1.3 – 1.5	10	0	0	-	-
		0.7 – 1.2	20	10	0	-	-
		0.1 – 0.6	40	20	0	-	-
		1.3 – 1.5	10	0	0	-	-
		0.7 – 1.2	20	10	0	-	-
		0.1 – 0.6	40	20	0	-	-
		0.1 – 0.6	60	40	20	-	-
Corn – silage	All	1.3 – 1.5	10	0	0	-	-
		0.7 – 1.2	10	0	0	-	-
		0.7 – 1.2	20	0	0	-	-
		0.7 – 1.2	25	10	0	-	-
		0.7 – 1.2	30	20	0	-	-
		0.7 – 1.2	40	25	10	-	-
		0.1 – 0.6	20	0	0	-	-
		0.1 – 0.6	30	20	0	-	-
		0.1 – 0.6	40	25	0	-	-
		0.1 – 0.6	50	30	0	-	-
Cotton	All	0.1 – 1.2	-	-	-	20	0
		0.1 – 1.2	-	-	-	0	0
Grass (forage, seed, & new seed)	Dryland	0.1 – 1.2	20	0	0	-	-
	Irrigated	1.3 – 1.5	15	0	0	-	-
	Irrigated	0.1 – 1.2	30	15	0	-	-
Meadow Hay	All	All	30	20	0	-	-
Millet	<51 bu/A	0.1 – 1.2	-	-	-	0	0
	51+ bu/A	0.1 – 1.2	-	-	-	10	0
Oats	<71 bu/A	0.1 – 1.2	-	-	-	0	0
	71+ bu/A	0.1 – 1.2	-	-	-	10	0
Oats – Alfalfa (nurse crop)	Dryland	0.7 – 1.2	15	0	0	-	-
		0.1 – 0.6	25	10	0	-	-
		0.7 – 1.2	30	10	0	-	-
		0.1 – 0.6	50	20	0	-	-
Onions	All	0.1 – 1.2	-	-	-	20	0
		0.1 – 1.2	-	-	-	20	0
Peanuts	All	0.1 – 1.2	-	-	-	30	20
Rye	<51 bu/A	0.1 – 1.2	-	-	-	0	0
	51+ bu/A	0.1 – 1.2	-	-	-	10	0
Safflower	All	0.1 – 1.2	-	-	-	0	0

## SULFUR FERTILIZER RECOMMENDATIONS

Crop	Yield Goal	Soil OM, %	Soil Sulfur (Ca phosphate extractable), ppm				
			0 – 8	9 – 15	16+	0 – 5	6+
			lbs S/Acre Recommended				
Sorghum – grain	All	1.3 – 1.5	10	0	0	-	-
	<61 bu/A	0.7 – 1.2	10	0	0	-	-
	61 – 80 bu/A	0.7 – 1.2	10	0	0	-	-
	81 – 125 bu/A	0.7 – 1.2	20	10	0	-	-
	126+ bu/A	0.7 – 1.2	25	15	0	-	-
	<61 bu/A	0.1 – 0.6	20	0	0	-	-
	61 – 80 bu/A	0.1 – 0.6	20	10	0	-	-
	81 – 125 bu/A	0.1 – 0.6	30	15	0	-	-
	126+ bu/A	0.1 – 0.6	40	20	0	-	-
Sorghum – silage	All	1.3 – 1.5	10	0	0	-	-
	<11 T/A	0.7 – 1.2	10	0	0	-	-
	11 – 13 T/A	0.7 – 1.2	10	0	0	-	-
	14 – 21 T/A	0.7 – 1.2	20	10	0	-	-
	22+ T/A	0.7 – 1.2	25	15	0	-	-
	<11 T/A	0.1 – 0.6	20	0	0	-	-
	11 – 13 T/A	0.1 – 0.6	20	10	0	-	-
	14 – 21 T/A	0.1 – 0.6	30	15	0	-	-
	22+ T/A	0.1 – 0.6	40	20	0	-	-
Soybeans	All	0.1 – 1.2	-	-	-	20	0
Sugar Beets	All	0.1 – 1.2	-	-	-	20	0
Sunflower	All	0.1 – 1.2	-	-	-	0	0
Wheat – ecofallow	<51 bu/A	0.1 – 1.5	-	-	-	0	0
	51+ bu/A	0.1 – 1.5	-	-	-	10	0
Wheat – continuous	<51 bu/A	0.1 – 1.5	-	-	-	0	0
	51+ bu/A	0.1 – 1.5	-	-	-	10	0
Wheat – fallow	<50 bu/A	0.1 – 1.5	-	-	-	0	0
	51+ bu/A	0.1 – 1.5	-	-	-	10	0

