Soil Test Interpretations and Fertilizer Recommendations in Kansas

K·STATE
Research and Extension

Kansas State University Agricaltural Experiment Station and Cooperative Extension Service

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The following abbreviations are used in this publication.

B = Boron
Bu = Bushel
Cl = Chlorine
CSTV = Critical Soil Test Value
Cu = Copper
DTPA = Diethylene-triaminepentaacetic acid
ECC = Effective Calcium Carbonate
Fe = Iron
K = Potassium
Mn = Manganese
Mo = Molybdenum
N = Nitrogen
P = Phosphorus
ppm = Parts per million
S = Sulfur
Zn = Zinc

Development of sound nutrient management programs involves understanding a wide range of information. Soil test records are an important piece of that information, but other factors, such as soil moisture conditions, land ownership/tenure, crop and cropping sequence, pest management, cultural practices, environmental issues, and other management items are vital for developing sound nutrient management programs. It is beyond the scope of this publication to detail the ramifications of all these factors, but they should not be overlooked when finalizing nutrient application programs.

The following tables, equations, and accompanying information are the most recent soil test interpretations for major crops for the most commonly deficient plant nutrients in Kansas. These interpretations are valid for interpreting soil test values from the KSU Soil Testing Laboratory and other laboratories using the same soil testing procedures.

Expected Yield

Suggested recommended application rates are tied to expected yields for several nutrients. Yield records should be used to set an individual and realistic, but progressive, expected yield for each field. An appropriate expected yield for a specific field should be high enough to take advantage of high production years when they occur, but not so high as to jeopardize environmental stewardship and/or profitability when environmental conditions are not favorable. Appropriate expected yield should be about 105% of the average yield obtained in a field over the past three to five years.

Soil Sampling Depth

Interpretations for the nitrate-N, sulfate-S and chloride-Cl soil tests are based on a 0- to 24-inch soil profile sampling depth. All other nutrient interpretations are based on surface soil samples collected to a depth of 0 to 6 inches. Collect a sample from the 0- to 24-inch depth for nitrogen (N), sulfur (S) and chlorine (Cl) recommendations and a separate 0- to 6-inch sample for pH, phosphorus (P), potassium (K), zinc (Zn), iron (Fe), and boron (B) soil test determinations.

For lime, the recommended lime rate should be adjusted to reflect the depth of lime incorporation, while no-till and perennial crops should assume a depth of 2 inches.

Appropriate Soil Test Procedures

These soil test interpretations are based on the following soil test procedures: All tests referred to in this publication are among the tests recommended for the North Central Region by the NCERA-13 Regional Committee on Soil Testing and Plant Analysis. These are described in the North Central Regional Publication 221 (Revised 2012) *Recommended Chemical Soil Test Procedures for the North Central Regio*n.

Soil pH: 1:1 Water pH

Buffer pH*:* Sikora Buffer (determines lime requirement)

Nitrogen: Available Nitrate-N

Phosphorus:

- Mehlich 3 Extractable P (Colorimetric)
- Bray P1 Extractable P
- Olsen P – multiply by 1.6 and interpret similarly to Mehlich 3 Colorimetric

Potassium: Mehlich 3 Extractable or Ammonium Acetate Extractable

Zinc, Iron and Boron: DTPA Extractable

Sulfur: Calcium Phosphate Extractable Sulfate

Chloride: Mercury (II) Thiocyanate Extractable (Colorimetric)

Soil pH and Liming Interpretations

The Sikora buffer pH is determined and used for lime rate calculations in acidic soils. Options are provided for liming to various target pHs and information is provided for various areas of the state to aid in selection of an appropriate target pH, based on subsoil acidity and crops to be grown.

Phosphorus and Potassium Interpretations

Kansas State University phosphorus and potassium recommendations provide two main options for producers, depending on circumstances for specific producers, fields and situations.

'Sufficiency' fertility programs are intended to estimate the long-term fertilizer phosphorus or potassium required to provide optimum economic return in the year of nutrient application while achieving about 90 to 95% of maximum yield. In some years, greater amounts of nutrient are required for optimum yield and economic return, while in other years less than recommended amounts of nutrient would suffice. There is little consideration of future soil test values, and soil test values will likely stabilize in the 'low' (i.e., deficient) sufficiency range.

"Build-maintenance" recommendations are intended to apply enough phosphorus or potassium to build soil test range to a target soil test value over a planned time frame (typically four to eight years) and then maintain soil test values in a target range in future years. If the soil test is within the target range, then recommended nutrient application rates are equal to crop removal. If soil test values exceed the target range, no phosphorus or potassium is recommended with the exception of low starter applied rates, if desired. Build-maintenance fertility programs are not intended to provide optimum economic returns in a given year, but rather attempt to minimize the probability of phosphorus or potassium limiting crop yields while providing for near maximum yield potential. The nutrient concentrations per unit of yield for various agronomic crops are presented in Table 1, which can be used in conjunction with yield data to calculate the total crop removal over a period of time.

Table 1. Phosphorus and Potassium Crop Removal Values

Crop	Unit of yield	Moisture for yield basis	P_2O_5	K_2O
Alfalfa & Clover	Ton	15%	12	60
Bermudagrass	Ton	15%	12	40
Bromegrass	Ton	15%	12	40
Fescue, tall	Ton	15%	12	40
Corn	Bushel	15.5%	0.33	0.26
Corn silage	Ton	65%	3.20	8.70
Grain sorghum	Bushel	15.5%	0.40	0.26
Sorghum silage	Ton	65%	3.20	8.70
Wheat	Bushel	13.5%	0.50	0.30
Sunflowers	Pound	10%	0.015	0.006
Oats	Bushel	14%	0.25	0.20
Soybeans	Bushel	13%	0.80	1.40
Native grass	Ton	15%	5.40	30

Secondary/Micronutrient Interpretations

The KSU Soil Testing Lab offers soil tests and interpretations for sulfur, zinc, chloride, iron, and boron. Detailed information is provided for interpreting soil test values for these nutrients and for recommending rates of application if they are deficient. To date in Kansas, we have not documented deficiencies of manganese (Mn), copper (Cu), or molybdenum (Mo) and do not offer interpretations for these micronutrients.

Nitrogen Recommendations

The nitrogen requirement for a specific crop and expected yield is adjusted by considering many field specific factors. The K-State nitrogen recommendation guidelines for all crops are directly adjusted for soil organic matter content. Twenty pounds of available nitrogen per acre is expected to be mineralized during the crop year for each 1.0% soil organic matter in the surface 6 inches for warm season crops (e.g., corn, grain sorghum), while 10 pounds nitrogen per acre is expected to be mineralized for each 1.0% soil organic matter for cool season crops (e.g., wheat). In addition, the previous crop, residual profile nitrogen, manure applications, irrigation water nitrogen content, grazing nitrogen removal and the tillage system used are additional factors used to refine suggested nitrogen application rates for specific crop situations. Detailed information for major crops is provided. Since nitrate (NO_3^--N) is mobile, we encourage use of a 0- to 24-inch soil sample to assess the profile nitrogen content (also for sulfate and chloride as they are mobile in soils as well).

How and when nitrogen is applied can have a dramatic effect on how efficiently it will be used by the crop. For example, using delayed or split nitrogen applications on irrigated fields, particularly on sandy soils, often improves nitrogen use efficiency by reducing the potential for loss. Also, for high residue systems such as no-till, placing fertilizer nitrogen below the residue or dribbling nitrogen solution in concentrated bands on the soil surface offers the potential for improved nitrogen use efficiency for summer crops. Many factors other than application rate influence nitrogen use efficiency and should be considered when developing the overall nutrient management plan. The Kansas State University nitrogen recommendation guidelines offer efficiency factor adjustments based on crop and fertilizer management.

