Soybean nutrient recommendations

Phosphate

Yield goal (bu/a)	Very Low	Low	Optimum	High	Very High	Ex. High
	LBS/ACRE OF P_2O_5 TO APPLY					
15-25	--	30	20	10	--	0
26-35	--	35	25	15	--	0
36-45	--	45	35	20	--	0
46-55	--	55	45	20	--	0
56-65	--	60	50	25	--	0
66-75	--	70	60	30	--	0
76-85	--	80	70	35	--	0

Potash

Yield goal (bu/a)	Very Low	Low	Optimum	High	Very High	Ex. High
	LBS/ACRE OF K_2O TO APPLY					
15-25	60-75**	35-60**	20	10	0	0
26-35	70-85**	45-70**	30	15	0	0
36-45	80-95**	55-80**	40	20	10	0
46-55	90-105**	65-90**	50	25	10	0
56-65	100-115**	75-100**	60	30	15	0
66-75	110-125**	85-110**	70	35	20	0
76-85	120-135**	95-120**	80	40	20	0

– Very low and very high category does not exist for soil test phosphorus
** Use lower values on sandy or organic soils

Alfalfa nutrient recommendations

Phosphate

Yield goal (tons/a)	Very Low	Low	Optimum	High	Very High	Ex. High
	LBS/ACRE OF P_2O_5 TO APPLY					
1.5-2.5	55-75*	45-65*	25	10	--	0
2.6-3.5	65-85*	55-75*	35	15	--	0
3.6-4.5	80-100*	70-90*	50	25	--	0
4.6-5.5	95-115*	85-105*	65	30	--	0
5.6-6.5	105-125*	95-115*	75	35	--	0
6.6-7.5	120-140*	110-130*	90	45	--	0

Potash

Yield goal (tons/a)	Very Low	Low	Optimum	High	Very High	Ex. High
	LBS/ACRE OF K_2O TO APPLY					
1.5-2.5	135-150**	125-135**	100	50	25	0
2.6-3.5	185-200**	175-185**	150	75	40	0
3.6-4.5	235-250**	225-235**	200	100	50	0
4.6-5.5	285-300**	275-285**	250	125	60	0
5.6-6.5	335-350**	325-335**	300	150	75	0
6.6-7.5	385-400**	375-385**	350	175	90	0

-- Very high category does not exist for soil test phosphorus
* Use lower values on sandy soils
** Use lower values on sandy or organic soils

Special Situations

Legume Forage	Where an alfalfa stand is to be maintained for more than three years **increase** the annual top-dressed **K_2O by 20%.** Apply **30 lb N/acre** in the seeding year if grown on soils with less than 2% organic matter. Apply **40 lb N/acre** for legume pasture on sandy soils and **20 lb N/acre** on soils with less than 2% organic matter.
Nurse Crops	Where barley or oats are seeded with legume forage, **reduce N** for the small grain **by 50%**.

Corn nutrient recommendations

Organic matter (%)	Medium and Fine Textured Soils – Yield potential[1]: High/very high	Medium and Fine Textured Soils – Yield potential[1]: Low/medium[2]	Sandy and Loamy Sands: Irrigated	Sandy and Loamy Sands: Non-irrigated
	LBS ACRE OF N TO APPLY			
Nitrogen under 2	180	150	200	120
2.0 - 9.9	160	120	160	110
10 - 20	120	90	120	100
over 20	80	80	80	80

Credit starter fertilizer N over 20 lb/a against the overall N recommendation.

[1] To determine yield potential consult UWEX publication A2809 or contact your agronomist or county agent
[2] Irrigated non-sandy soils with a low/medium yield potential should use the high/very high recommendation

GRAIN

Phosphate

Yield goal (bu/a)	Very Low	Low	Optimum	High	Ex. High
	LBS/ACRE OF P_2O_5 TO APPLY				
71-90	60-90*	50-70*	30	15	0
91-110	70-100*	60-80*	40	20	0
111-130	75-105*	65-85*	45	25	0
131-150	85-115*	75-95*	55	25	0
151-170	90-120*	80-100*	60	30	0
171-190	100-130*	90-110*	70	35	0
191-220	105-135*	95-115*	75	40	0

