Whole Farm Nutrient Management Planning Workbook

THE NUTRIENT AND PEST MANAGEMENT PROGRAM
COLLEGE OF AGRICULTURAL AND LIFE SCIENCES
UNIVERSITY OF WISCONSIN-EXTENSION

A Case Study on Whole-farm Nutrient Management

Background

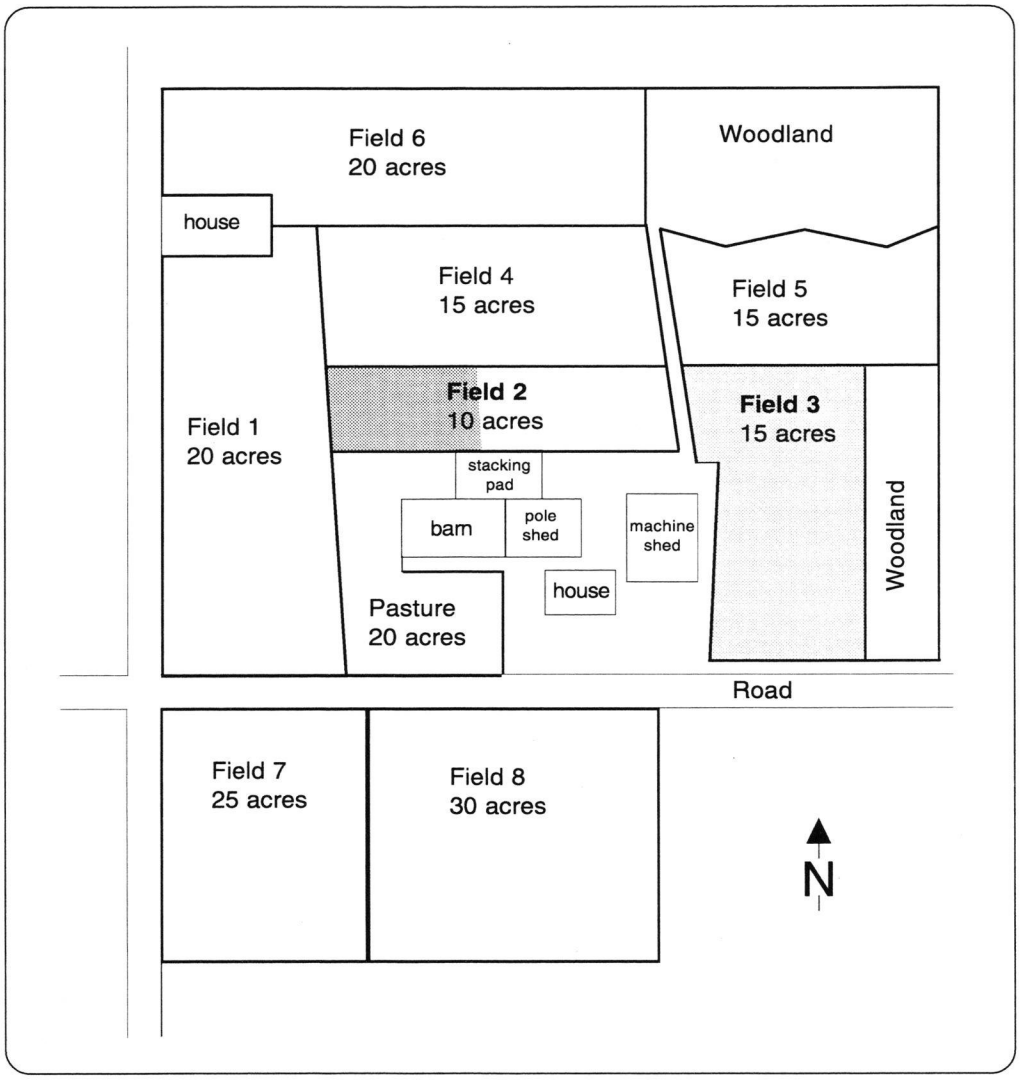
Fred Johnson operates a dairy farm in Washington County. He owns 150 acres of tillable land and rents an additional 25 acres from a neighbor 2 miles down the road. His crop rotation consists of 2 years corn, 1 year oats seeded with alfalfa, and 3 years alfalfa. This rotation was designed by the county Land Conservation Department as part of the farm conservation plan. Fred is fairly lucky because most of his land has slope less than 3%. However, fields 4 and 6 have 7% and 12% slopes respectively. These fields are required by his conservation plan to have at least 30% crop residue left on the surface. Fred harvests some high moisture corn but harvests most of his corn as silage and bales all his hay. His oats are combined and straw baled for bedding. He milks his 68 cow dairy herd twice a day, and has a rolling herd average of 19,500 pounds. From April to the first part of November, the cows are pastured during the day and confined to the barn at night. He stacks dairy manure from April until November, and daily hauls for the months of November and December. Manure is also stacked in January, February and March. Fred cleans out the pole shed where he keeps 8 dry cows and 12 heifers, once a month, hauling out six loads at each cleaning. His manure spreader was calibrated by a crop consultant, and holds 4 tons of manure on average.

Fred believes in the value of soil testing and tests every 3 or 4 years and has just had all of his fields, including the rented land tested.