Nitrogen Rate Recommendation Adjustments

Cool Season Crops

Soil Organic Matter (SOM) Adjustment		
lb N/a Adjustment = % SOM × 10		
Manure N		
Inorganic N	100%	of Manure Worksheet value*
Organic N	50%	of Manure Worksheet value*
Profile N Test (2 foot sampling depth, if possible)		
Default	30	lb N/a if Profile N Sample Not Collected
lb N/a = 0.3 × Sampling Depth (inches) × ppm Profile Nitrate-N		
Tillage Adjustment		
Conventional Tillage	0	lb N/a
No-Tillage	+ 20	lb N/a
Grazing Adjustment		
40 lb N per 100 lb beef weight gain per acre		
Previous Crop Adjustment		
Corn, Wheat	0	lb N/a
Sorghum, Sunflowers	+ 30	lb N/a
Soybeans	0	lb N/a
Fallow		
Without Profile N Test	- 20	lb N/a
With Profile N Test	0	lb N/a
With Stand Destruction Tillage, for no-till production reduce N credit adjustment by 50%		
Alfalfa		
Excellent Stand (> 5 plants/ft^2)	- 60	lb N/a
Good Stand (2 – 5 plants/ft^2)	- 40	lb N/a
Fair Stand (1 – 2 plants/ft^2)	- 20	lb N/a
Poor Stand (< 1 plant/ft^2)	0	lb N/a
Red Clover		
Excellent Stand	- 40	lb N/a
Good Stand	- 20	lb N/a
Poor Stand	0	lb N/a
Sweet Clover		
Excellent Stand	- 55	lb N/a
Good Stand	- 30	lb N/a
Poor Stand	0	lb N/a

**Estimating Manure Nutrient Availability*, MF2562

Nitrogen Rate Recommendation Adjustments

Warm Season Crops

Soil Organic Matter (SOM) Adjustment		
lb N/a Adjustment = % SOM × 20		
Manure N		
Inorganic N	100%	of Manure Worksheet value*
Organic N	100%	of Manure Worksheet value*
Profile N Test (2 foot sampling depth , if possible)		
Default	30	lb N/a if Profile N Sample Not Collected
lb N/a = 0.3 × Sampling Depth (inches) × ppm Profile Nitrate-N		
Irrigation Water Nitrate N		
lb N/a = ppm Nitrate-N in Water × 0.226 × Inches Irrigation Water Applied		
Previous Crop Adjustment		
Corn, Wheat	0	lb N/a
Sorghum, Sunflowers	0	lb N/a
Soybeans	- 40	lb N/a
Fallow		
Without Profile N Test	- 20	lb N/a
With Profile N Test	0	lb N/a
With Stand Destruction Tillage, for no-till production reduce N credit adjustment by 50%		
Alfalfa		
Excellent Stand (> 5 plants/ft^2)	- 120	lb N/a
Good Stand (2 – 5 plants/ft^2)	- 80	lb N/a
Fair Stand (12 – 2 plants/ft^2)	- 40	lb N/a
Poor Stand (< 1 plant/ft^2)	0	lb N/a
Red Clover		
Excellent Stand	- 80	lb N/a
Good Stand	- 40	lb N/a
Poor Stand	0	lb N/a
Sweet Clover		
Excellent Stand	- 110	lb N/a
Good Stand	- 60	lb N/a
Poor Stand	0	lb N/a

**Estimating Manure Nutrient Availability*, MF2562

Corn

N (lb/a) = (ie/fe) EY – (se) Profile N – (% SOM × 20) – Manure N – Other N Adjustments + Previous Crop Adjustments

ie (corn internal efficiency) lbs/bu		
Irrigated	0.84	
Non-Irrigated	0.88	

fe (fertilizer recovery efficiency)		
High efficiency	0.65	Injected or split applied
Default	0.55	Broadcast, fall-applied pre-plant

se ("soil" NO_3 efficiency)		
Low risk for N loss	1.0	Medium texture or western KS
High risk for N loss	0.7	Coarse texture or eastern KS

Efficiency factors:

ie: internal crop efficiency

fe: fertilizer efficiency

se: soil nitrate-N efficiency

EY: expected yield (bu/a)

Profile N: profile NO_3 (lb/a)

SOM: soil organic matter (×20 for summer crops) lb N/a

Previous crop adjustment: lb/a (see pages 3 and 4)

- Maximum fertilizer N recommendations are 230 lb N/a for dryland corn production and 300 lb N/a for irrigated corn production.
- A minimum fertilizer N application of 30 lb N/a is recommended for early crop growth and development.

Grain Sorghum

N (lb/a) = (ie/fe) EY – (se) Profile N – (% SOM × 20) – Manure N – Other N Adjustments + Previous Crop Adjustments

ie (sorghum internal efficiency) lbs/bu: 1.2		

fe (fertilizer recovery efficiency)		
High efficiency	0.65	Injected or split applied
Default	0.55	Broadcast, fall-applied pre-plant

se ("soil" NO_3 efficiency)		
Low risk for N loss	1.0	Medium texture or western KS
High risk for N loss	0.7	Coarse texture or eastern KS

Efficiency factors:

ie: internal crop efficiency

fe: fertilizer efficiency

se: soil nitrate-N efficiency

EY: expected yield (bu/a)

Profile N: profile NO_3 (lb/a)

SOM: soil organic matter (×20 for summer crops) lb N/a

Previous crop adjustment: lb/a see pages 3 and 4)

- A minimum fertilizer N application of 30 lb N/a is recommended for early crop growth and development.

Wheat

N (lb/a) = (ie/fe) EY – (se) Profile N – (% SOM × 10) – Manure N – Other N Adjustments + Previous Crop Adjustments

ie (wheat internal efficiency) lbs/bu: 1.45		

fe (fertilizer recovery efficiency)		
High efficiency	0.65	Injected or split applied
Default	0.55	Broadcast, fall-applied pre-plant

se ("soil" NO_3 efficiency)		
Low risk for N loss	1.0	Medium texture or western KS
High risk for N loss	0.7	Coarse texture or eastern KS

Efficiency factors:

ie: internal crop efficiency

fe: fertilizer efficiency

se: soil nitrate-N efficiency

EY: expected yield (bu/a)

Profile N: profile NO_3 (lb/a)

SOM: soil organic matter (×10 for winter crops) lb N/a

Previous crop adjustment: lb/a (see pages 3 and 4)

- A minimum fertilizer N application of 30 lb N/a is recommended for early crop growth and development.

Sunflower

N Rec = (EY × 0.075) – (% SOM × 20) – Profile N – Manure N – Other N Adjustments + Previous Crop Adjustments

- A minimum fertilizer N application of 30 lb N/a may be appropriate for early crop growth and development.

Oats

N Rec = (EY × 1.3) – (% SOM × 10) – Profile N – Other N Adjustments + Previous Crop Adjustments + Tillage Adjustments

- A minimum fertilizer N application of 30 lb N/a may be appropriate for early crop growth and development.

Corn/Sorghum Silage

N Rec = (EY × 10.67) – (% SOM × 20) – Profile N – Manure N – Other N Adjustments + Previous Crop Adjustments

- Maximum fertilizer N recommendations are 230 lb N/a for dryland corn production and 300 lb N/a for irrigated corn production. A minimum fertilizer N application of 30 lb N/a may be appropriate for early crop growth and development. Expected yield (ton/a) is expressed at 65% moisture.

Brome, Fescue and Bermudagrass

Nitrogen required at various expected yields. The total N requirements presented only include expected yield adjustments, and the total N requirements should be modified for other appropriate adjustments.

Expected Yield (ton/a)	Production (lb N/a)	New Seeding (lb N/a)
2	80	20
4	160	20
6	240	20
8	320	20
10	400	20

Liming Recommendations

The appropriate target pH varies by region based on subsoil acidity; lime rates are based on 6-inch soil depth. Soil depth is the depth of lime incorporation through tillage. For no-till systems, alfalfa and grass – assume 2-inch depth of incorporation (about one third of the rate for 6-inch depth). When lime recommendation exceeds 10,000 lb ECC/a, we suggest applying one-half rate, incorporate, wait 12 to 18 months and then retest.

Target pH of 6.8 = [28,300 – (7100 × Buffer pH) + (Buffer pH × Buffer pH × 449)] × Depth (inches)

- All crops in southeast Kansas – east of Flint Hills and south of Highway 56
- Alfalfa and clover in northeast Kansas
- Lime Rec if pH < 6.4

Target pH of 6.0 = [14,100 – (3,540 × Buffer pH) + (Buffer pH × Buffer pH × 224)] × Depth (inches)

- All crops in northeast Kansas except alfalfa and clover
- All crops in central and western Kansas
- Lime Rec if pH < 5.8

Target pH of 5.5 = [7,060 – (1770 × Buffer pH) + (Buffer pH × Buffer pH × 112)] × Depth (inches)

- Cash flow/lime availability problem areas in central and western Kansas
- Lime Rec if pH < 5.5

Lime Recommendations in Pounds of Effective Calcium Carbonate (lb ECC/a)

Sikora Buffer pH	Target pH = 6.8	Target pH = 6.0	Target pH = 5.5
	lb ECC/a		
7.1	3,100	1,500	800
7.0	3,600	1,800	900
6.9	4,100	2,000	1,100
6.8	4,700	2,300	1,200
6.7	5,300	2,600	1,400
6.6	6,000	3,000	1,500
6.5	6,700	3,300	1,700
6.4	7,500	3,700	1,900
6.3	8,300	4,100	2,100
6.2	9,200	4,600	2,300
6.1	10,200	5,000	2,600
6.0	11,200	5,500	2,800
5.9	12,200	6,100	3,100
5.8	13,300	6,600	3,400
5.7	14,500	7,200	3,700

Corn

Corn Sufficiency P Rec = [50 + (Expected Yield × 0.2) + (Mehlich-3 P × -2.5) + (Expected Yield × Mehlich-3 P × –0.01)]

Crop P recommendations are for the total amount of broadcast and banded nutrients to be applied. At a very low soil test level, applying at least 25 to 50% of total as a band is recommended.

