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Fertilizer Guideline

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Much of the contained information is from the "WARDguide"

NITROGEN .... (N)

Estimated amounts of Nitrogen available from past legume plants:

Alfalfa .. good stand .. 100 pounds of "N" per acre	**Soybeans .. 40 pounds of "N" per acre**
Alfalfa .. average stand .. 50 pounds of "N" per acre	**Other Beans .. 25 pounds of "N" per acre**
Alfalfa .. poor stand .. 0 pounds of "N" per acre	**Clovers .. 75 pounds of "N" per acre**

Estimated amount of Nitrogen available from manure application:

Beef Feedlot .. 5 pounds of "N" per ton	**Swine .. 8 pounds of "N" per ton**
Dairy .. 8 pounds of "N" per ton	**Slurry .. 17 pounds of "N" per 1000 gallons**
Poultry .. 15 pounds of "N" per ton	

Figuring Nitrogen need for corn:

Factors to consider when figuring Nitrogen need for corn:

- Corn nitrogen need (factor) is **1.33** pounds of "N" per bushel goal. **
- Subsoil factor **0.3**
- **Surface-soil ppm** (parts per million) .. Surface soil depth is usually to 8 inches.
- **Sub-soil depth ppm** .. Usually up to 3 foot depth. Note if sub-soil ppm is unknown, as a rule of thumb use 5 ppm for fine textured soils and 2 ppm for sandy soils.
- Nitrogen that may be available from other sources after soil test was taken such as manure or other crop grown.

- The nitrogen requirement for corn is figured by (1) multiplying the **crop yield goal** by nitrogen requirement, **1.33 ****.
- Calculate the amount of Nitrogen available in the surface-soil by multiplying the **ppm** from the soil test by both the subsoil factor (**0.3**), and the **soil depth** in inches at which the soil samples were taken.
- Calculate the Nitrogen available in the sub-soil by multiplying the **ppm** from your soil test, (or use the 5 ppm or 2 ppm factors mentioned above if no sub-soil test was made) by both the subsoil factor (**0.3**) and the soil depth in inches at which the sub-soil test was taken.
- Nitrogen need is then calculated by taking the corn Nitrogen requirement figure and

  subtracting the Nitrogen available in the surface-soil, and
  subtracting the Nitrogen available in the sub-soil, and also
  subtracting the Nitrogen available in the soil from other crops or manure applications.

  ** (NOTE: Some researchers feel if adequate nitrogen carryover is in the first three feet of soil, then .8# of added N is the figure to use for each bushel of your yield goal)

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PHOSPHORUS .... (P2O5)

Each soil test range is an estimate of "sufficiency". Sufficiency is the range of possible yield as determined by the ppm level. The percent sufficiency ranges for phosphorus soil tests are as follows:

Soil Test, Phosphorus ppm	% Sufficiency (% of expected standard yield
0 - 5 ppm	25% - 50% of standard yield could be expected
6 - 12 ppm	45% - 80% of standard yield could be expected
13 - 25 ppm	70% - 95% of standard yield could be expected
26 - 50 ppm	90% - 100% of standard yield could be expected
51+ ppm	100% of standard yield could be expected

	Soil Phosphorus Level, ppm						P205 rate: +/- adjust
CROP	0 - 5 ppm	6 - 12 ppm	13 - 25 ppm	26 - 50 ppm	51+ ppm	Standard yield level	for other yields.
	Pounds of P2O5 needed to add to bring up to standard yield level						
Irr. Corn	70 - 100	45 - 60	25 - 40	0 - 20	0	120 bu	2 lb / 10 bu
Dryl. Corn	65 - 90	40 - 50	20 - 35	0 - 20	0	95 bu	2 lb / 10 bu
Corn Silage	70 - 100	45 - 65	25 - 45	0 - 20	0	12 ton	1.5 lb / ton
Soybean	50 - 70	35 - 45	20 - 30	0 - 15	0	35 bu	5 lb / 10 bu
Irr. Milo	60 - 80	40 - 55	15 - 35	0 - 20	0	100 bu	2 lb / 10 bu
Dryl. Milo	55 - 70	35 - 50	15 - 30	0 - 15	0	75 bu	2 lb / 10 bu
New Alfalfa	90 - 120	60 - 85	30 - 55	0 - 25	0	3 ton	5 lb / ton
Est. Alfalfa	90 - 120	60 - 85	30 - 55	0 - 25	0	4 ton	5 lb / ton