Potash

Yield goal (bu/a)	Very Low	Low	Optimum	High	Ex. High
	LBS/ACRE OF K_2O TO APPLY				
71-90	50-80**	40-65**	25	15	0
91-110	55-85**	45-70**	30	15	0
111-130	60-90**	50-75**	35	15	0
131-150	65-95**	55-80**	40	20	0
151-170	70-100**	60-85**	45	20	0
171-190	75-105**	65-90**	50	20	0
191-220	80-110**	70-95**	55	25	0

* Use higher values on sandy or organic soils
** Use lower values on sandy or organic soils

SILAGE

Phosphate

Yield goal @ 35% DM (tons/a)	Very Low	Low	Optimum	High	Very High	Ex. High
	LBS/ACRE OF P_2O_5 TO APPLY					
under 16	80-110*	70-90*	50	25	--	0
16 - 20	95-125*	85-105*	65	30	--	0
20 - 25	115-145*	105-125*	85	40	--	0
over 25	130-160*	120-140*	100	50	--	0

Potash

Yield goal @ 35% DM (tons/a)	Very Low	Low	Optimum	High	Very High	Ex. High
	LBS/ACRE OF K_2O TO APPLY					
under 16	125-155**	115-140**	100	50	25	0
16 - 20	145-175**	135-160**	120	60	30	0
20 - 25	160-190**	150-175**	135	70	35	0
over 25	175-205**	165-190**	150	75	40	0

-- Very high category does not exist for soil test phosphorus
* Use higher values on sandy or organic soils
** Use lower values on sandy or organic soils

Special Situations

Conservation tillage	When corn is planted in fields with at least 50% residue cover from the previous corn crop, increase **N application** by **30 lb N/a.**
High P soils	If P levels exceed 150 ppm, **do not apply additional P**, except for a maximum of 20 lb/a of starter P_2O_5 for row crops.
Sandy soils	**N** should be applied as single sidedress application or as split applications.

Legume N credits

FORAGE - 1ST YEAR

	MEDIUM / FINE TEXTURED SOILS: more than 8 inches of regrowth	MEDIUM / FINE TEXTURED SOILS: less than 8 inches of regrowth	SANDY SOILS: more than 8 inches of regrowth	SANDY SOILS: less than 8 inches of regrowth
	LBS/ACRE OF NITROGEN TO CREDIT			
Alfalfa*				
Stand Density				
Good (70-100% alfalfa, more than 4 plants/ft^2)	190	150	140	100
Fair (30-70% alfalfa, 1.5 - 4 plants/ft^2)	160	120	110	70
Poor (0-30% alfalfa, less than 1.5 plants/ft^2)	130	90	80	40
Red Clover or Birdsfoot Trefoil	**80% of alfalfa credit** for similar stands.			

*Second year credit: In the second cropping year following a fair or good stand on a fine/medium textured soil, take a **50 lb N/acre** credit.

FIELD CROPS

Soybean	**40 lb N/acre** No credit on sandy soils.
Pea, snap or lima bean	**20 lb N/acre** No credit on sandy soils.

GREEN MANURE

Alfalfa	**60-100 lb N/acre**	Use **40 lb N/acre** credit if less than 6 inches of growth before tillage.
Sweet Clover	**80-120 lb N/acre**	
Red Clover	**50-80 lb N/acre**	

NPM Contacts

Nutrient Mgmt. Specialist:
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(800-228-8672)
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CERTIFIED CROP ADVISER

Manure info.

APPROX. AVAILABLE NUTRIENT CONTENT

1ST YEAR [2ND YEAR]

	N	N*	P_2O_5	K_2O
Dairy				
Solid (lb/ton)	3 [1]	4 [1]	3 [1]	7 [1]
Liquid (lb/1000 gal)	7 [3]	10 [2]	5 [1]	16 [2]
Beef				
Solid (lb/ton)	4 [1]	5 [1]	5 [1]	9 [1]
Liquid (lb/1000 gal)	5 [2]	7 [2]	5 [1]	16 [2]
Swine				
Solid (lb/ton)	7 [1]	9 [2]	6 [1]	7 [1]
Liquid (lb/1000 gal)				
Indoor Pit	25 [5]	33 [5]	25 [4]	24 [3]
Outdoor Pit	17 [3]	22 [4]	10 [1]	16 [2]
Farrow-nursery Indoor Pit	13 [2]	16 [3]	14 [2]	18 [2]
Poultry				
Solid (lb/ton)	20 [4]	24 [4]	30* [5]	24 [3]
Liquid (lb/1000 gal)	8 [2]	10 [1]	6 [1]	10 [1]
Horse				
Solid (lb/ton)	3 [1]	4 [1]	4 [0]	8 [1]