If Mehlich-3 P is greater than 20 ppm, then only starter fertilizer is suggested, and defined as a maximum of 20 lb P_2O_5/a applied at planting. If Mehlich-3 P is less than 20 ppm, then the minimum P recommendation is 15 lb P_2O_5/a.

Application of starter fertilizer containing NP, NPK or NPKS may be beneficial regardless of P soil test level, especially for cold/wet soil conditions and/or high surface crop residues. For in-furrow applications do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (bu/a)				
		80	120	160	200	240
(ppm)		lb P_2O_5/a				
0 – 8	Very Low	55	60	65	70	80
9 – 15	Low	25	30	35	35	40
16 – 20	Medium	15	15	15	15	15
21 – 30	High	0	0	0	0	0
31+	Very High	0	0	0	0	0

$$\text{Phosphorus Build-Maintenance Rec} = \left\{ \frac{(20 - \text{Current P Soil Test}) \times 18}{\text{Years To Build}} \right\} + P_2O_5 \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 20 ppm, and subsequently maintain it within the range of 20 to 30 ppm through crop removal replacement. The quantity of P_2O_5 fertilizer required to elevate the soil test P value differs according to soil type, in addition to differences in P removal and cycling, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Phosphorus Build-Maintenance Recommendations

Mehlich-3 P Soil Test	Category	4-Year Build Time Frame, Expected Yield (bu/a)			6-Year Build Time Frame, Expected Yield (bu/a)			8-Year Build Time Frame, Expected Yield (bu/a)		
		80	160	240	80	160	240	80	160	240
(ppm)		lb P_2O_5/a			lb P_2O_5/a			lb P_2O_5/a		
0 – 8	Very Low	98	125	151	74	101	127	62	89	115
9 – 15	Low	62	89	115	50	77	103	44	71	97
16 – 20	Medium	35	62	88	32	59	85	31	57	84
21 – 30*	High	26	53	79	26	53	79	26	53	79
30+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of P_2O_5 are based on crop nutrient removal only.

Wheat

Wheat Sufficiency P Rec = [46 + (Expected Yield × 0.42) + (Mehlich-3 P × –2.3) + (Expected Yield × Mehlich-3 P × –0.021)]

Crop P recommendations are for the total amount of broadcast and banded nutrients to be applied. At a very low soil test level, applying at least 25 to 50% of total as a band is recommended. Wheat is generally considered more responsive to band-applied P fertilizer.

If Mehlich-3 P is greater than 20 ppm, then only starter fertilizer is suggested, and defined as a maximum of 20 lb P_2O_5/a applied at planting. If Mehlich-3 P is less than 20 ppm, then the minimum P recommendation is 15 lb P_2O_5/a.

Application of NP, NPK or NPKS starter fertilizer may be beneficial regardless of P or K soil test level, especially for cold/wet soil conditions and/or high surface crop residues. Do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (bu/a)				
		30	40	50	60	70
(ppm)		lb P_2O_5/a				
0 – 8	Very Low	45	50	55	55	60
9 – 15	Low	25	25	25	30	30
16 – 20	Medium	15	15	15	15	15
21 – 30	High	0	0	0	0	0
31+	Very High	0	0	0	0	0

$$\text{Phosphorus Build-Maintenance Rec} = \left\{ \frac{(20 - \text{Current P Soil Test}) \times 18}{\text{Years To Build}} \right\} + P_2O_5 \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 20 ppm, and subsequently maintain it within the range of 20 to 30 ppm through crop removal replacement. The quantity of P_2O_5 fertilizer required to elevate the soil test P value differs according to soil type, in addition to differences in P removal and cycling, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Phosphorus Build-Maintenance Recommendations

Mehlich-3 P Soil Test	Category	4-Year Build Time Frame, Expected Yield (bu/a)			6-Year Build Time Frame, Expected Yield (bu/a)			8-Year Build Time Frame, Expected Yield (bu/a)		
		30	50	70	30	50	70	30	50	70
(ppm)		lb P_2O_5/a			lb P_2O_5/a			lb P_2O_5/a		
0 – 8	Very Low	87	97	107	63	73	83	51	61	71
9 – 15	Low	51	61	71	39	49	59	33	43	53
16 – 20	Medium	24	34	44	21	31	41	20	30	40
21 – 30*	High	15	25	35	15	25	35	15	25	35
30+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of P_2O_5 are based on crop nutrient removal only.

Grain Sorghum

Grain Sorghum Sufficiency P Rec = [50 + (0.16 × Expected Yield) + (Mehlich-3 P × –2.5) + (Expected Yield × Mehlich-3 P × –0.008)]

Crop P recommendations are for the total amount of broadcast and banded nutrients to be applied. At a very low soil test level, applying at least 25 to 50% of total as a band is recommended.

If Mehlich-3 P is greater than 20 ppm, then only starter fertilizer is suggested, and defined as a maximum of 20 lb P_2O_5/a applied at planting. If Mehlich-3 P is less than 20 ppm, then the minimum P recommendation is 15 lb P_2O_5/a.

Application of starter fertilizer containing NP, NPK or NPKS may be beneficial regardless of P soil test level, especially for cold/wet soil conditions and/or high surface crop residues. For in-furrow applications do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (bu/a)				
		40	80	120	160	200
(ppm)		lb P_2O_5/a				
0 – 8	Very Low	45	50	55	60	65
9 – 15	Low	25	25	30	30	35
16 – 20	Medium	15	15	15	15	15
21 – 30	High	0	0	0	0	0
31+	Very High	0	0	0	0	0

$$\text{Phosphorus Build-Maintenance Rec} = \left\{ \frac{(20 - \text{Current P Soil Test}) \times 18}{\text{Years To Build}} \right\} + P_2O_5 \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 20 ppm, and subsequently maintain it within the range of 20 to 30 ppm through crop removal replacement. The quantity of P_2O_5 fertilizer required to elevate the soil test P value differs according to soil type, in addition to differences in P removal and cycling, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Phosphorus Build-Maintenance Recommendations

Mehlich-3 P Soil Test	Category	4-Year Build Time Frame, Expected Yield (bu/a)			6-Year Build Time Frame, Expected Yield (bu/a)			8-Year Build Time Frame, Expected Yield (bu/a)		
		40	120	200	40	120	200	40	120	200
(ppm)		lb P_2O_5/a			lb P_2O_5/a			lb P_2O_5/a		
0 – 8	Very Low	88	120	152	64	96	128	52	84	116
9 – 15	Low	52	84	116	40	72	104	34	66	98
16 – 20	Medium	25	57	89	22	54	86	21	53	85
21 – 30*	High	16	48	80	16	48	80	16	48	80
30+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of P_2O_5 are based on crop nutrient removal only.

Soybean

Soybeans Sufficiency P Rec = [56 + (0.51 × Expected Yield) + (Mehlich-3 P × –2.8) + (Expected Yield × Mehlich-3 P × –0.0257)]

Crop P recommendations are for the total amount of broadcast and banded nutrients to be applied. At a very low soil test level, applying at least 25 to 50% of total as a band is recommended.

If Mehlich-3 P is greater than 20 ppm, then only starter fertilizer is suggested, and defined as a maximum of 20 lb P_2O_5/a applied at planting. If Mehlich-3 P is less than 20 ppm, then the minimum P recommendation is 15 lb P_2O_5/a.