Estimated amount of Phosphorus available from manure application:

Manure ..... Pounds of P2O5	*Manure ..... Pounds of P2O5*
Beef Feedlot .. 4 pounds / ton	Swine .. 5 pounds / ton
Dairy .. 4 pounds / ton	Slurry .. 13 pounds per 1000 gallons
Poultry .. 15 pounds / ton	

POTASSIUM .... (K2O)

Each soil test range is an estimate of "sufficiency". Sufficiency is the range of possible yield as determined by the ppm level. The percent sufficiency ranges for potassium soil tests are as follows:

Soil Test, Potassium ppm	% Sufficiency (% of expected standard yield
0 - 40 ppm	20% - 50% of standard yield could be expected
41 - 80 ppm	45% - 80% of standard yield could be expected
81 - 120 ppm	70% - 95% of standard yield could be expected
121 - 200 ppm	90% - 100% of standard yield could be expected
200+ ppm	100% of standard yield could be expected

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Estimated amount of Phosphorus available from manure application:

Manure ……. Pounds of P2O5	*Manure ……. Pounds of P2O5*
Beef Feedlot .. 10 pounds / ton	Swine .. 12 pounds / ton
Dairy .. 12 pounds / ton	Slurry .. 34 pounds per 1000 gallons
Poultry .. 15 pounds / ton	

	Soil Potassium (K2O) Level, ppm						K20 rate: +/- adjust
CROP	0 - 40 ppm	41 - 80 ppm	81 - 120 ppm	121 up to 200 ppm	200 + ppm	Standard yield level	for other yields.
	Pounds of K2O needed to add to bring up to standard yield level						
Irr. Corn1	105 - 180	60 - 100	35 - 55	15 - 30	0	120 bu	5 lb / 20 bu
Dryl. Corn	100 - 175	55 - 95	30 - 50	0 - 25	0	95 bu	5 lb / 20 bu
Corn Silage	135 - 220	80 - 130	50 - 70	30 - 45	0	12 ton	2 lb / ton
Soybean	90 - 145	55 - 85	30 - 50	0 - 25	0	40 bu	6 lb / 10 bu
Irr. Milo	75 - 120	50 - 70	30 - 45	15 - 30	0	100 bu	5 lb / 20 bu
Dryl. Milo	70 - 115	45 - 65	25 - 40	0 - 20	0	75 bu	5 lb / 20 bu
New Alfalfa	130 - 210	80 - 125	45 - 75	25 - 40	0	3 ton	6 lb / ton
Est. Alfalfa	130 - 210	80 - 125	45 - 75	25 - 40	0	4 ton	6 lb / ton

SULFUR (SO4)

- Research has found that organic matter is a good supplier of sulfate-sulfur. It is estimated that approximately three pounds of sulfate-sulfur is released annually from each percent organic matter.
- Irrigation water is also an important source of sulfate-sulfur. Irrigation water should be considered a possible source of Sulfur. Sulfur fertilizer generally does not produce a yield increase on any soil when the irrigation water contains more that 8ppm SO4-S. The possible exception to this is sandy soils.

	Soil Sulfur Level, ppm						rate: +/- adjust
CROP	0 - 2 ppm	3 - 4 ppm	5 - 7 ppm	8 - 12 ppm	13+ ppm	Standard yield level	for other yields.
	Pounds of P2O5 needed to add to bring up to standard yield level						
Irr. Corn	18 - 24	11 - 16	0 - 9	0	0	150 bu	
Dryl. Corn	8 - 15	0 - 7	0	0	0	95 bu	
Corn Silage	18 - 24	11 - 16	0 - 9	0	0	20 ton	
Soybean	12 - 17	5 - 10	0	0	0	40 bu	
Irr. Milo	16 - 21	9 - 14	0 - 7	0	0	140 bu	
Dryl. Milo	4 - 9	0	0	0	0	75 bu	
New Alfalfa	22 - 27	14 - 19	6 - 11	0	0	5 ton	
Est. Alfalfa	35 - 40	27 - 32	17 - 22	0 - 14	0	7 ton	

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ZINC (Zn)

- Some crops are more responsive to Zinc than others.
- Zinc is an immobile plant nutrient; therefore it should be incorporated into the soil.