<b>ZINC FERTILIZER RECOMMENDATIONS</b>					
Crop	Yield Goal	Soil Zinc (DTPA), ppm			
		0.1 – 0.5 (L)	0.6 – 1.0 (M)	1.1 – 1.2 (H)	1.3+ (VH)
lbs Zn (as zinc sulfate)/Acre Recommended					
Alfalfa	<6 T/A	3	0	0	0
	6+ T/A	5	0	0	0
Barley (grain & feed)	<71 bu/A	0	0	0	0
	71+ bu/A	3	0	0	0
Barley (malting)	<71 bu/A	0	0	0	0
	71+ bu/A	3	0	0	0
Beans – dry	All	10	5	2	0
Cane	Dryland	3	0	0	0
Corn – grain	<101 bu/A	5	3	0	0
	101 – 130 bu/A	5	3	0	0
	131 – 180 bu/A	10	5	2	0
	181+ bu/A	10	5	2	0
Corn – popcorn	All	5	3	0	0
Corn – seed	All	5	3	0	0
Corn – silage	<15 T/A	5	3	0	0
	15 – 19 T/A	5	3	0	0
	20 – 26 T/A	10	5	2	0
	26+ T/A	10	5	2	0
Cotton	All	5	3	0	0
Flax	All	10	5	2	0
Grass (forage, new seed, seed production)	Dryland	0	0	0	0
	Irrigated	5	0	0	0
Meadow Hay	All	5	3	0	0
Millet	<51 bu/A	0	0	0	0
	51+ bu/A	3	0	0	0
Oats	<71 bu/A	0	0	0	0
	71+ bu/A	3	0	0	0
Oats – Alfalfa (nurse crop)	Dryland	3	0	0	0
	Irrigated	5	0	0	0
Onions	All	10	5	2	0
Peanuts	All	10	5	2	0
Potatoes	All	10	5	2	0
Rye	<51 bu/A	0	0	0	0
	51+ bu/A	3	0	0	0
Safflower	All	3	0	0	0
Sorghum – grain	<61 bu/A	5	3	0	0
	61 – 80 bu/A	5	3	0	0
	81 – 125 bu/A	10	5	2	0
	126+ bu/A	10	5	2	0
Sorghum – silage	<11 T/A	5	3	0	0
	11 – 13 T/A	5	3	0	0
	14 – 21 T/A	10	5	2	0
	22+ T/A	10	5	2	0
Soybeans	All	5	0	0	0
Sugar Beets	All	5	0	0	0
Sunflower	All	3	0	0	0
Wheat – ecofallow	<51 bu/A	5	3	0	0
	51+ bu/A	5	3	0	0
Wheat – continuous	<51 bu/A	0	0	0	0
	51+ bu/A	3	0	0	0
Wheat – fallow	<51 bu/A	0	0	0	0
	51+ bu/A	3	0	0	0

< = Less than    VL = Very Low    L = Low    M = Medium    H = High    VH = Very High

## IRON FERTILIZER RECOMMENDATIONS

Iron deficiency is most common in calcareous soils with a high pH (greater than 8.0). Iron responsive crops are field beans, sorghum (grain and forage), soybeans, cane, corn, and potatoes. Most other crops usually do not respond to iron fertilizer applications. The following guidelines are used in the interpretation of the iron soil test (DTPA method) for iron-responsive crops.

Soil Iron, ppm	Level	Recommendation
0.1 – 5.0	Low	*
5.1 – 10.0	Medium	0
10.1 – 40.0	High	0
41.0+	Very High	0

\*Correction of iron deficiency is difficult in growing crops. If possible, plant varieties tolerant to iron deficiency. In addition, application of dry ferrous sulfate fertilizer with the seed at planting time has resulted in increased crop yields under certain conditions. Including a chelated iron fertilizer in starter fertilizers will occasionally correct iron deficiencies. Crop responses to foliar applications of iron solutions commonly do not result in correcting the problem.