Application of starter fertilizer containing NP, NPK or NPKS may be beneficial regardless of P soil test level, especially for cold/wet soil conditions and/or high surface crop residues. Soybean seedlings are particularly sensitive to fertilizer damage, and fertilizer placed in direct seed contact is not recommended.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (bu/a)				
		40	50	60	70	80
(ppm)		lb P_2O_5/a				
0 – 8	Very Low	60	65	70	75	75
9 – 15	Low	30	30	35	35	40
16 – 20	Medium	15	15	15	15	15
21 – 30	High	0	0	0	0	0
31+	Very High	0	0	0	0	0

$$\text{Phosphorus Build-Maintenance Rec} = \left\{ \frac{(20 - \text{Current P Soil Test}) \times 18}{\text{Years To Build}} \right\} + P_2O_5 \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 20 ppm, and subsequently maintain it within the range of 20 to 30 ppm through crop removal replacement. The quantity of P_2O_5 fertilizer required to elevate the soil test P value differs according to soil type, in addition to differences in P removal and cycling, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Phosphorus Build-Maintenance Recommendations

Mehlich-3 P Soil Test	Category	4-Year Build Time Frame, Expected Yield (bu/a)			6-Year Build Time Frame, Expected Yield (bu/a)			8-Year Build Time Frame, Expected Yield (bu/a)		
		40	60	80	40	60	80	40	60	80
(ppm)		lb P_2O_5/a			lb P_2O_5/a			lb P_2O_5/a		
0 – 8	Very Low	104	120	136	80	96	112	68	84	100
9 – 15	Low	68	84	100	56	72	88	50	66	82
16 – 20	Medium	41	57	73	38	54	70	37	53	69
21 – 30*	High	32	48	64	32	48	64	32	48	64
30+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of P_2O_5 are based on crop nutrient removal only.

Sunflower

Sunflower Sufficiency P Rec = [42 + (Expected Yield × 0.01) + (Mehlich-3 P × –2.1) + (Expected Yield × Mehlich-3 P × –0.0005)]

Crop P recommendations are for the total amount of broadcast and banded nutrients to be applied. At a very low soil test level, applying at least 25 to 50% of total as a band is recommended.

If Mehlich-3 P is greater than 20 ppm, then only starter fertilizer is suggested, and defined as a maximum of 20 lb P_2O_5/a applied at planting. If Mehlich-3 P is less than 20 ppm, then the minimum P recommendation is 15 lb P_2O_5/a.

Application of starter fertilizer containing NP, NPK or NPKS may be beneficial regardless of P soil test level, especially for cold/wet soil conditions and/or high surface crop residues. For in-furrow applications do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (lb/a)				
		1,000	1,500	2,000	2,500	3,000
(ppm)		---------- lb P_2O_5/a ----------				
0 – 8	Very Low	40	45	50	55	60
9 – 15	Low	20	25	25	25	30
16 – 20	Medium	15	15	15	15	15
21 – 30	High	0	0	0	0	0
31+	Very High	0	0	0	0	0

$$\text{Phosphorus Build-Maintenance Rec} = \left\{ \frac{(20 - \text{Current P Soil Test}) \times 18}{\text{Years To Build}} \right\} + P_2O_5 \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 20 ppm, and subsequently maintain it within the range of 20 to 30 ppm through crop removal replacement. The quantity of P_2O_5 fertilizer required to elevate the soil test P value differs according to soil type, in addition to differences in P removal and cycling, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Phosphorus Build-Maintenance Recommendations

Mehlich-3 P Soil Test	Category	4-Year Build Time Frame, Expected Yield (lb/a)			6-Year Build Time Frame, Expected Yield (lb/a)			8-Year Build Time Frame, Expected Yield (lb/a)		
		1,000	2,000	3,000	1,000	2,000	3,000	1,000	2,000	3,000
(ppm)		---------- lb P_2O_5/a ----------			---------- lb P_2O_5/a ----------			---------- lb P_2O_5/a ----------		
0 – 8	Very Low	87	102	117	63	78	93	51	66	81
9 – 15	Low	51	66	81	39	54	69	33	48	63
16 – 20	Medium	24	39	54	21	36	51	20	35	50
21 – 30*	High	15	30	45	15	30	45	15	30	45
30+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of P_2O_5 are based on crop nutrient removal only.

Oats

Oats Sufficiency P Rec = [47 + (Expected Yield × 0.25) + (Mehlich-3 P × –2.3) + (Expected Yield × Mehlich-3 P × –0.013)]

Crop P recommendations are for the total amount of broadcast and banded nutrients to be applied. At a very low soil test level, applying at least 25 to 50% of total as a band is recommended. Oat is generally considered more responsive to band-applied P fertilizer.

If Mehlich-3 P is greater than 20 ppm, then only starter fertilizer is suggested, and defined as a maximum of 20 lb P_2O_5/a applied at planting. If Mehlich-3 P is less than 20 ppm, then the minimum P recommendation is 15 lb P_2O_5/a.

Application of starter fertilizer containing NP, NPK or NPKS may be beneficial regardless of P soil test level, especially for cold/wet soil conditions and/or high surface crop residues. For in-furrow applications do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (bu/a)				
		60	80	100	120	140
(ppm)		lb P_2O_5/a				
0 – 8	Very Low	50	55	60	60	65
9 – 15	Low	25	25	30	30	35
16 – 20	Medium	15	15	15	15	15
21 – 30	High	0	0	0	0	0
31+	Very High	0	0	0	0	0

$$\text{Phosphorus Build-Maintenance Rec} = \left\{ \frac{(20 - \text{Current P Soil Test}) \times 18}{\text{Years To Build}} \right\} + P_2O_5 \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 20 ppm, and subsequently maintain it within the range of 20 to 30 ppm through crop removal replacement. The quantity of P_2O_5 fertilizer required to elevate the soil test P value differs according to soil type, in addition to differences in P removal and cycling, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Phosphorus Build-Maintenance Recommendations

Mehlich-3 P Soil Test	Category	4-Year Build Time Frame, Expected Yield (bu/a)			6-Year Build Time Frame, Expected Yield (bu/a)			8-Year Build Time Frame, Expected Yield (bu/a)		
		60	100	140	60	100	140	60	100	140
(ppm)		lb P_2O_5/a			lb P_2O_5/a			lb P_2O_5/a		
0 – 8	Very Low	87	97	107	63	73	83	51	61	71
9 – 15	Low	51	61	71	39	49	59	33	43	53
16 – 20	Medium	24	34	44	21	31	41	20	30	40
21 – 30*	High	15	25	35	15	25	35	15	25	35
30+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of P_2O_5 are based on crop nutrient removal only.

Corn Silage

Corn Silage Sufficiency P Rec = [56 + (Expected Yield × 1.12) + (Mehlich-3 P × –2.8) + (Expected Yield × Mehlich-3 P × –0.056)]

Crop P recommendations are for the total amount of broadcast and banded nutrients to be applied. At a very low soil test level, applying at least 25 to 50% of total as a band is recommended.

If Mehlich-3 P is greater than 20 ppm, then only starter fertilizer is suggested, and defined as a maximum of 20 lb P_2O_5/a applied at planting. If Mehlich-3 P is less than 20 ppm, then the minimum P recommendation is 15 lb P_2O_5/a.

Application of starter fertilizer containing NP, NPK or NPKS may be beneficial regardless of P soil test level, especially for cold/wet soil conditions and/or high surface crop residues. For in-furrow applications do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (ton/a)				
		10	15	20	25	30
(ppm)		lb P_2O_5/a				
0 – 8	Very Low	55	60	65	65	70
9 – 15	Low	25	30	30	35	35
16 – 20	Medium	15	15	15	15	15
21 – 30	High	0	0	0	0	0
31+	Very High	0	0	0	0	0

$$\text{Phosphorus Build-Maintenance Rec} = \left\{ \frac{(20 - \text{Current P Soil Test}) \times 18}{\text{Years To Build}} \right\} + P_2O_5 \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 20 ppm, and subsequently maintain it within the range of 20 to 30 ppm through crop removal replacement. The quantity of P_2O_5 fertilizer required to elevate the soil test P value differs according to soil type, in addition to differences in P removal and cycling, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Phosphorus Build-Maintenance Recommendations

Mehlich-3 P Soil Test	Category	4-Year Build Time Frame, Expected Yield (ton/a)			6-Year Build Time Frame, Expected Yield (ton/a)			8-Year Build Time Frame, Expected Yield (ton/a)		
		10	20	30	10	20	30	10	20	30
(ppm)		lb P_2O_5/a			lb P_2O_5/a			lb P_2O_5/a		
0 – 8	Very Low	104	136	168	80	112	144	68	100	132
9 – 15	Low	68	100	132	56	88	120	50	82	114
16 – 20	Medium	41	73	105	38	70	102	37	69	101
21 – 30*	High	32	64	96	32	64	96	32	64	96
31+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of P_2O_5 are based on crop nutrient removal only.