	Soil Zinc Level, ppm						rate: +/- adjust
CROP	0 - .25 ppm	.26 - .50 ppm	.51 - 1.00 ppm	1.01+ ppm		Standard yield level	for other yields.
	Pounds of Zinc needed to add to bring up to standard yield level						
Irr. Corn	8 - 10	6 - 8	1 - 5	0			
Dryl. Corn	8 - 10	6 - 8	1 - 5	0			
Corn Silage	8 - 10	6 - 8	1 - 5	0			
Soybean	8 - 10	6 - 8	1 - 5	0			
Irr. Milo	8 - 10	6 - 8	1 - 5	0			
Dryl. Milo	5 - 7	3 - 5	0 - 2	0			
New Alfalfa	1 - 3	0	0	0			
Est. Alfalfa	1 - 3	0	0	0			

IRON

Iron Soil Test, ppm	Rating	Comments
0 - 2.5 ppm	Low	Many crops show Iron Chlorosis
2.6 ppm - 4.5 ppm	Medium	Iron sensitive crops such as milo show Chlorosis
4.6 ppm - 10.0 ppm	High	Lawns may show Iron Chlorosis
10.1+ ppm	Very High	Iron is adequate for all crops

Low Iron soils are ones that usually have a high pH, low organic matter and excess lime. Application of Ferrous (iron) Sulfate or iron chelate may help to correct this problem. Treatment methods include iron compound additions to the starter fertilizer or foliar application.

LIME

- Lime is applied to the soil to reduce acidity. Soil acidity is determined by soil pH, the lower the pH number is, the more a soil may need to be limed.
- Soils higher in clay and organic matter will require higher amounts of lime.
- Lime applications are used to neutralize low pH soils, or move the soil pH factor up to 6.5 / 7.0.
- Two factors affect the neutralizing value of lime. One is calcium carbonate equivalence (CCE) which is the purity or percent calcium carbonate. The other is the fineness of the grind. Limestone ground to pass through a 60-mesh screen is considered 100% effective and limestone that passes through a 8-mess screen is 50% effective.
- The rate of application is determined by dividing the suggested EEC rate per acre by the percent EEC of the lime being applied. The equation is:

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Ag Lime Application

(ECC/Acre Recommended) / (% ECC of Ag Lime X 100

- Lime should be applied well enough in advance of planting to insure adequate incorporation.
- The suggested rates of lime are based on neutralizing 8 inches of soil.
- Research in some states indicates the top 2 inches of soil may become very acid after the use of reduced tillage. In some cases, the application of ¼ the lime amount recommended could be applied every two years to maintain the desirable range.

Crop pH ranges:

CROP	DESIRED Ph range
Irr. Corn	5.7 - 8.3 pH
Dryl. Corn	5.7 - 8.3pH
Corn Silage	5.7 - 8.3 pH
Soybeans	6.1 - 8.3 pH
Irr. Milo	5.7 - 8.0 pH
Dryl. Milo	5.7 - 8.0 pH
New Alfalfa	6.1 - 8.3 pH
Estalished Alfalfa	6.1 - 8.3 pH

When soil pH is less then the desired range, the grower should consider liming. (Irrigators should be aware of the calcium and magnesium content of their irrigation water. Many times there is enough "lime" in the water to compensate for the lime need.

Buffer pH	Tons of EEC* per acre	Tons of Ag Lime at 60% EEC
7.0	0.4	0.7
6.9	0.4	0.7
6.8	0.9	1.5
6.7	1.4	2.3
6.6	1.8	3.0
6.5	2.3	3.8
6.4	2.7	4.5
6.3	3.2	5.3
6.2	3.6	6.0
6.1	4.1	6.8
6.0	4.5	7.5

*** This amount will bring the soil pH to 6.5**