Chapter ATCP 50
APPENDIX B

Soybean nutrient recommendations

	Yield goal (bu/a)	Soil test level of the field: Very Low	Low	Opti-mum	High	Very High	Ex. High
		LBS/ACRE OF P_2O_5 TO APPLY					
Phosphate	15-25	30	30	20	10	--	0
	26-35	35	35	25	15	--	0
	36-45	45	45	35	20	--	0
	46-55	55	55	45	20	--	0
	56-65	60	60	50	25	--	0
	66-75	70	70	60	30	--	0
	76-85	80	80	70	35	--	0
		LBS/ACRE OF K_2O TO APPLY					
Potash	15-25	60-75**	35-50**	20	10	0	0
	26-35	70-85**	45-60**	30	15	0	0
	36-45	80-95**	55-70**	40	20	10	0
	46-55	90-105**	65-80**	50	25	10	0
	56-65	100-115**	75-90**	60	30	15	0
	66-75	110-125**	85-100**	70	35	20	0
	76-85	120-135**	95-110**	80	40	20	0

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

Alfalfa nutrient recommendations

	Yield goal (tons/a)	Soil test level of the field: Very Low	Low	Opti-mum	High	Very High	Ex. High
		LBS/ACRE OF P_2O_5 TO APPLY					
Phosphate	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
		LBS/ACRE OF K_2O TO APPLY					
Potash	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**	225-285**	250	125	60	0
	5.6-6.5	335-350**	325-335**	300	150	75	0
	6.6-7.5	385-400**	325-385**	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 (%)	Soil texture: Sands or loamy sands: Non-irrigated	Irrigated	Other Soils, Yield potential[1]: Low/medium[2]	High/very high
		LBS/ACRE OF N TO APPLY			
Nitrogen	< 2	120	200	150	180
	2.0 - 4.9	110	160	120	160
	5.0 - 20	100	120	90	120
	> 20	80	80	80	80

Credit starter fertilizer N >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

	Yield goal (bu/a)	Soil test level of the field: Very Low	Low	Opti-mum	High	Ex. High
		LBS/ACRE OF P_2O_5 TO APPLY				
Phosphate	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
	191-210	105-135*	95-115*	75	40	0
		LBS/ACRE OF K_2O TO APPLY				
Potash	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
	191-210	80-110**	70-95**	55	25	0

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

Silage

	Yield goal (tons/a)	Soil test level of the field: Very Low	Low	Opti-mum	High	Very High	Ex. High
		LBS/ACRE OF P_2O_5 TO APPLY					
Phosphate	< 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
	> 25	130-160*	120-140*	100	50	--	0
		LBS/ACRE OF K_2O TO APPLY					
Potash	< 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
	> 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	If > 50% residue cover remains on the surface, increase **N requirement** for corn by **30 lb N/acre** for the first two years.
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

Legume crop	Nitrogen credit	Exceptions
Forages		
First Year Credit		
Alfalfa	**190 lb N/acre** for **good** stand (more than 70% alfalfa or more than 4 plants/ft²)	**Reduce credit by 50 lb N/acre** on sands and loamy sands.
	160 lb N/acre for **fair** stand (30 - 70% alfalfa or 1.5 - 4 plants/ft²)	**Reduce credit by 40 lb N/acre** if less than 8 inches of regrowth after last harvest.
	130 lb N/acre for **poor** stand (less than 30% alfalfa or less than 1.5 plants/ft²)	
Red Clover & Birdsfoot Trefoil	**80% of alfalfa credit** for similar stands	
Second Year Credit	**50 lb N/acre**, following a good or fair stand.	No credit on sands and loamy sands.
Green manures		
Sweet clover	**80-120 lb N/acre**	**Use 20 lb N/acre credit** if field has less than 6 inches of growth before tillage.
Alfalfa	**60-100 lb N/acre**	
Red clover	**50-80 lb N/acre**	
Soybeans	**40 lb N/acre**	
Vegetable Crops		No credit on sands and loamy sands.
Peas, snap beans & lima beans	**20 lb N/acre**	

Manure info.