Sorghum Silage

Sorghum Silage Sufficiency P Rec = [48 + (1.19 × Expected Yield) + (Mehlich-3 P × –2.38) + (Expected Yield × Mehlich-3 P × –0.0594)]

Crop P recommendations are for the total amount of broadcast and banded nutrients to be applied. At a very low soil test level, applying at least 25 to 50% of total as a band is recommended.

If Mehlich-3 P is greater than 20 ppm, then only starter fertilizer is suggested, and defined as a maximum of 20 lb P_2O_5/a applied at planting. If Mehlich-3 P is less than 20 ppm, then the minimum P recommendation is 15 lb P_2O_5/a.

Application of starter fertilizer containing NP, NPK or NPKS may be beneficial regardless of P soil test level, especially for cold/wet soil conditions and/or high surface crop residues. For in-furrow applications do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (ton/a)				
		10	15	20	25	30
(ppm)		lb P_2O_5/a				
0 – 8	Very Low	50	55	60	60	65
9 – 15	Low	25	25	30	30	35
16 – 20	Medium	15	15	15	15	15
21 – 30	High	0	0	0	0	0
31+	Very High	0	0	0	0	0

$$\text{Phosphorus Build-Maintenance Rec} = \left\{ \frac{(20 - \text{Current P Soil Test}) \times 18}{\text{Years To Build}} \right\} + P_2O_5 \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 20 ppm, and subsequently maintain it within the range of 20 to 30 ppm through crop removal replacement. The quantity of P_2O_5 fertilizer required to elevate the soil test P value differs according to soil type, in addition to differences in P removal and cycling, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Phosphorus Build-Maintenance Recommendations

Mehlich-3 P Soil Test	Category	4-Year Build Time Frame, Expected Yield (ton/a)			6-Year Build Time Frame, Expected Yield (ton/a)			8-Year Build Time Frame, Expected Yield (ton/a)		
		10	20	30	10	20	30	10	20	30
(ppm)		lb P_2O_5/a			lb P_2O_5/a			lb P_2O_5/a		
0 – 8	Very Low	104	136	168	80	112	144	68	100	132
9 – 15	Low	68	100	132	56	88	120	50	82	114
16 – 20	Medium	41	73	105	38	70	102	37	69	101
21 – 30*	High	32	64	96	32	64	96	32	64	96
30+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of P_2O_5 are based on crop nutrient removal only.

Brome and Fescue

Brome/Fescue Sufficiency P Rec = [44 + (6.3 × Expected Yield) + (Mehlich-3 P × –2.2) + (Expected Yield × Mehlich-3 P × –0.315)]

The P recommendations are for the total amount of broadcast and banded nutrients to be applied. If Mehlich-3 P is greater than 20 ppm, then basic P recommendation is zero. If Mehlich-3 P is less than 20 ppm, then the minimum P recommendation is 15 lb P_2O_5/a.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (ton/a)				
		2	3	4	5	6
(ppm)		---------- lb P_2O_5/a ----------				
0 – 8	Very Low	45	50	55	60	65
9 – 15	Low	25	25	30	30	35
16 – 20	Medium	15	15	15	15	15
21 – 30	High	0	0	0	0	0
31+	Very High	0	0	0	0	0

New Brome and Fescue

New Brome/Fescue Sufficiency P Rec = [68 + (11.2 × Expected Yield) + (Mehlich-3 P × –3.4) + (Expected Yield × Mehlich-3 P × –0.56)]

The P recommendations are for the total amount of broadcast and banded nutrients to be applied. If Mehlich-3 P is greater than 20 ppm, then basic P recommendation is zero. If Mehlich-3 P is less than 20 ppm, then the minimum P recommendation is 15 lb P_2O_5/a.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (ton/a)				
		2	2.5	3	3.5	4
(ppm)		---------- lb P_2O_5/a ----------				
0 – 8	Very Low	70	75	80	85	90
9 – 15	Low	35	40	40	45	45
16 – 20	Medium	15	15	15	15	15
21 – 30	High	0	0	0	0	0
31+	Very High	0	0	0	0	0

Bermudagrass

Bermuda Sufficiency P Rec = [64 + (5.3 × Expected Yield) + (Mehlich-3 P × –2.56) + (Expected Yield × Mehlich-3 P × –0.21)]

The P recommendations are for the total amount of broadcast and banded nutrients to be applied. If Mehlich-3 P is greater than 25 ppm, then basic P recommendation is zero. If Mehlich-3 P is less than 25 ppm, then the minimum P recommendation is 15 lb P_2O_5/a.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (ton/a)				
		2	4	6	8	10
(ppm)		---------- lb P_2O_5/a ----------				
0 – 8	Very Low	65	70	80	90	100
9 – 16	Low	35	45	50	55	60
17 – 25	Medium	15	15	15	15	20
26 – 35	High	0	0	0	0	0
36+	Very High	0	0	0	0	0

New Bermudagrass

Bermuda Sufficiency P Rec = [64 + (9.1 × Expected Yield) + (Mehlich-3 P × –2.56) + (Expected Yield × Mehlich-3 P × –0.365)]

The P recommendations are for the total amount of broadcast and banded nutrients to be applied. If Mehlich-3 P is greater than 25 ppm, then basic P recommendation is zero. If Mehlich-3 P is less than 25 ppm, then the minimum P recommendation is 15 lb P_2O_5/a.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (ton/a)				
		2	3	4	5	6
(ppm)		---------- lb P_2O_5/a ----------				
0 – 8	Very Low	70	75	85	90	100
9 – 16	Low	40	45	50	55	60
17 – 25	Medium	15	15	15	15	20
26 – 35	High	0	0	0	0	0
36+	Very High	0	0	0	0	0

Alfalfa and Clover

Alfalfa/Clover Sufficiency P Rec = [73 + (4.56 × Expected Yield) + (Mehlich-3 P × –2.92) + (Expected Yield × Mehlich-3 P × –0.18)]

Crop P recommendations are for the total amount of broadcast and banded nutrients to be applied. Nitrogen fertilizer is not recommended for established alfalfa and clover, however, the amount of N supplied by common P fertilizers is not detrimental to production.

If Mehlich-3 P is greater than 25 ppm, then the basic P recommendation is zero. If Mehlich-3 P is less than 25 ppm, then the minimum P recommendation is 15 lb P_2O_5/a.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (ton/a)				
		2	4	6	8	10
(ppm)		lb P_2O_5/a				
0 – 8	Very Low	70	75	85	90	100
9 – 16	Low	40	45	50	55	60
17 – 25	Medium	15	15	15	20	20
26 – 35	High	0	0	0	0	0
36+	Very High	0	0	0	0	0

$$\text{Phosphorus Build-Maintenance Rec} = \left\{ \frac{(25 - \text{Current P Soil Test}) \times 18}{\text{Years To Build}} \right\} + P_2O_5 \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 25 ppm, and subsequently maintain it within the range of 25 to 35 ppm through crop removal replacement. The quantity of P_2O_5 fertilizer required to elevate the soil test P value differs according to soil type, in addition to differences in P removal and cycling, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Phosphorus Build-Maintenance Recommendations

Mehlich-3 P Soil Test	Category	4-Year Build Time Frame, Expected Yield (ton/a)			6-Year Build Time Frame, Expected Yield (ton/a)			8-Year Build Time Frame, Expected Yield (ton/a)		
		2	6	10	2	6	10	2	6	10
(ppm)		lb P_2O_5/a			lb P_2O_5/a			lb P_2O_5/a		
0 – 8	Very Low	119	167	215	87	135	183	71	119	167
9 – 16	Low	80	128	176	62	110	158	52	100	148
17 – 25	Medium	42	90	138	36	84	132	33	81	129
26 – 35*	High	24	72	120	24	72	120	24	72	120
36+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of P_2O_5 are based on crop nutrient removal only.

New Alfalfa and Clover

New Alfalfa/Clover Sufficiency P Rec = [84 + (12 × Expected Yield) + (Mehlich-3 P × –3.37) + (Expected Yield × Mehlich-3 P × –0.48)]

Crop P recommendations are for the total amount of broadcast and banded nutrients to be applied. If Mehlich-3 P is greater than 25 ppm, then the basic P recommendation is zero. If Mehlich-3 P is less than 25 ppm, then the minimum P recommendation is 15 lb P_2O_5/a. A small amount of nitrogen fertilizer (15 to 20 lb/a) preplant can be beneficial for new alfalfa establishment.