An application of manure at a rate of 20 to 30 T/A annually to calcareous spots in the field may correct the deficiency.

For further information concerning the correction of iron deficiency, please contact the laboratory.

## MANGANESE FERTILIZER RECOMMENDATIONS

Crop yield response to an application of manganese fertilizer in the Great Plains region is unlikely except for oats and soybeans. Manganese deficiency may occur in these crops if grown in a calcareous soil with a low manganese soil test. Manganese toxicities have been noted in soils with a low pH (less than 5.0). The following table is used as a guideline for the interpretation of manganese soil tests as determined by the DTPA method.

Crop	Soil Manganese, ppm	Level	Manganese Recommendation, lbs Mn/A (as manganese sulfate)
Oats, Soybeans, Turf	0.0 – 1.0	Low	5
All other crops	0.0 – 1.0	Low	0
All crops	1.1 – 5.0	Medium	0
All crops	5.1 – 10.0	High	0
All crops	10.1+	Very High	0

## COPPER FERTILIZER RECOMMENDATIONS

Crop yield response to an application of copper fertilizer in the Great Plains region is unlikely. The greatest probability of a copper response would be in extremely sandy soils, highly calcareous soils (pH 8.0 or greater), or organic soils. Under these soil conditions, the copper soil test would probably be in the low range before a response would occur. Copper toxicities have been noted on some crops if the soil test is in the very high range. The following table is used as a guideline for the interpretation of copper soil tests as determined by the DTPA method.

Soil Copper, ppm	Level	Copper Recommendation
0.0 – 0.2	Low	0
0.3 – 0.6	Medium	0
0.7 – 1.0	High	0
1.1+	Very High	0

## BORON FERTILIZER RECOMMENDATIONS

Crop yield response to an application of boron fertilizer is unlikely in most soils. Alfalfa and sugar beets are crops that may respond to boron fertilization when the soil test is low. Other crops, such as dry beans, small grains, sorghum, and corn usually do not respond to boron. Because of the low tolerance of some crops to excess boron, application of boron should be used with caution, especially in crop rotations such as alfalfa-corn-soybeans. The following table can be used for the interpretation of boron soil tests as determined by the hot water extractable method.

Crop	Soil Boron, ppm	Level	Boron Recommendation, lbs B/A
Alfalfa, sugar beets	0.0 – 0.2	Low	1
All other crops	0.0 – 0.2	Low	0
All crops	0.3 – 0.8	Medium	0
All crops	0.8 – 1.5	High	0
All crops	1.6+	Very High	0

## CHLORIDE FERTILIZER RECOMMENDATIONS

Wheat:

lbs Cl/A recommended = 60 - chloride soil test to 24 inches, lbs/A

or

lbs Cl/A recommended = 40 - chloride soil test for surface sample, lbs/A

Research has indicated that crops other than wheat do not generally respond to applications of chloride fertilizer.

## SALINE-SODIC TEST

If a saline and/or sodic (high sodium) soil condition is suspected, a saline-sodic soil test should be performed. This test includes soil pH, Excess Lime, Electrical Conductivity (soluble salts), Sodium Adsorption Ratio/Estimated Sodium Percentage (SAR/ESP), and gypsum requirement. The interpretation of these test results is as follows:

1. Soluble Salts: See table for crop tolerance to soluble salts.
2. SAR/ESP: If the ESP value is 8 or greater, an adverse soil condition caused by high sodium levels may exist. High sodium levels may have a direct toxic effect on the crop. In addition, water infiltration, water drainage, and root penetration in the soil will be restricted. To determine the amount of gypsum necessary to reclaim a sodic soil, a gypsum requirement test is determined on all samples with an ESP greater than 8. Elemental sulfur can be used to reclaim sodic soils if the soil contains Excess Lime. The rate of elemental sulfur to use is calculated by the following equation:

$$\text{Elemental Sulfur}(100\% \text{ S}), \text{ lbs/A} = \text{Gypsum Requirement, T/A} \times 380$$

Crops have varying degrees of tolerance to high sodium levels. Beans are very sensitive and sugar beets are tolerant. Contact the lab for information concerning the sodium tolerance of specific crops.

3. Boron: Use the guidelines below for interpretation of boron (hot water extractable) in soils on the tolerance of crops to boron toxicity.