Approx. 1st & 2nd year available nutrient content with 2nd year in brackets [ ]

	N (manure not incorporated)	N (manure incorporated by 3rd day)	P_2O_5	K_2O
Dairy manure				
Solid (lb/ton)	3 [1]	4 [1]	3 [0]	8 [1]
Liquid (lb/1000 gal)	8 [3]	10 [3]	8 [1]	21 [3]
Beef manure				
Solid (lb/ton)	4 [1]	4 [2]	5 [1]	8 [1]
Liquid (lb/1000 gal)	10 [4]	12 [4]	14 [2]	23 [3]
Swine manure				
Solid (lb/ton)	4 [1]	5 [1]	3 [1]	7 [1]
Liquid (lb/1000 gal)	22 [6]	28 [5]	15 [3]	26 [3]
Poultry manure				
Solid (lb/ton)	13 [2]	15 [3]	14 [2]	9 [1]
Liquid (lb/1000 gal)	35 [7]	41 [7]	38 [7]	25 [3]

Manure output

Animal and size	lb/day	tons/year
Dairy (1400 lb)	120	21.9
Beef (1250 lb)	75	13.7
Swine (200 lb)	13	2.4
Poultry (4 lb)	0.21	0.038

Determining manure application rate :

Step 1: Figure load size :

Weigh spreader in tons — Solid or semi-solid

90% tank capacity in gallons — Liquid

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 or its **phosphorus equivalent** per year

	Solid (tons)	Liquid (gallons)
Dairy	25	9000
Beef	14	5000
Swine	25	5000
Poultry	5	2000

NUTRIENT MANAGEMENT

FAST FACTS

Nutrient and Pest Management Program (NPM), University of Wisconsin-Extension. Call (608) 265-2660 for additional copies. 3/97

indicates information pertains to Wisconsin only.

Harvest info.

Nutrients removed by crop at harvest

	P_2O_5	K_2O
	approximate lb	
Alfalfa* / **red clover**, 1 ton/a	13	50
Barley[1], 50 bu/a	19	13
Corn		
Grain (1 bu = 56 lb @ 15.5% moisture)		
90-110 bu/a	40	25
110-130 bu/a	45	30
130 - 150 bu/a	55	35
150 -170 bu/a	60	40
Silage,1 ton/a	4	11
Oats[1]		
Grain, 100 bu/a (1 bu = 32 lb @ 13% moisture)	25	19
Straw, 1 ton/a	5	30
Potatoes[2], 100 cwt/a	13	58
Sorghum[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% moisture)	31	19
Straw, 1 ton/a	3	40

USING THIS TABLE IS NOT A SUBSTITUTE FOR SOIL TESTING

***Nitrogen removal** by alfalfa (1 ton) is 60 lb and by soybeans (40 bu) is 115 lb.

Source: University of Wisconsin Extension unless noted
1 From Modern Corn Production, S.R. Aldrich, et al., 1986
2 From Minnesota Extension Bulletin 262

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 row is 1210 feet long
30 inches = 2.5 feet
(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-K
Nitrogen	
Anhydrous ammonia	82-0-0
Ammonium nitrate	34-0-0
Urea	46-0-0
UAN solution - 28 and 32%	28-0-0
(Urea ammonium nitrate)	32-0-0
Aqueous ammonia	20-0-0
Ammonium sulfate (AMS)	21-0-0-24(S)
Phosphorus	
Triple superphosphate (TSP)	0-46-0
Diammonium phosphate(DAP)	18-46-0
Monoammonium phosphate (MAP)	11-52-0
Ammonium polyphosphate liquid	10-34-0
Ammonium polyphosphate	15-62-0
Potassium	
Potassium chloride (muriate of potash)	0-0-60 to 62
Potassium sulfate	0-0-50-18(S)
Potassium-magnesium sulfate	0-0-22-22(S)-11(Mg)
Potassium nitrate	13-0-44

1 gallon water weighs 8.3 lbs
1 gallon UAN (28%N) weighs 10.6 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