Phosphorus Sufficiency Recommendations

Mehlich-3 P Soil Test	Category	Expected Yield (ton/a)				
		2	3	4	5	6
(ppm)		---------- lb P_2O_5/a ----------				
0 – 8	Very Low	90	100	110	120	130
9 – 16	Low	55	60	65	70	80
17 – 25	Medium	15	20	20	25	25
26 – 35	High	0	0	0	0	0
36+	Very High	0	0	0	0	0

Corn

Corn Sufficiency K Rec = [73 + (Expected Yield × 0.21) + (Extractable K × -0.565) + (Expected Yield × Extractable K × –0.0016)]

Crop K recommendations are for the total amount of broadcast and banded nutrients to be applied. If soil extractable K is greater than 130 ppm, then only NPK or NPKS starter fertilizer is suggested. If extractable K is less than 130 ppm, then the minimum K recommendation is 15 lb K_2O/a. For in-furrow starter fertilizer do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (bu/a)				
		80	120	160	200	240
(ppm)		----------lb K_2O/a ----------				
0 – 40	Very Low	75	85	90	95	105
41 – 80	Low	50	50	55	60	65
81 – 130	Medium	15	20	20	20	25
131 – 160	High	0	0	0	0	0
161+	Very High	0	0	0	0	0

$$\text{Potassium Build-Maintenance Rec} = \left\{ \frac{(130 - \text{Current K Soil Test}) \times 9}{\text{Years To Build}} \right\} + K_2O \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 130 ppm, and subsequently maintain it within the range of 130 to 160 ppm through crop removal replacement. The quantity of K_2O fertilizer required to elevate the soil test K value differs according to soil type, in addition to differences in K crop removal, cycling to the soil and soil-K interaction, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Potassium Build-Maintenance Recommendations

Extractable K Soil Test	Category	4-Year Build Time Frame, Expected Yield (bu/a)			6-Year Build Time Frame, Expected Yield (bu/a)			8-Year Build Time Frame, Expected Yield (bu/a)		
		80	160	240	80	160	240	80	160	240
(ppm)		---------- lb K_2O/a ----------			---------- lb K_2O/a ----------			---------- lb K_2O/a ----------		
0 – 40	Very Low	268	289	310	186	207	227	145	165	186
41 – 80	Low	177	198	219	125	146	167	99	120	141
81 – 130	Medium	76	97	118	58	78	99	48	69	90
131 – 160*	High	21	42	62	21	42	62	21	42	62
161+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of K_2O are based on crop nutrient removal only.

Wheat

Wheat Sufficiency K Rec = [62 + (Expected Yield × 0.24) + (Extractable K × –0.48) + (Expected Yield × Extractable K × –0.0018)]

Crop K recommendations are for the total amount of broadcast and banded nutrients to be applied. If soil extractable K is greater than 130 ppm, then only NPK or NPKS starter fertilizer is suggested. If extractable K is less than 130 ppm, then the minimum K recommendation is 15 lb K_2O/a. For in-furrow starter fertilizer do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (bu/a)				
		30	40	50	60	70
(ppm)		----------lb K_2O/a ----------				
0 – 40	Very Low	60	60	65	65	65
41 – 80	Low	35	40	40	40	40
81 – 130	Medium	15	15	15	15	15
131 – 160	High	0	0	0	0	0
161+	Very High	0	0	0	0	0

$$\text{Potassium Build-Maintenance Rec} = \left\{ \frac{(130 - \text{Current K Soil Test}) \times 9}{\text{Years To Build}} \right\} + K_2O \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 130 ppm, and subsequently maintain it within the range of 130 to 160 ppm through crop removal replacement. The quantity of K_2O fertilizer required to elevate the soil test K value differs according to soil type, in addition to differences in K crop removal, cycling to the soil and soil-K interaction, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Potassium Build-Maintenance Recommendations

Extractable K Soil Test	Category	4-Year Build Time Frame, Expected Yield (bu/a)			6-Year Build Time Frame, Expected Yield (bu/a)			8-Year Build Time Frame, Expected Yield (bu/a)		
		30	50	70	30	50	70	30	50	70
(ppm)		---------- lb K_2O/a ----------			---------- lb K_2O/a ----------			---------- lb K_2O/a ----------		
0 – 40	Very Low	257	263	269	174	180	186	133	139	145
41 – 80	Low	165	171	177	113	119	125	87	93	99
81 – 130	Medium	64	70	76	46	52	58	37	43	49
131 – 160*	High	9	15	21	9	15	21	9	15	21
161+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of K_2O are based on crop nutrient removal only.

Grain Sorghum

Grain Sorghum Sufficiency K Rec = [80 + (0.17 × Expected Yield) + (Extractable K × –0.616) + (Expected Yield × Extractable K × –0.0013)]

Crop K recommendations are for the total amount of broadcast and banded nutrients to be applied. If soil extractable K is greater than 130 ppm, then only NPK or NPKS starter fertilizer is suggested. If extractable K is less than 130 ppm, then the minimum K recommendation is 15 lb K_2O/a. For in-furrow starter fertilizer do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (bu/a)				
		40	80	120	160	200
(ppm)		----------lb K_2O/a ----------				
0 – 40	Very Low	75	80	90	95	100
41 – 80	Low	55	60	60	65	70
81 – 130	Medium	30	30	35	35	35
131 – 160	High	0	0	0	0	0
161+	Very High	0	0	0	0	0

$$\text{Potassium Build-Maintenance Rec} = \left\{ \frac{(130 - \text{Current K Soil Test}) \times 9}{\text{Years To Build}} \right\} + K_2O \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 130 ppm, and subsequently maintain it within the range of 130 to 160 ppm through crop removal replacement. The quantity of K_2O fertilizer required to elevate the soil test K value differs according to soil type, in addition to differences in K crop removal, cycling to the soil and soil-K interaction, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Potassium Build-Maintenance Recommendations

Extractable K Soil Test	Category	4-Year Build Time Frame, Expected Yield (bu/a)			6-Year Build Time Frame, Expected Yield (bu/a)			8-Year Build Time Frame, Expected Yield (bu/a)		
		40	120	200	40	120	200	40	120	200
(ppm)		---------- lb K_2O/a ----------			---------- lb K_2O/a ----------			---------- lb K_2O/a ----------		
0 – 40	Very Low	258	279	300	175	196	217	134	155	176
41 – 80	Low	167	188	208	115	135	156	89	109	130
81 – 130	Medium	66	86	107	47	68	89	38	59	80
131 – 160*	High	10	31	52	10	31	52	10	31	52
161+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of K_2O are based on crop nutrient removal only.

Soybean

Soybeans Sufficiency K Rec = [60 + (0.628 × Expected Yield) + (Extractable K × –0.46) + (Expected Yield × Extractable K × –0.0048)]

Crop K recommendations are for the total amount of broadcast and banded nutrients to be applied. If soil extractable K is greater than 130 ppm, then only NPK or NPKS starter fertilizer is suggested. If extractable K is less than 130 ppm, then the minimum K recommendation is 15 lb K_2O/a. Soybean seedlings are particularly sensitive to fertilizer damage, and fertilizer placed in direct seed contact is not recommended.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (bu/a)				
		30	40	50	60	70
(ppm)		---------- lb K_2O/a ----------				
0 – 40	Very Low	65	70	75	85	90
41 – 80	Low	40	45	50	50	55
81 – 130	Medium	15	15	20	20	20
131 – 160	High	0	0	0	0	0
161+	Very High	0	0	0	0	0

$$\text{Potassium Build-Maintenance Rec} = \left\{ \frac{(130 - \text{Current K Soil Test}) \times 9}{\text{Years To Build}} \right\} + K_2O \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 130 ppm, and subsequently maintain it within the range of 130 to 160 ppm through crop removal replacement. The quantity of K_2O fertilizer required to elevate the soil test K value differs according to soil type, in addition to differences in K crop removal, cycling to the soil and soil-K interaction, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Potassium Build-Maintenance Recommendations

Extractable K Soil Test	Category	4-Year Build Time Frame, Expected Yield (bu/a)			6-Year Build Time Frame, Expected Yield (bu/a)			8-Year Build Time Frame, Expected Yield (bu/a)		
		30	50	70	30	50	70	30	50	70
(ppm)		---------- lb K_2O/a ----------			---------- lb K_2O/a ----------			---------- lb K_2O/a ----------		
0 – 40	Very Low	290	318	346	207	235	263	166	194	222
41 – 80	Low	198	226	254	146	174	202	120	148	176
81 – 130	Medium	97	125	153	79	107	135	70	98	126
131 – 160*	High	42	70	98	42	70	98	42	70	98
161+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of K_2O are based on crop nutrient removal only.