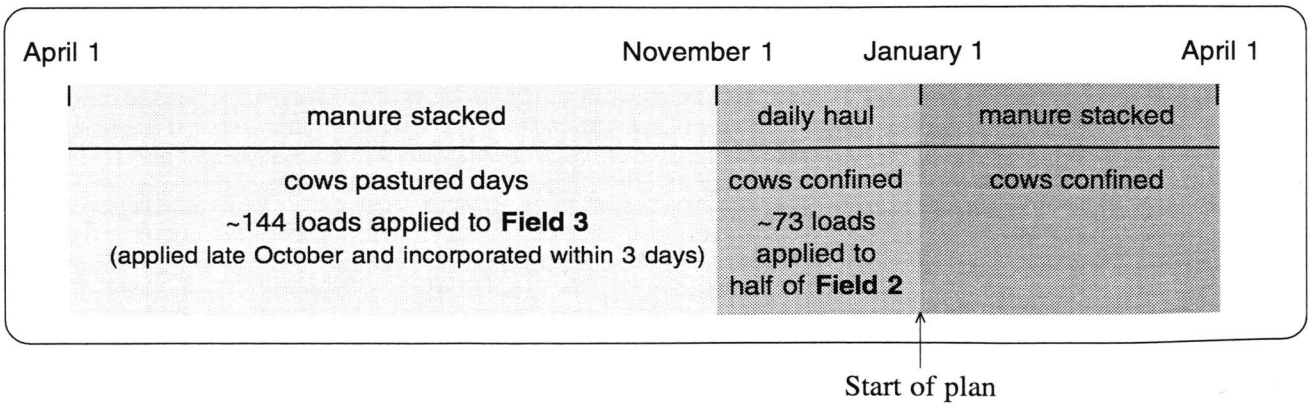
Objective

Fred recently attended a few meetings and field days about sound nutrient management and decided to adopt some of these practices on his farm. He is especially interested in manure and legume crediting, however, he is not sure where to start. The objective of this case study is to help Fred develop a nutrient management plan for his farm. He plans to start following his nutrient management plan by January 1.

Farm Map



Manure Application Timeline



Soil Information Sheet

COOPERATIVE EXTENSION PROGRAMS
University of Wisconsin—Extension
University of Wisconsin—Madison

SOIL INFORMATION SHEET
FOR
FARM FIELD AND COMMERCIAL VEGETABLE AND FRUIT CROPS
(Use a Separate Sheet for Each Farm); READ INSTRUCTIONS ON REVERSE SIDE

PLEASE PRINT OR TYPE

LAB USE ONLY
Date Rec'd ________
Lab No. ________
County Code ________

1 NAME AND ADDRESS
ASCS Farm No. ________
Name THE PROGRESSIVE FARM
St. or R.R. N 3895 FARMLAND RD County WASHINGTON
City OATVILLE State WI Zip 51515

2 PAYMENT
Enclosed $ ________
Acct. No. ________

3 No. of samples for Routine Test (pH, O.M., P,K) ________

4 Special Test(s) Requested *(list field or sample identification)*

Calcium-Magnesium (includes estimated CEC)	Zinc
Boron	Sulfur 1-3
Manganese	Other (choices listed on fee schedule)

Comments/Special Instructions:

SOIL & PLANT ANALYSIS LAB
5711 MINERAL POINT ROAD
MADISON, WI 53705
(608) 262-4364

SOIL & FORAGE ANALYSIS LAB
8396 YELLOWSTONE DRIVE
MARSHFIELD, WI 54449
(715) 387-2523

5 Will sewage sludge be applied to these fields?
yes ________ no ✓

FIELD INFORMATION FOR SOIL SAMPLES
Read reverse side for further instructions

6 FIELD LETTER AND/OR NUMBER	7 SAMPLE NO(S)	8 Check (✓) if irrigated	9 Check (✓) if limed in last 3 years	10 SOIL NAME	Lab Code	11 ACRES IN FIELD	12 Plow Depth Inches		13 Crop Rotation OPTION 1 Crop to be Grown	OPTION 1 Yield Goal	OPTION 2 Crop to be Grown	OPTION 2 Yield Goal	Fertilizer Replacement Information 14A Previous Crop Information[1] Crop	Yield	Legume Forage % stand	Check if harvested after Sept. 10	14B Manure Applied Since Last Crop Animal	Liquid or Solid (Circle one)	Application rate T/a or 1000 gal/a
3	1-3			SISSON		15	8	Year 1	18	140	18	140	CORN	15 t/a	–	–	DAIRY	Liquid	38 t/a
								Year 2	1	4	30	65						(Solid)	
								Year 3	1	4	1	4							
								Year 1										Liquid	
								Year 2										Solid	
								Year 3											
								Year 1										Liquid	
								Year 2										Solid	
								Year 3											
								Year 1										Liquid	
								Year 2										Solid	
								Year 3											
								Year 1										Liquid	
								Year 2										Solid	
								Year 3											
								Year 1										Liquid	
								Year 2										Solid	
								Year 3											
								Year 1										Liquid	
								Year 2										Solid	
								Year 3											
								Year 1										Liquid	
								Year 2										Solid	
								Year 3											
								Year 1										Liquid	
								Year 2										Solid	
								Year 3											

[1] Legume forage plowdown or manure application will result in a reduction of nutrients needed

Soil Information Sheet

INSTRUCTIONS FOR COMPLETING SOIL INFORMATION SHEET

1. **NAME AND ADDRESS:** Enter complete name and address including county from which soil sample was taken. Include ASCS Farm number where applicable.

2. **PAYMENT:** Enclose the required sample fee or enter the account number assigned to you by the laboratory clerical staff. New accounts may be opened upon application if payment according to a monthly bill is desired.

3. **NO. OF SAMPLES FOR ROUTINE TEST:** Enter the total number of samples submitted for which the routine soil test is requested.

4. **SPECIAL TEST(S) REQUESTED:** Special tests may be run on individual samples, or all of the samples from the same field may be composited for a single field analysis. If the special test(s) is requested on a field basis only, enter the field designation only. If the special test(s) is requested for each sample, enter the field **AND** sample designation. Other tests which may be run on either individual samples or a composited field sample are listed on the fee schedule.

5. **SEWAGE SLUDGE APPLICATION:** Check (✓) if sewage sludge will be applied to the field(s).

6., 7. **FIELD NUMBER OR LETTER AND SAMPLE NUMBERS:** Record the field and sample identification for each field on a separate line. List the number(s) of **all samples** taken from a field on the same line as the field (see example right). Any change in field number or letter will result in a separate field recommendation. Number all samples consecutively.