<b>RELATIVE TOLERANCE OF CROPS TO BORON</b>		
<b>Tolerance Decreases in Descending Order from Top to Bottom</b>		
Boron Level, ppm	Sensitivity	Crop
8.0	Tolerant	Sugar Beets
4.0	Semi-tolerant	Alfalfa
		Sunflower
		Potato
		Cotton
		Barley
		Wheat
		Corn
2.0	Sensitive	Sorghum
		Oat
		Dry Beans

<b>INTERPRETATION OF SOLUBLE SALTS</b>						
Crop	<u>Electrical Conductivity, mmhos/em (1)</u>					
	Very Low	Low	Medium	High	Very High	Maximum (2)
Alfalfa	<2.0	2.0 – 3.4	3.5 – 5.4	5.5 – 8.8	8.9+	15.0
Barley (3)	<8.0	8.0 – 10.0	10.1 – 13.0	13.1 – 18.01	18.1+	28.0
Beans – dry	<1.0	1.0 – 1.5	1.6 – 2.3	2.4 – 3.6	3.7+	6.5
Cane	<4.0	4.0 – 5.1	5.2 – 7.2	7.3 – 11.0	11.1+	18.0
Corn	<1.7	1.7 – 2.5	2.6 – 3.8	3.9 – 5.9	6.0+	10.0
Cotton	<7.7	7.7 – 9.6	9.7 – 13.0	13.1 – 17.0	17.1+	27.0
Flax	<1.7	1.7 – 2.5	2.6 – 3.8	3.9 – 5.9	6.0+	10.0
Grass	Depends on individual species					
Millet	<6.0	6.0 – 7.4	7.5 – 9.5	9.6 – 13.0	13.1+	20.0
Oats	<6.0	6.0 – 7.4	7.5 – 9.5	9.6 – 13.0	13.1+	20.0
Oats – Alfalfa	<2.0	2.0 – 3.4	3.5 – 5.4	5.5 – 8.8	8.9+	15.5
Onions	<1.2	1.2 – 1.8	1.9 – 2.8	2.9 – 4.3	4.4+	7.4
Peanuts	<3.2	3.2 – 3.5	3.6 – 4.1	4.2 – 4.9	5.0+	6.5
Potatoes	<1.7	1.7 – 2.5	2.6 – 3.8	3.9 – 5.9	6.0+	10.0
Sorghum	<4.0	4.0 – 5.1	5.2 – 7.2	7.3 – 11.0	11.1+	18.0
Soybeans	<5.0	5.0 – 5.5	5.6 – 6.2	6.3 – 7.5	7.6+	10.0
Sugar Beets (4)	<7.0	7.0 – 8.7	8.8 – 11.0	11.1 – 15.0	15.1+	24.0
Sunflower		<4.1	4.1 – 6.0	6.1 – 8.0	8.1+	13.0
Turf	Depends on individual species					
Rye	<6.0	6.0 – 7.4	7.5 – 9.5	9.6 – 13.0	13.1+	20.0
Wheat (3)	<6.0	6.0 – 7.4	7.5 – 9.5	9.6 – 13.0	13.1+	20.0

1.

<u>Level</u>	<u>Expected Yield Reduction, %</u>
Very Low	0
Low	0 – 10
Medium	10 – 25
High	25 – 50
Very High	50 – 100

- The maximum Electrical Conductivity is the value at which the crop growth ceases.
- Barley and wheat are less tolerant during germination and seedling stages. The Electrical Conductivity should not exceed 4 or 5 mmhos/cm at these stages of growth.
- Sugar beets are sensitive during germination. The Electrical Conductivity should not exceed 3 mmhos/cm during germination.