* Manure incorporated within 3 days
* 24 for turkey

MANURE OUTPUT*

Animal	(weight)	lb/day	tons/year	gal/day	1000 gal/year
Dairy	(1400 lb)	148	27	17.7	6.5
Beef	(1100 lb)	80	15	9.5	3.5
Swine	(150 lb)	9.5	1.7	1.2	0.44
Chicken/broiler	(2 lb)	0.18	0.031	0.02	0.008
Horse	(1000 lb)	50	9.1	6.0	2.2

*Volume as excreted.

DETERMINING MANURE APPLICATION RATE

Step 1 Figure load size: Weigh spreader in tons for solid or semi-solid manure

Use 90% tank capacity in gallons for liquid manure

Step 2 Determine field acreage:

$$\frac{\text{field length (ft)} \times \text{field width (ft)}}{43{,}560\ \text{ft}^2/\text{a}} = \text{acres}$$

Step 3 Calculate manure application rate:

$$\frac{[(\#\ \text{of loads}) \times (\text{load size})]}{\text{field acreage}} = \text{tons or gallons / acre}$$

GUIDELINE FOR UNINCORPORATED MANURE

Do not apply more than 25 tons of solid dairy manure per acre per year or its **phosphorus equivalent**.

	Solid (tons)	Liquid (gallons)
Dairy	25	15000
Beef	15	15000
Swine	13	7500*
Chicken	3	12500

* outdoor pit

NUTRIENT MANAGEMENT

FAST FACTS

Nutrient and Pest Management Program (NPM), University of Wisconsin-Extension. Call (608) 265-2660 for additional copies 4/03

indicates information pertains to Wisconsin only.

Planting & Harvest info.

DETERMINING PLANT POPULATIONS

Row Width	20"	28"	30"	32"	36"	38"	40"
Row Length*	26'1"	18'8"	17'5"	16'4"	14'6"	13'9"	13'1"

*Row length required to equal 1/1000 acre.

Calculation: (# of plants in row length) x 1000 = **plants/acre**

NUTRIENTS REMOVED BY CROP AT HARVEST

	P_2O_5	K_2O
	approx. lb	
Alfalfa* / red clover, 1 ton/a	13	60
Barley[1],		
Grain, 50 bu/a (1 bu = 48 lb @ 14.5% moisture)	19	13
Straw, 1 ton/a	5	30
Corn		
Grain (1 bu = 56 lb @ 15.5% moisture)		
91-110 bu/a	40	30
111- 130 bu/a	45	35
131-150 bu/a	55	40
151-170 bu/a	60	45
171-190 bu/a	70	50
191-220 bu/a	75	55
Silage,1 ton/a	4	8
Oats[1]		
Grain, 100 bu/a (1 bu = 32 lb @ 14% moisture)	25	19
Straw, 1 ton/a	8	40
Potatoes, 100 cwt/a	15	50
Sorghum Silage[1], 1 ton/a	15	58
Soybean*, 40 bu/a (1 bu = 60 lb @ 13% moisture)	35	40
Wheat[1]		
Grain, 50 bu/a (1 bu = 60 lb @ 13.5% moisture)	31	19
Straw, 1 ton/a	3	40

***Nitrogen removal** by alfalfa (1ton) is 60 lb and by soybeans (40 bu) is 125 lb.

Source: University of Wisconsin Extension unless noted

[1]From Modern Corn Production, S.R. Aldrich, et al., 1986

USING THIS TABLE IS NOT A SUBSTITUTE FOR SOIL TESTING

CONVERTING POUNDS HARVESTED TO BUSHELS WITH % MOISTURE CONTENT CORRECTIONS

Shelled Corn

[lbs harvested x (1 - % moisture in corn)] ÷ 47.32 = **bu @ 15.5% moisture**

Ear corn

lbs harvested ÷ number from chart below = **bu @ 15.5% moisture**

moisture %	15	15.5	16	17	18	19	20	21	22	23	24	25	26	27
equation #	68.1	68.6	69.2	70.4	71.6	72.8	74.1	75.4	76.6	78.0	79.4	80.7	82	83.4