6	7
FIELD LETTER AND/OR NUMBER	SAMPLE NO (S)
1	1-4
2	5
3	6-8

8. **IRRIGATED:** Check (✓) this column if the field is irrigated.

9. **LIMED:** Check (✓) this column if the field was limed in the last 2 years.

10. **SOIL NAME:** Write the soil name (not the abbreviation) from an SCS farm plan or county soil survey map whenever this information is available. Example: For Fayette silt loam, write in "Fayette." Write in the predominant soil when more than one type is found in a field. A more precise soil test recommendation can be written if the soil name is included. Leave "LAB CODE" column blank.

11. **ACRES IN FIELD:** Enter the number of acres in the field to the nearest 0.5 of an acre.

12. **PLOW DEPTH:** Enter the normal depth of plowing for each field. The lime recommendation will be based on a plowing depth of 6½ inches unless otherwise listed.

13. **CROP ROTATION:** Indicate the intended crops to be grown for the next three years under option 1. If desired, another crop rotation may be entered under option 2. Use the crop code(s) listed below for each option. Enter the realistic yield goal (no more than 10-15% higher than prior 5-year average) for each crop and each option. Base the yield goal for corn on yield of No. 2 corn at 15.5% moisture. Yield goal for alfalfa should be based on DRY MATTER in tons/acre. Base yield of other crops on the yield unit shown in parenthesis ( ) following the crop name below. Give yield goals to the nearest ½ ton for crop units expressed in tons/a. These yield goals will affect the amount of fertilizer recommended on the soil test report.

14. **FERTILIZER REPLACEMENT INFORMATION: LEGUME-SOD PLOWDOWN OR MANURE APPLICATION MAY RESULT IN A REDUCTION OF NUTRIENTS NEEDED**

    A. **PREVIOUS CROP INFORMATION:** Enter the previous crop that was grown on the field and the yield that was harvested. For all forage crops plowed down, indicate the % legume remaining in stand and check (✓) if harvested after September 10.

    B. **MANURE APPLIED SINCE LAST CROP:** If manure has been applied to the field since harvesting the last crop, indicate the type of animal (dairy, beef, swine, poultry), whether the storage was liquid or solid and the rate of application in tons/acre for dry or 1000 gal/acre for liquid manure.

Crop Code	Crop Name	Yield Unit	Crop Code	Crop Name	Yield Unit	Crop Code	Crop Name	Yield Unit
1	Alfalfa	(tons)	25	Lettuce	(tons)	48	Sorghum, forage	(tons)
2	Amarath	(lbs)	26	Lupines	(bu)	49	Soybeans	(bu)
3	Asparagus	(lbs)	27	Melons	(tons)	50	Squash	(tons)
4	Barley	(bu)	28	Millet	(bu)	51	Spinach	(tons)
5	Beans, lima	(lbs)	29	Mint, oil	(lbs)	52	Sunflower	(lbs)
6	Beans, navy	(bu)	30	Oats	(bu)	53	Tobacco	(lbs)
7	Beets, table	(tons)	31	Onion	(cwt)	54	Tomatoes	(tons)
8	Brassicas, forage	(tons)	32	Pasture, bluegrass	(tons)	55	Trefoil, birdsfoot	(tons)
9	Broccoli	(tons)	33	Pasture, tall grasses	(tons)	56	Triticale	(lbs)
10	Brussel sprouts	(tons)	34	Pasture, legume	(tons)	57	Truck crops	(tons)
11	Buckwheat	(bu)	35	Peas, canning	(lbs)	58	Vetch, hairy, crown	(tons)
12	Cabbage	(tons)	36	Peas, chick, field, cow	(lbs)	59	Wheat	(bu)
13	Canola	(lbs)	37	Peppers	(tons)	60	Wild rice	(lbs)
14	Carrots	(tons)	38	Popcorn	(bu)	61	Miscellaneous	- -
15	Cauliflower	(tons)	39	Potatoes	(cwt)	62	Apple	- -
16	Celery	(tons)	40	Pumpkins	(tons)	63	Blueberry	- -
17	Comfrey	(tons)	41	Radish	(lbs)	64	Cherry	- -
18	Corn, field	(bu)	42	Red Clover	(tons)	65	Cranberry	- -
19	Corn, sweet	(tons)	43	Rye	(bu)	66	Raspberry	- -
20	Cucumber	(bu)	44	Safflower	(lbs)	67	Strawberry	- -
21	Fababean	(bu)	45	Snapbeans	(lbs)	68	CRP, Alfalfa	- -
22	Flax	(bu)	46	Sod	(tons)	69	CRP, Red clover	- -
23	Ginseng	(lbs)	47	Sorghum, grain	(bu)	70	CRP, Grass	- -
24	Lentil	(lbs)						

Soil Test Report

Samples Analyzed By:

SOIL TEST REPORT

UNIVERSITY OF WISCONSIN SOIL TEST RECOMMENDATIONS

SOIL SCIENCE DEPARTMENT
College of Agricultural & Life Sciences
University of Wisconsin-Madison
University of Wisconsin-Extension

LAB NO.

State	County	Account No.
Washington		

Date Rec'd	Date Processed
12/28/93	01/21/94

This Report is for:

ASCS No. k3456

The Progressive Farm
N9900 Farmland Road
Oatville, WI 51515

IDENTIFICATION

Field	Acres	Soil Name (or subsoil group)	Plow Depth
3	15	Seaon	8.0

LABORATORY ANALYSIS

Sam. No.	Test. code	Est. CEC	Soil pH	O.M. %	P ppm	K ppm	Ca ppm	Mg ppm	B ppm	Mn ppm	Zn ppm	SO_4-S ppm	S Avail. Index	Other Tests	LAB USE: Sample Density g/cm³	LAB USE: Buffer Code
1	2		7.6	3.2	105	205						1.0	71		1.04	N.R.
2	2		7.4	2.9	98	195						1.0	71		1.03	N.R.
3	2		7.5	2.7	102	210						1.1	70		1.05	N.R.