Sunflower

Sunflower Sufficiency K Rec = [80 + (Expected Yield × 0.008) + (Extractable K × –0.622) + (Expected Yield × Extractable K × –0.00006)]

Crop K recommendations are for the total amount of broadcast and banded nutrients to be applied. If soil extractable K is greater than 130 ppm, then only NPK or NPKS starter fertilizer is suggested. If extractable K is less than 130 ppm, then the minimum K recommendation is 15 lb K_2O/a. For in-furrow starter fertilizer do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (lb/a)				
		1,000	1,500	2,000	2,500	3,000
(ppm)		----------lb K_2O/a ----------				
0 – 40	Very Low	75	80	80	85	90
41 – 80	Low	45	50	50	55	55
81 – 130	Medium	15	15	20	20	20
131 – 160	High	0	0	0	0	0
161+	Very High	0	0	0	0	0

$$\text{Potassium Build-Maintenance Rec} = \left\{ \frac{(130 - \text{Current K Soil Test}) \times 9}{\text{Years To Build}} \right\} + K_2O \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 130 ppm, and subsequently maintain it within the range of 130 to 160 ppm through crop removal replacement. The quantity of K_2O fertilizer required to elevate the soil test K value differs according to soil type, in addition to differences in K crop removal, cycling to the soil and soil-K interaction, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Potassium Build-Maintenance Recommendations

Extractable K Soil Test	Category	4-Year Build Time Frame, Expected Yield (lb/a)			6-Year Build Time Frame, Expected Yield (lb/a)			8-Year Build Time Frame, Expected Yield (lb/a)		
		1,000	2,000	3,000	1,000	2,000	3,000	1,000	2,000	3,000
(ppm)		---------- lb K_2O/a ----------			---------- lb K_2O/a ----------			---------- lb K_2O/a ----------		
0 – 40	Very Low	254	260	266	171	177	183	130	136	142
41 – 80	Low	162	168	174	110	116	122	84	90	96
81 – 130	Medium	61	67	73	43	49	55	34	40	46
131 – 160*	High	6	12	18	6	12	18	6	12	18
161+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of K_2O are based on crop nutrient removal only.

Oats

Oats Sufficiency K Rec = [62 + (Expected Yield × 0.221) + (Extractable K × –0.48) + (Expected Yield × Extractable K × –0.0017)]

Crop K recommendations are for the total amount of broadcast and banded nutrients to be applied. If soil extractable K is greater than 130 ppm, then only NPK or NPKS starter fertilizer is suggested. If extractable K is less than 130 ppm, then the minimum K recommendation is 15 lb K_2O/a. For in-furrow starter fertilizer do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (bu/a)				
		60	80	100	120	140
(ppm)		---------- lb K_2O/a ----------				
0 – 40	Very Low	65	65	70	75	80
41 – 80	Low	40	40	45	45	50
81 – 130	Medium	15	15	15	15	15
131 – 160	High	0	0	0	0	0
161+	Very High	0	0	0	0	0

$$\text{Potassium Build-Maintenance Rec} = \left\{ \frac{(130 - \text{Current K Soil Test}) \times 9}{\text{Years To Build}} \right\} + K_2O \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 130 ppm, and subsequently maintain it within the range of 130 to 160 ppm through crop removal replacement. The quantity of K_2O fertilizer required to elevate the soil test K value differs according to soil type, in addition to differences in K crop removal, cycling to the soil and soil-K interaction, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Potassium Build-Maintenance Oats Recommendations

Extractable K Soil Test	Category	4-Year Build Time Frame, Expected Yield (bu/a)			6-Year Build Time Frame, Expected Yield (bu/a)			8-Year Build Time Frame, Expected Yield (bu/a)		
		60	100	140	60	100	140	60	100	140
(ppm)		---------- lb K_2O/a ----------			---------- lb K_2O/a ----------			---------- lb K_2O/a ----------		
0 – 40	Very Low	260	268	276	177	185	193	136	144	152
41 – 80	Low	168	176	184	116	124	132	90	98	106
81 – 130	Medium	67	75	83	49	57	65	40	48	56
131 – 160*	High	12	20	28	12	20	28	12	20	28
161+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of K_2O are based on crop nutrient removal only.

Corn Silage

Corn Silage Sufficiency K Rec = [74 + (Expected Yield × 1.50) + (Extractable K × –0.567) + (Expected Yield × Extractable K × –0.0115)]

Crop K recommendations are for the total amount of broadcast and banded nutrients to be applied. If soil extractable K is greater than 130 ppm, then only NPK or NPKS starter fertilizer is suggested. If extractable K is less than 130 ppm, then the minimum K recommendation is 15 lb K_2O/a. For in-furrow starter fertilizer do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (ton/a)				
		10	15	20	25	30
(ppm)		----------lb K_2O/a ----------				
0 – 40	Very Low	75	80	90	95	100
41 – 80	Low	50	50	55	60	65
81 – 130	Medium	15	20	20	20	25
131 – 160	High	0	0	0	0	0
161+	Very High	0	0	0	0	0

$$\text{Potassium Build-Maintenance Rec} = \left\{ \frac{(130 - \text{Current K Soil Test}) \times 9}{\text{Years To Build}} \right\} + K_2O \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 130 ppm, and subsequently maintain it within the range of 130 to 160 ppm through crop removal replacement. The quantity of K_2O fertilizer required to elevate the soil test K value differs according to soil type, in addition to differences in K crop removal, cycling to the soil and soil-K interaction, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Potassium Build-Maintenance Recommendations

Extractable K Soil Test	Category	4-Year Build Time Frame, Expected Yield (ton/a)			6-Year Build Time Frame, Expected Yield (ton/a)			8-Year Build Time Frame, Expected Yield (ton/a)		
		10	20	30	10	20	30	10	20	30
(ppm)		---------- lb K_2O/a ----------			---------- lb K_2O/a ----------			---------- lb K_2O/a ----------		
0 – 40	Very Low	335	422	509	252	339	426	211	298	385
41 – 80	Low	243	330	417	191	278	365	165	252	339
81 – 130	Medium	142	229	316	124	211	298	115	202	289
131 – 160*	High	87	174	261	87	174	261	87	174	261
161+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of K_2O are based on crop nutrient removal only.

Sorghum Silage

Sorghum Silage Sufficiency K Rec = [73 + (1.8 × Expected Yield) + (Extractable K × –0.56) + (Expected Yield × Extractable K × –0.0139)]

Crop K recommendations are for the total amount of broadcast and banded nutrients to be applied. If soil extractable K is greater than 130 ppm, then only NPK or NPKS starter fertilizer is suggested. If extractable K is less than 130 ppm, then the minimum K recommendation is 15 lb K_2O/a. For in-furrow starter fertilizer do not exceed N + K_2O guidelines for fertilizer placed in direct seed contact.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (ton/a)				
		10	15	20	25	30
(ppm)		----------lb K_2O/a ----------				
0 – 40	Very Low	75	85	90	100	105
41 – 80	Low	50	55	60	65	70
81 – 130	Medium	15	20	20	20	25
131 – 160	High	0	0	0	0	0
161+	Very High	0	0	0	0	0

$$\text{Potassium Build-Maintenance Rec} = \left\{ \frac{(130 - \text{Current K Soil Test}) \times 9}{\text{Years To Build}} \right\} + K_2O \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 130 ppm, and subsequently maintain it within the range of 130 to 160 ppm through crop removal replacement. The quantity of K_2O fertilizer required to elevate the soil test K value differs according to soil type, in addition to differences in K crop removal, cycling to the soil and soil-K interaction, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Potassium Build-Maintenance Recommendations

Extractable K Soil Test	Category	4-Year Build Time Frame, Expected Yield (ton/a)			6-Year Build Time Frame, Expected Yield (ton/a)			8-Year Build Time Frame, Expected Yield (ton/a)		
		10	20	30	10	20	30	10	20	30
(ppm)		---------- lb K_2O/a ----------			---------- lb K_2O/a ----------			---------- lb K_2O/a ----------		
0 – 40	Very Low	335	422	509	252	339	426	211	298	385
41 – 80	Low	243	330	417	191	278	365	165	252	339
81 – 130	Medium	142	229	316	124	211	298	115	202	289
131 – 160*	High	87	174	261	87	174	261	87	174	261
161+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of K_2O are based on crop nutrient removal only.