## LIMESTONE RECOMMENDATIONS

Alfalfa (established stand and new seeding) and soybeans:

1. If soil pH = 6.0 or above, no limestone is recommended.
2. If soil pH = 5.9 or less, use the following table:

<u>Buffer pH (Woodruff)</u>	<u>Limestone (60% ECCE) Recommendation, T/A</u>
7.0	0.0
6.9	0.5
6.8	1.0
6.7	1.5
6.6	2.0
6.5	2.5
6.4	3.0
6.3	3.5
6.2	4.0
6.1	4.5
6.0	5.0

All crops except alfalfa and soybeans:

1. If soil pH = 5.3 or greater, no lime is recommended.
2. If soil pH = 5.2 or less, use the following table:

<u>Buffer pH (Woodruff)</u>	<u>Limestone (60% ECCE) Recommendation Tons/acre</u>
7.0	0.0
6.9	0.5
6.8	1.0
6.7	1.5
6.6	2.0
6.5	2.5
6.4	3.0
6.3	3.5
6.2	4.0
6.1	4.5
6.0	5.0

Freight costs for limestone can be very high, depending on the distance that the material has to be transported. The laboratory encourages that producers use strip trials to determine the effectiveness of the limestone on crop production. Irrigated, sandy soils that have been continuously cropped to corn for 25 or more years may have a pH less than 6.0. The pH of these soils should be monitored closely to determine the future effects of the acid soil on crop production.

## LAWN FERTILIZER RECOMMENDATIONS

Nitrogen	High Maintenance	General Lawn
	Lawn	
All Test Levels	6 lbs N/1,000 ft <sup>2</sup>	4 lbs N/1,000 ft <sup>2</sup>

### Phosphorus

Level	PPM	PPM		
	Bray P1	Bicarbonate P		
VL	0 – 5	0 – 4	4 lbs P <sub>2</sub> O <sub>5</sub> /1,000 ft <sup>2</sup>	3 lbs P <sub>2</sub> O <sub>5</sub> /1,000 ft <sup>2</sup>
L	6 – 15	5 – 11	3 lbs P <sub>2</sub> O <sub>5</sub> /1,000 ft <sup>2</sup>	2 lbs P <sub>2</sub> O <sub>5</sub> /1,000 ft <sup>2</sup>
M	16 – 25	12 – 18	2 lbs P <sub>2</sub> O <sub>5</sub> /1,000 ft <sup>2</sup>	1 lb P <sub>2</sub> O <sub>5</sub> /1,000 ft <sup>2</sup>
H	26+	19+	1 lb P <sub>2</sub> O <sub>5</sub> /1,000 ft <sup>2</sup>	0 lbs P <sub>2</sub> O <sub>5</sub> /1,000 ft <sup>2</sup>

### Potassium

Level	PPM		
	Exchangeable K		
VL	0 – 40	4 lbs K <sub>2</sub> O/1,000 ft <sup>2</sup>	3 lbs K <sub>2</sub> O/1,000 ft <sup>2</sup>
L	41 – 80	3 lbs K <sub>2</sub> O/1,000 ft <sup>2</sup>	2 lbs K <sub>2</sub> O/1,000 ft <sup>2</sup>
M	81 – 125	2 lbs K <sub>2</sub> O/1,000 ft <sup>2</sup>	1 lb K <sub>2</sub> O/1,000 ft <sup>2</sup>
H	126+	1 lb K <sub>2</sub> O/1,000 ft <sup>2</sup>	0 lbs K <sub>2</sub> O/1,000 ft <sup>2</sup>

### Sulfur

All Test Levels	1 lb S/1,000 ft <sup>2</sup>	0.5 lb S/1,000 ft <sup>2</sup>
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### Zinc

Level	PPM		
	DTPA Zn		
L	0.0 – 0.5	0.5 lb Zn/1,000 ft <sup>2</sup>	0 lbs Zn/1,000 ft <sup>2</sup>
H	0.6+	0 lbs Zn/1,000 ft <sup>2</sup>	0 lbs Zn/1,000 ft <sup>2</sup>

### Iron

Level	PPM		
	DTPA Fe		
L	0.0 – 15.0	(see below)	(see below)
H	15.1+	0	0

VL = Very Low

L = Low

M = Medium

H = High

### Comments:

1. Lawns generally do not respond to applications of calcium, magnesium, manganese, copper, boron, and chloride fertilizer.
2. Iron fertilizer can be applied as broadcast or foliar treatments. Iron deficiency is difficult to correct, especially in soils that have a pH of 7.5 or greater. In these situations, several applications may be required during the growing season.
3. Fertilizers should be applied to lawns as split applications as follows:
  - a. Nitrogen and sulfur: 1/3 early spring, 1/3 early summer, 1/3 fall
  - b. Phosphorus, Potassium, and Zinc: 1/2 early spring, 1/2 fall
  - c. Iron: Apply at regular intervals throughout growing period