OPTION 1:

Cropping year	Crop to be Grown	Crop Yield Goal	Soil Test Interpretation 1/ P	Soil Test Interpretation 1/ K	RECOMMENDATIONS: Nutrient Needs N	Nutrient Needs P_2O_5 lbs/a	Nutrient Needs K_2O	Fertilizer Replacement Credit 2/ N	Fertilizer Replacement Credit 2/ P_2O_5 lbs/a	Fertilizer Replacement Credit 2/ K_2O	Nutrients to Apply N	Nutrients to Apply P_2O_5 lbs/a	Nutrients to Apply K_2O
1	Corn, field	131 - 150	EH	EH	160	30	90	152	114	304	46	0	0*
2	Alfalfa	3.6 - 4.5	EH	EH	0	0	0	0	0	0	0	0	0
3	Alfalfa	3.6 - 4.5	EH	EH	0	0	0	0	0	0	0	0	0

Lime required for this rotation to reach pH 6.8 is 0 T/a of 80-89 lime or 0 T/a of 80-89 lime.

OPTION 2:

Cropping year	Crop to be Grown	Crop Yield Goal	Soil Test Interpretation 1/ P	Soil Test Interpretation 1/ K	RECOMMENDATIONS: Nutrient Needs N	Nutrient Needs P_2O_5 lbs/a	Nutrient Needs K_2O	Fertilizer Replacement Credit 2/ N	Fertilizer Replacement Credit 2/ P_2O_5 lbs/a	Fertilizer Replacement Credit 2/ K_2O	Nutrients to Apply N	Nutrients to Apply P_2O_5 lbs/a	Nutrients to Apply K_2O
1	Corn, field	131 - 150	EH	EH	160	0	0	152	114	304	46	0	0*
2	Oats	61.0 - 90.0	EH	EH	40	0	0	0	0	0	40	0	0
3	Alfalfa	3.6 - 4.5	EH	EH	0	0	0	0	0	0	0	0	0

Lime required for this rotation to reach pH 6.8 is 0 T/a of 80-89 lime or 0 T/a of 80-89 lime.

1/ Soil Test Interpretation Codes: VL (very low), L (low), Opt (optimum), H (high), VH (very high), EH (excessively high)

2/ These credits are determined from information provided relative to legume-sod plowdown and manure application.
Note: if spring nitrogen availability test has been run, subtract the nitrogen credit from crop nitrogen needs.

1st year ppmnt credit based on 38.0 tons of incorporated dairy manure/a

COMMENTS SECTION

Interpretations & Comments for Option 1 Crops

Crop Year	Ca	Mg	B	Mn	Zn	SAI-H
1						≤3
2						≤3
3						≤3

See indicated comments on enclosed sheet

Interpretations & Comments for Option 2 Crops

Crop Year	Ca	Mg	B	Mn	Zn	SAI-H
1						≤3
2						≤3
3						≤3

N.R. = not required for calculation of lime requirement when the soil pH is 6.6 or higher.
If the alfalfa stand will be maintained for more than three years increase topdressed potash by 20 percent.
Where barley or oats are underseeded with a legume forage reduce nitrogen by 50 percent.
* No nutrients recommended for corn, however on slow warming soils some starter fertilizer is suggested.

FARMER'S COPY

Field Summary for the Progressive Farm - Owned Land

Field 1

Size: 15 acres
Soil name: Hochheim silt loam
Manure applied: none
Soil test results: pH: 7.6
OM%: 3.2
P(ppm): 9 (very low)
K(ppm): 95 (optimum)
SAI: 36

Last Year
Crop: Alfalfa
Variety: Apollo II
Yield: 4 tons/acre

This Year
Crop: Field corn - 1 year.
Variety: Cargill 809
Yield Goal: 145 bu/acre

Field 2

Size: 10 acres
Soil name: Hochheim silt loam
Manure applied: 73 loads to west half of field
Soil test results: pH: 7.6
OM%: 3.6
P(ppm): 98 (excessively high)
K(ppm): 175 (excessively high)
SAI: 41

Last Year
Crop: Field corn
Variety: Pioneer 3747
Yield: 14 tons/acre

This Year
Crop: Field corn - 2 year.
Variety: Cargill 809.
Yield Goal: 150 bu/acre

Field 3

Size: 15 acres
Soil name: Sisson silt loam
Manure applied: 144 loads to entire field
Soil test results: pH: 7.6
OM%: 3.2
P(ppm): 102 (excessively high)
K(ppm): 203 (excessively high)
SAI: 71

Last Year
Crop: Field corn
Variety: Cargill 809
Yield: 15 tons/acre

This Year
Crop: Field corn - 2 year
Variety: Pioneer 3751
Yield Goal: 140 bu/acre

Field 4

Size: 15 acres
Soil name: Hochheim silt loam
Manure applied: none
Soil test results: pH: 7.5
OM%: 2.6
P(ppm): 17 (optimum)
K(ppm): 75 (low)
SAI: 31

Last Year
Crop: Alfalfa
Variety: Legend
Yield: 3.1 tons/acre

This Year
Crop: Field corn - 1 year.
Variety: Cargill 809
Yield Goal: 140 bu/acre

Field 5

Size: 15 acres
Soil name: Hochheim silt loam
Manure applied: none
Soil test results: pH: 7.6
OM%: 3.1
P(ppm): 21 (optimum)
K(ppm): 115 (optimum)
SAI: 41