Soybeans or wheat

lbs harvested x (1 - % foreign matter) = adjusted lbs harvested

[adjusted lbs x (1 - % moisture)] ÷ 52.2 = **bu soybeans @ 13% moisture**
bu wheat @ 0% moisture

CALCULATING ACRES HARVESTED:

acres harvested =
[row length(ft) x row width(ft) x # of rows harvested] ÷ 43,560 ft²/acre

Example with corn harvested by combine :

Step 1: 12,580 lbs corn harvested @ 21.35% moisture
12,580 lbs x (1 - .2135) ÷ 47.32 = 209 bu of corn @ 15.5 % moisture

Step 2: Four-row harvester: 16 rows , each 30 inch (2.5 ft) row is 1210 feet long
(1210 ft x 2.5 ft x 16 rows) ÷ 43,560 ft²/acre = 1.10 acres

Step 3: 209 bu of corn ÷ 1.10 acres = 190 bu/acre

Fertilizer analysis

	N	P_2O_5	K_2O	other
	% content			
Nitrogen				
Ammonium nitrate	34	0	0	
Ammonium sulfate (AMS)	21	0	0	24(S)
Ammonium thiosulfate (ATS)	12	0	0	26(S)
Anhydrous ammonia	82	0	0	
Aqueous ammonia	20	0	0	
Calcium nitrate (CN)	15	0	0	17(Ca)
Urea	46	0	0	
28% Urea ammonium nitrate (UAN)	28	0	0	
32% UAN	32	0	0	
Phosphorus				
Ammonium polyphosphate (dry)	15	62	0	
Ammonium polyphosphate (liquid)	10	34	0	
Diammonium phosphate (DAP)	18	46	0	
Monoammonium phosphate (MAP)	11	52	0	
Triple superphosphate (TSP)	0	46	0	
Potassium				
Potassium chloride (muriate of potash)	0	0	60-62	
Potassium-magnesium sulfate	0	0	22	22(S),11(Mg)
Potassium nitrate	13	0	44	
Potassium sulfate	0	0	50	18(S)

Liquid weights:
1 gallon water weighs 8.3 lbs
1 gallon UAN (28%) weighs 10.6 lbs
1 gallon 10-34-0 weighs 11.6 lbs
1 gallon 9-18-9 weighs 11.1 lbs

Conversions

Take column 1	multiply by column 2	to get column 3
acre (a)	43,560	square feet (ft²)
acre (a)	0.405	hectare (ha)
square mile (mi²)	640	acres (a)
cubic yard (yd³)	27	cubic feet (ft³)
cubic feet (ft³)	7.48	gallons (gal)
bushel (bu)	1.244	cubic feet (ft³)
bushel (bu)	8	gallons - dry
bushel (bu)	9.31	gallons - liquid
ounces (oz)	29.6	milliliters (ml)
gallon (gal)	3.78	liters (l)
gallon (gal)	128	fluid ounces (fl oz)
gallon (gal)	4	quart (qt)
acre-foot	43,560	cubic feet (ft³)
acre-foot	325,851	gallons (gal)
chain (ch)	66	feet (ft)
chain (ch)	4	rods (r)
rods (r)	16.5	feet (ft)
mile (mi)	5280	feet (ft)
ton (short)	2,000	pounds (lb)
ton (long)	2,230	pounds (lb)
gallons/acre (gal/a)	9.354	liters/hectare (l/ha)
miles/hour (mph)	88	feet/minute (ft/min)
pounds/acre (lb/a)	1.12	kilograms/hectare (kg/ha)
P_2O_5 (lb)	0.44	P (lb)
K_2O (lb)	0.83	K (lb)
ppm-plow layer (6 in)	2	lb/acre (lb/a)
ppm-top soil (12 in)	4	lb/acre (lb/a)

To get column 1, divide column 3 by column 2