Brome and Fescue

Brome/Fescue Sufficiency K Rec = [41 + (5.85 × Expected Yield) + (Extractable K × –0.315) + (Expected Yield × Extractable K × –0.045)]

The K recommendations are for the total amount of broadcast and banded nutrients to be applied. If extractable K is greater than 130 ppm, then basic K recommendation is zero. If extractable K is less than 130 ppm, then the minimum K recommendation is 15 lb P_2O_5/a.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (ton/a)				
		2	3	4	5	6
(ppm)		----------lb K_2O/a ----------				
0 – 40	Very Low	45	50	55	60	65
41 – 80	Low	30	30	35	40	40
81 – 130	Medium	15	15	15	15	15
131 – 160	High	0	0	0	0	0
161+	Very High	0	0	0	0	0

New Brome and Fescue

New Brome/Fescue Sufficiency K Rec = [91 + (15 × Expected Yield) + (Extractable K × –0.7) + (Expected Yield × Extractable K × –0.116)]

The K recommendations are for the total amount of broadcast and banded nutrients to be applied. If extractable K is greater than 130 ppm, then basic K recommendation is zero. If extractable K is less than 130 ppm, then the minimum K recommendation is 15 lb P_2O_5/a.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (ton/a)				
		2	2.5	3	3.5	4
(ppm)		----------lb K_2O/a ----------				
0 – 40	Very Low	100	110	115	120	130
41 – 80	Low	65	70	75	75	80
81 – 130	Medium	25	25	25	25	30
131 – 160	High	0	0	0	0	0
161+	Very High	0	0	0	0	0

Bermudagrass

Bermuda Sufficiency K Rec = [75 + (6. 25 × Expected Yield) + (Extractable K × –0.5) + (Expected Yield × Extractable K × –0.042)]

The K recommendations are for the total amount of broadcast and banded nutrients to be applied. If extractable K is greater than 150 ppm, then basic K recommendation is zero. If extractable K is less than 150 ppm, then the minimum K recommendation is 15 lb P_2O_5/a.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (ton/a)				
		2	4	6	8	10
(ppm)		----------lb K_2O/a ----------				
0 – 50	Very Low	75	85	95	105	115
51 – 100	Low	45	50	55	60	70
101 – 150	Medium	15	15	20	20	20
151 – 180	High	0	0	0	0	0
181+	Very High	0	0	0	0	0

New Bermudagrass

Bermuda Sufficiency K Rec = [105 + (15 × Expected Yield) + (Extractable K × –0.7) + (Expected Yield × Extractable K × –0.1)]

The K recommendations are for the total amount of broadcast and banded nutrients to be applied. If extractable K is greater than 150 ppm, then basic K recommendation is zero. If extractable K is less than 150 ppm, then the minimum K recommendation is 15 lb P_2O_5/a.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (ton/a)				
		2	3	4	5	6
(ppm)		----------lb K_2O/a ----------				
0 – 50	Very Low	115	125	140	150	165
51 – 100	Low	65	75	80	90	95
101 – 150	Medium	20	25	25	30	30
151 – 180	High	0	0	0	0	0
181+	Very High	0	0	0	0	0

Alfalfa and Clover

Alfalfa/Clover Sufficiency K Rec = [84 + (5.24 × Expected Yield) + (Extractable K × –0.56) + (Expected Yield × Extractable K × –0.035)]

The K recommendations are for the total amount of broadcast and banded nutrients to be applied. If extractable K is greater than 150 ppm, then basic K recommendation is zero. If extractable K is less than 150 ppm, then the minimum K recommendation is 15 lb P_2O_5/a.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (ton/a)				
		2	4	6	8	10
(ppm)		---------- lb K_2O/a ----------				
0 – 50	Very Low	80	85	95	105	115
51 – 100	Low	45	50	55	65	70
101 – 150	Medium	15	15	20	20	20
151 – 180	High	0	0	0	0	0
181+	Very High	0	0	0	0	0

$$\text{Potassium Build-Maintenance Rec} = \left\{ \frac{(150 - \text{Current K Soil Test}) \times 9}{\text{Years To Build}} \right\} + K_2O \text{ Removal In Crop}$$

The goal of the initial phase is to build the soil test value to the critical soil test value (CSTV) of 150 ppm, and subsequently maintain it within the range of 150 to 180 ppm through crop removal replacement. The quantity of K_2O fertilizer required to elevate the soil test K value differs according to soil type, in addition to differences in K crop removal, cycling to the soil and soil-K interaction, therefore regular soil sampling is necessary to keep track of soil test levels.

Four-, six-, and eight-year time frames below are examples only. Build programs can be over longer time frames, however, build-maintenance recommendations should not be less than crop sufficiency-based fertility programs.

Potassium Build-Maintenance Recommendations

Extractable K Soil Test	Category	4-Year Build Time Frame, Expected Yield (ton/a)			6-Year Build Time Frame, Expected Yield (ton/a)			8-Year Build Time Frame, Expected Yield (ton/a)		
		2	6	10	2	6	10	2	6	10
(ppm)		---------- lb K_2O/a ----------			---------- lb K_2O/a ----------			---------- lb K_2O/a ----------		
0 – 50	Very Low	356	596	836	278	518	758	238	478	718
51 – 100	Low	243	483	723	202	442	682	181	421	661
101 – 150	Medium	130	370	610	127	367	607	125	365	605
151 – 180 *	High	120	360	600	120	360	600	120	360	600
181+	Very High	0	0	0	0	0	0	0	0	0

*Recommended amounts of K_2O are based on crop nutrient removal only.

New Alfalfa and Clover

New Alfalfa/Clover Sufficiency K Rec = [105 + (15 × Expected Yield) + (Extractable K × –0.7) + (Expected Yield × Extractable K × –0.1)]

The K recommendations are for the total amount of broadcast and banded nutrients to be applied. If extractable K is greater than 150 ppm, then basic K recommendation is zero. If extractable K is less than 150 ppm, then the minimum K recommendation is 15 lb P_2O_5/a.

Potassium Sufficiency Recommendations

Extractable K Soil Test	Category	Expected Yield (ton/a)				
		2	3	4	5	6
(ppm)		----------lb K_2O/a ----------				
0 – 50	Very Low	115	125	140	150	165
51 – 100	Low	65	75	80	90	95
101 – 150	Medium	20	25	25	30	30
151 – 180	High	0	0	0	0	0
181+	Very High	0	0	0	0	0

Chloride

Chloride fertilizer is recommended for wheat, corn and sorghum only.

Chloride Recommendation

Profile Soil Chloride		Chloride Recommendation
ppm	lb/a	lb Cl/a
< 4	< 30	20
4 – 6	30 – 45	10
> 6	> 45	0

Boron

Do not band apply boron. **Recommendations are for southeast Kansas in alfalfa, corn, sorghum and soybeans only.** Test is not well calibrated.

Boron Recommendation

DTPA Extractable B	Boron Recommendation
ppm	lb B/a
< 0.5	2
0.6 – 1.0	1
> 1.0	0

Zinc

Zinc recommendation is for corn, sorghum and soybeans only.

Broadcast application is intended to build Zn soil test level to non-responsive range and correct soil deficiency for several years. If applied as banded starter at planting, application of about 0.5 – 1.0 lb Zn/a will correct crop deficiency for that crop year. Soil deficiency will likely remain.

Zinc recommendation for wheat, sunflowers, oats, alfalfa, brome, fescue, Bermudagrass and other crops. These crops show little to no response to zinc applications. No application is recommended.

Zinc Recommendation

Zn Rate = 11.5 – (11.25 × ppm DTPA Zn)

If DTPA Zn > 1.0 ppm then Zn Rec = 0

If DTPA Zn <= 1.0 ppm then Minimum Zn Rec = 1

Sulfur

Corn and Grain Sorghum Sulfur Recommendation (lb/a) = (0.2 × Expected Yield) – (2.5 × % OM) – Profile Sulfur – Other Sulfur Credits

Corn and Forage Sorghum Silage Sulfur Recommendation (lb/a) = (1.33 × Expected Yield) – (2.5 × % OM) – Profile Sulfur – Other Sulfur Credits

Wheat Sulfur Recommendation (lb/a) = (0.6 × Expected Yield) – (2.5 × % OM) – Profile Sulfur – Other Sulfur Credits

Soybean Sulfur Recommendation (lb/a) = (0.4 × Expected Yield) – (2.5 × % OM) – Profile Sulfur – Other Sulfur Credits

Sunflower Sulfur Recommendation (lb/a) = (0.005 × Expected Yield) – (2.5 × % OM) – Profile Sulfur – Other Sulfur Credits

Brome, Fescue & Bermudagrass Sulfur Recommendation (lb/a) = (5.0 × Expected Yield) – (2.5 × % OM) – Profile Sulfur – Other Sulfur Credits

Alfalfa Sulfur Recommendation (lb/a) = (6.0 × Expected Yield) – (2.5 × % OM) – Profile Sulfur – Other Sulfur Credits

*Default Profile Sulfur = 25 lb S/a

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