Last Year
Crop: Oats
Variety: Ogle
Yield: 55 bu/acre

This Year
Crop: Alfalfa - 1year.
Variety: Legend
Yield Goal: 4 tons/acre

Field 6

Size: 20 acres
Soil name: Fox silt loam
Manure applied: none
Soil test results: pH: 7.4
OM%: 2.9
P(ppm): 23 (optimum)
K(ppm): 105 (optimum)
SAI: 39

Last Year
Crop: Alfalfa - 1 year
Variety: Apollo II
Yield: 4.1 tons/acre

This Year
Crop: Alfalfa - 2 year.
Variety: Apollo II
Yield Goal: 4 tons/acre

Field 7

Size: 25 acres
Soil name: Hochheim silt loam
Manure applied: none
Soil test results: pH: 7.6
OM%: 2.3
P(ppm): 18 (optimum)
K(ppm): 95 (optimum)
SAI: 37

Last Year
Crop: Alfalfa - 2 year
Variety: Vernal
Yield: 3.3 tons/acre

This Year
Crop: Alfalfa - 3 year.
Variety: Vernal
Yield Goal: 4 tons/acre

Field 8

Size: 30 acres
Soil name: Hochheim silt loam
Manure applied: none
Soil test results: **pH:** 7.6
OM%: 2.5
P(ppm): 24 (high)
K(ppm): 120 (high)
SAI: 36

Last Year
Crop: Field corn
Variety: Pioneer 3747
Yield: 136 bu/acre

This Year
Crop: Oats
Variety: Ogle
Yield Goal: 85 bu/acre

Field Summary for the Progressive Farm - *Rented Land*

Field R1

Size: 15 acres
Soil name: Sisson silt loam
Manure applied: none
Soil test results: pH: 6.8
OM%: 1.9
P(ppm): 19 (optimum)
K(ppm): 105 (optimum)
SAI: 32

Last Year
Crop: Oats
Variety: Ogle
Yield: 57 bu/acre

This Year
Crop: Alfalfa - 1 year
Variety: Vernal
Yield Goal: 4 tons/acre

Field R2

Size: 10 acres
Soil name: Sisson silt loam
Manure applied: none
Soil test results: pH: 6.7
OM%: 2.0
P(ppm): 17 (optimum)
K(ppm): 95 (optimum)
SAI: 33

Last Year
Crop: Alfalfa - 1 year
Variety: Vernal
Yield: 3.1 tons/acre

This Year
Crop: Alfalfa - 2 year
Variety: Vernal
Yield Goal: 4 tons/acre

Determining Nutrient Need

Table 1. Nitrogen recommendations for corn in Wisconsin.

Organic Matter	Sands and loamy sands		Other Soils	
	Irrigated	*Non-irrigated*	*Medium and low yield potential**	*Very high and high yield potential**
%	lbs N/a			
< 2	200	120	150	180
2.0 - 4.9	160	110	120	160
5.0 - 10.0	120	100	90	120
> 10.0	80	80	80	80

* To determine your soil yield potential, see Table 16 of UWEX bulletin A2809, *Soil test recommendations for field, vegetable, and fruit crops*, or contact your agronomist or county agent.

Note: For conservation tillage, where more than 50% residue cover remains on the surface, increase the N requirement for corn by 30 lbs/a N.

What is the nitrogen recommendation for corn on Field 3? ( )

Sisson soil =high yield potential

Table 2. Corn fertilizer recommendations for phosphate and potash at various soil test levels.

	Soil test level[1]				
Yield goal	Very Low[2]	Low[2]	Optimum	High	Excessively High[3]
(bu/a)			P_2O_5, lb/a		
71-90	45-60	40-50	30	15	0
91-110	55-90	50-60	40	20	0
111-130	60-95	55-65	45	25	0
131-150	70-85	65-75	55	25	0
151-170	75-90	70-80	60	30	0
171-190	85-100	80-90	70	35	0
191-210	90-105	85-95	75	40	0
			K_2O, lb/a		
71-90	35-60	30-50	20	10	0
91-110	40-65	35-55	25	15	0
111-130	45-70	40-60	30	15	0
131-150	50-75	45-65	35	20	0
151-170	55-80	50-70	40	20	0
171-190	60-85	55-75	45	20	0
191-210	65-90	60-80	50	25	0

[1] Where corn is harvested for silage, an additional 30 lb P_2O_5/a amd 90 lb K_2O/a should be applied to the subsequent crop if soil tests are optimum or below.

[2] For phosphate, use the higher values on sandy or organic soils and lower values for other soils. For, potash, use the lower values on sandy or organic soils and higher values for other soils.

[3] Use a small amount of starter fertilizer on soils that warm slowly in spring (a minimum addition is consedered 5, 10, 10 lb/a of N, P_2O_5, and K_2O, respectively).

What is the P_2O_5 recommendation for corn on Field 3? _____

What is the K_2O recommendation for corn on Field 3? _____

Table 3. Alfalfa fertilizer recommendations for phosphate and potash at various soil test levels.

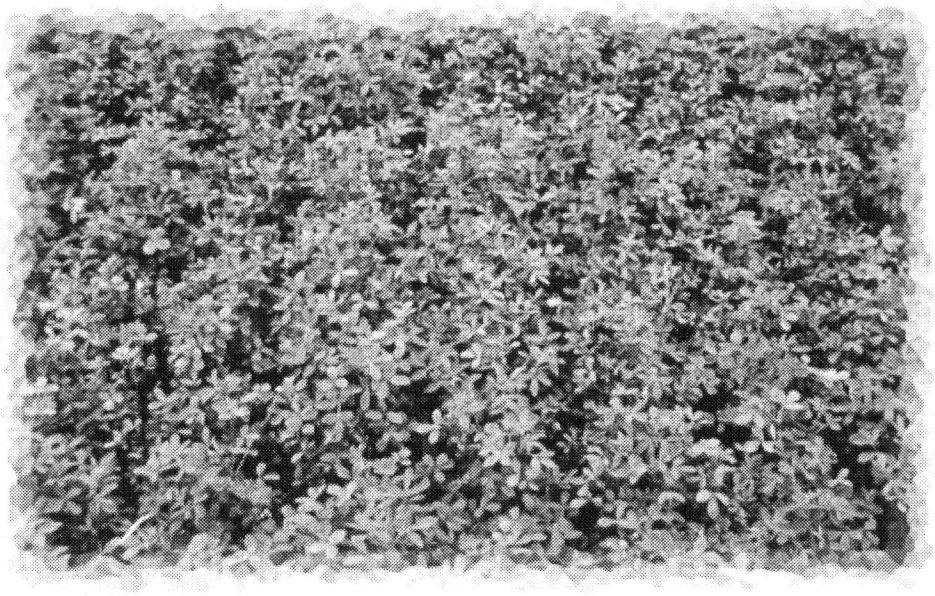
	Soil test level					
Yield goal	**Very Low**	**Low**	**Optimum**	**High**	**Very High**	**Excessively High**
(tons/a)			**P_2O_5, lb/a**			
1.5 - 2.5	**45**	**40**	**25**	**10**		**0**
2.6 - 3.5	**55**	**50**	**35**	**15**		**0**
3.6 - 4.5	**70**	**65**	**50**	**25**		**0**
4.6 - 5.5	**85**	**80**	**65**	**30**		**0**
5.6 - 6.5	**95**	**90**	**75**	**35**		**0**
6.6 - 7.5	**110**	**105**	**90**	**45**		**0**
			K_2O, lb/a[1]			
1.5 - 2.5	**130**	**120**	**100**	**50**	**25**	**0**
2.6 - 3.5	**180**	**170**	**150**	**75**	**40**	**0**
3.6 - 4.5	**230**	**220**	**200**	**100**	**50**	**0**
4.6 - 5.5	**280**	**270**	**250**	**125**	**60**	**0**
5.6 - 6.5	**330**	**320**	**300**	**150**	**75**	**0**
6.6 - 7.5	**380**	**370**	**350**	**175**	**90**	**0**

[1] If the alfalfa stand is to be maintained more than three years, increase potash by 20%.

What is the P_2O_5 recommendation for alfalfa on Field 3?

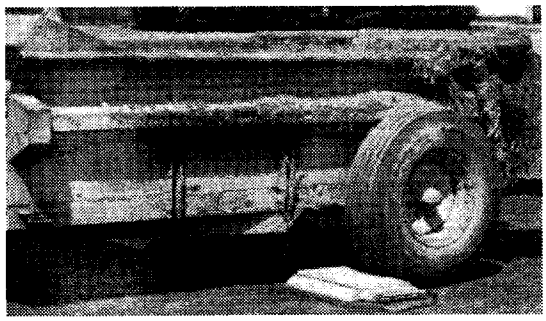
What is the K_2O recommendation for alfalfa on Field 3?

Determining Nutrient Credits



Manure Spreader Calibration — Using Scales

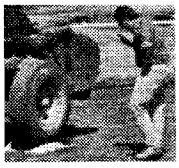
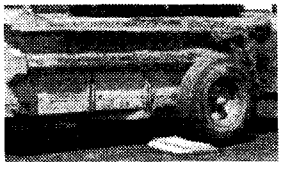
1 Drive on empty.*



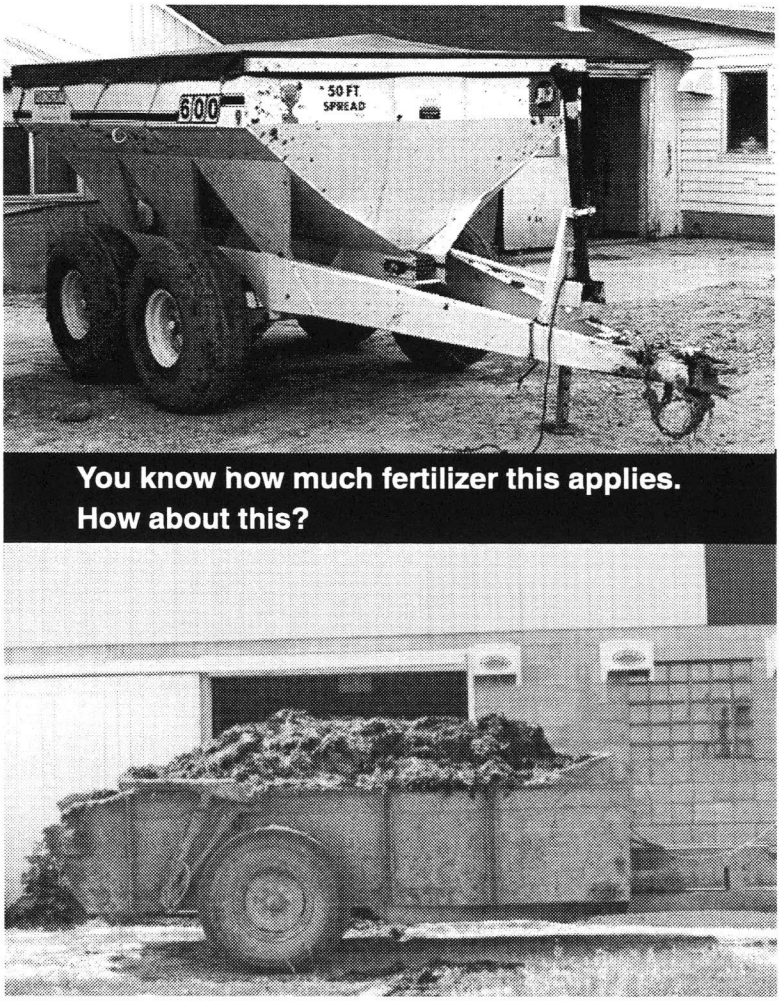
2 Fill to typical load.

3 Drive on full.*

4

Full weight		Empty weight		Load weight
 11,720 lbs	—	 3,600 lbs	=	8,120 lbs
8120 lbs	÷	2,000 lbs/ton	=	4 tons

* Also weigh rear tractor axle



Crediting Nutrients from Manure

Determine application rate:

1) Count number of loads applied to field 3. _____

2) Determine acreage of field 3. _____

3) Caculate rate: _____

$$\frac{\text{(\# of loads) x (load weight)*}}{\text{(field acreage)}} = \text{tons of manure/acre}$$

* Load weight in tons

Table 7. Nutrients available for crop use in the first year after spreading manure.

Animal	Solid				Liquid			
	N		P_2O_5	K_2O	N		P_2O_5	K_2O
	incorp.*	not incorp.			incorp.*	not incorp.		
	lbs/ton				lbs/1000 gal			
Dairy	4	3	3	8	10	8	8	21
Beef	4	4	5	8	12	10	14	23
Swine (finish)	5	4	3	7	28	22	15	26
Swine (farrow)	5	4	3	7	15	12	6	8
Poultry	15	13	14	9	41	35	38	25

* Injected or incorporated into the soil within 72 hours after spreading.

Source: Department of Soil Science, College of Agricultural and Life Sciences, University of Wisconsin-Madison, University of Wisconsin-Extension.

Take nutrient credits:

	N	P_2O_5	K_2O
1) Determine the available nutrient content of manure. ❑ Book values ❑ Manure analysis			
2) Determine nutrient credit:			

(application rate) x (nutrient content) = lbs of nutrients/acre

Table 8. Nitrogen credits for alfalfa and soybeans in Wisconsin.

Alfalfa	**Medium and Fine Textured Soils**		**Sandy Soils**	
	last cut before Sept. 10	last cut after Sept. 10	last cut before Sept. 10	last cut after Sept. 10
Stand Density	**lb N/acre**			
Good (70-100% alfalfa, more than 4 plants/ft²)	**190**	**150**	**140**	**100**
Fair (30-70% alfalfa, 1.5 to 4 plants/ft²)	**160**	**120**	**110**	**70**
Poor (0-30% alfalfa, less than 1.5 plants/ft²)	**130**	**90**	**80**	**40**

Second year credit: In the second cropping year following fair and good stands on medium and fine textured soils, you can take a credit of 50 lb N/acre.

Soybeans

1 lb N/acre for each bu/acre of beans harvested up to a maxium credit of 40 lb N/acre. (Note: No credit on sandy soils).

What is the nitrogen credit for Field 4?

Stand density = fair

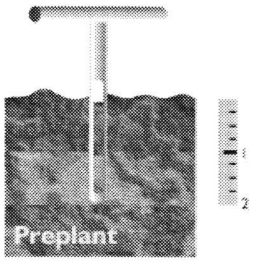
Last alfalfa harvest = September 5

Residual Soil Nitrate Test

Check the boxes below that apply to each corn field.

If you check two or more, the preplant soil nitrate test will be beneficial

- ❑ Corn following corn
- ❑ Second-year corn after alfalfa that received manure
- ❑ Previous year's rainfall was normal or below
- ❑ Long history of manure application



Advantages of a preplant soil profile nitrate test

Economic benefits
- Reduce N fertilizer expenses

Groundwater protection
- Prevent N applications in excess of crop need
- Reduce the risk of nitrate additions to groundwater

Use test on medium or finer textured soils

Collect samples in the early spring
- Anytime after frost has left the ground and prior to planting of preplant N applications

Collect soil samples in 1 foot increments to a depth of 2 feet
- Separate the 1 foot and 2 foot samples

Collect at least 15 cores per 20 acres of uniform soil areas

Submit a 1 cup subsample from each depth to the soil testing lab

Send samples within 1 day or freeze or air-dry samples for extended storage

Fill out background information sheet
- Soil name
- Field history

Which field(s) would be appropriate for this test? ( )

Worksheet for a Step-by-Step Guide to Nutrient Management on Your Farm

Complete One Form Per Field

1. Field Information

a) Field ID 3 c) Acres 15 e) Soil name Sisson silt loam

b) Year _____ d) Crop to be grown Corn f) Previous crop Corn

2. Nutrient Need

	N (lbs/acre)	P_2O_5 (lbs/acre)	K_2O (lbs/acre)
a) Nutrient recommendations (from soil test report)			
b) Special nutrient need			
c) *Total nutrient need*			

3. Nutrient Credit

a) Manure			
b) Legume			
c) Residual nitrate (if test was not conducted enter 0)			
d) Other sources (whey, sludge, etc., must have sample analysis)			
e) Total nutrient credit			

4. Adjusted Nutrient Need

(Total nutrient need - Total nutrient credit)

Other Nutrient Needs

a) Secondary and micronutrients

Specific nutrient		
Application rate (lb/acre)		

b) Lime

Application rate (tons/acre)	

Worksheet for a Step-by-Step Guide to Nutrient Management on Your Farm

Complete One Form Per Field

1. Field Information

a) Field ID 4 c) Acres 15 e) Soil name Hochheim silt loam

b) Year _____ d) Crop to be grown Corn f) Previous crop Alfalfa

2. Nutrient Need

	N (lbs/acre)	P_2O_5 (lbs/acre)	K_2O (lbs/acre)
a) Nutrient recommendations (from soil test report)			
b) Special nutrient need			
c) *Total nutrient need*			

3. Nutrient Credit

a) Manure			
b) Legume			
c) Residual nitrate (if test was not conducted enter 0)			
d) Other sources (whey, sludge, etc., must have sample analysis)			
e) Total nutrient credit			

4. Adjusted Nutrient Need

(Total nutrient need - Total nutrient credit)

Other Nutrient Needs

a) Secondary and micronutrients

Specific nutrient _____ _____

Application rate (lb/acre) _____ _____

b) Lime

Application rate (tons/acre) _____

Farmstead Nutrient Use Summary Worksheet

Field	Size	Crop	Total Nutrient Need			Total Nutrient Credit			Adjusted Nutrient Need		
			N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
	- - - acres - - -		- - - - - - - lb/acre - - - - - - -			- - - - - - - lb/acre - - - - - - -			- - - - - - - lb/acre - - - - - - -		
1	15	Corn-1	160	55	35	160	—	—	0	55	35
2	10	Corn-2	160	0	0	175/0	—	—	0/160	0	0
3	15	Corn-2									
4	15	Corn-1									
5	15	Alf-1	0	25	200	—	—	—	0	25	200
6	20	Alf-2	0	50	200	—	—	—	0	50	200
7	25	Alf-3	0	25	200	—	—	—	0	25	200
8	30	Oats	40	30	135	—	—	—	40	30	135
R1	15	Alf-1	30	50	200	—	—	—	30	50	200
R2	10	Alf-2	0	50	200	—	—	—	0	50	200

Farmstead Manure Planning Worksheet

	(from page 20)			*(Step 2)*	*(Step 3)*	*(Step 4)*			*(Step 5)*
Field	**Adjusted Nutrient Need**			**Manure to Apply**	**Loads of Manure to Apply**	**Supplemental Fertilizer (if needed)**			**Loads of Manure Remaining**
	N	P_2O_5	K_2O			N	P_2O_5	K_2O	Start = _____ loads
	lb/acre			tons/a		lb/acre			

Steps

1. Determine if you will apply manure on a N need or P_2O_5 need basis.

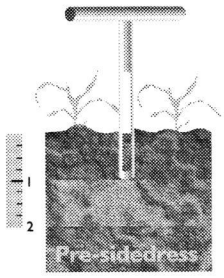
2. **Manure to Apply** (tons/a) = $\dfrac{\text{Adjusted Nutrient Need (lb/a)}}{\text{Nutrient}^* \text{ Content of Manure (lbs/ton)}}$

3. **Loads of Manure to Apply** = $\dfrac{\text{Manure to Apply (tons/a)}}{\text{Spreader Capacity (tons/load)}}$ *x* Field Acreage

4. **Supplemental Fertilizer** = Amount of commercial fertilizer to apply if manure does not supply all the nutrient need (Adjusted Nutrient Need – Manure Supplied Nutrients)

5. **Loads of Manure Remaining** = Loads at Start – Loads Applied to Field

* Available N or P_2O_5



Is the Nitrogen Really There?

Pre-sidedress Soil Nitrate Test

What is it?

The pre-sidedress soil nitrate test (PSNT) is one of two tests available to corn growers for improving the efficiency of nitrogen (N) fertilizer applications. Use of the test allows corn N recommendations to be adjusted for the soil's nitrate content. Accounting for soil nitrate not only reduces fertilizer costs; it also reduces the risk of nitrate movement to groundwater due to N applications in excess of crop need.

Advantages

The PSNT measures the amount of N released from previous legume crops, manure applications, and soil organic matter in addition to a portion of the N carried-over from the previous growing season. The test can be a valuable tool for growers wanting to confirm N credits from manure or legumes.

Disadvantages

Corn growers using the PSNT are locked into applying any supplemental N as a sidedress application. Also, use of this test requires that soil sampling, laboratory analysis, and sidedress N applications all occur during a short period of time when a grower may be committed to other farm operations, such as cultivating, haying, etc.

Conducting a PSNT

Nitrate-N is more likely to accumulate in silt loam or heavier textured soils. The PSNT is not recommended on sands. Soil samples for the PSNT are collected to a depth of one foot when corn plants are 6 to 12 inches tall. Analysis of PSNT samples is offered by several commercial soil testing labs, as well as the University of Wisconsin labs in Madison and Marshfield.

Table 9. Corn Nitrogen Recommendations Based on the Pre-sidedress Soil Nitrate Test.

PSNT Result	Soil Yield Potential[1]	
	Very High/High	*Medium/Low*
N (ppm)	N Application Rate (lb/a)	
≥ 21	0	0
20-18	60	40
17-15	100	40
14-13	125	80
12-11	150	80
≤ 10	160[2]	120[2]

[1] To determine your soil yield potential, see Table 16 of UWEX bulletin A2809, *Soil test recommendations for field, vegetable, and fruit crops*, or contact your agronomist or county agent.

[2] No adjustment made to corn N recommendations.

Note: Whan corn follows alfalfa, the maxium N recommendation is 40 lb N/a for all PSNT results less than 21 ppm N.

Additional Reference Materials

Corn Fertilization. University of Wisconsin-Extension publication A3340.

Farmer's Pocket Guide to Managing Nutrients and Pesticides. University of Wisconsin-Extension publication A3607.

Farm Smart - Credit Manure: Fertilizer Value of Dairy Manure. Available from the University of Wisconsin - NPM Program, call 608-262-4326.

Guidelines for Applying Manure to Cropland and Pasture in Wisconsin. University of Wisconsin-Extension publication A3392.

Manure Hauling Record Book. Available from the University of Wisconsin-NPM Program, call 608-262-4326.

Nutrient Management: Practices for Wisconsin Corn Production and Water Quality Protection. University of Wisconsin-Extension publication A3557.

Soil Nitrate Tests for Wisconsin Cropping Systems. University of Wisconsin-Extension publication A3624.

Soil Test Recommendations for Field, Vegetable, and Fruit Crops. University of Wisconsin-Extension publication A2809.

Using Legumes as a Nitrogen Source. University of Wisconsin-Extension publication A3517.

What is a Farm Nutrient Management Plan? Available from the University of Wisconsin-NPM Program, call 608-262-4326.

Wisconsin's Preplant Soil Nitrate Test. University of Wisconsin-Extension publication A3512.

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