

# Evening One Agenda

**Make the most of what you have**



**Improve or change what you have**



# Make the most of what you have

## ☐ What do I have?

- ☐ Species

- ☐ Soil type

- ☐ Soil fertility

## ☐ What do I do with it?

- ☐ Improve fertility

- ☐ Improve cutting management

Would you keep it?

Why or why not?













3





4



# Make the most of what you have

- Know what species you have
  - Look for the good stuff
  - Can you manage it to be more productive?
  - Tailor your management to what you have
- Planting new takes resources and incurs a risk
  - If you aren't managing what you have now what you plant new may become what you have
  - Can you establish and manage a new seeding?



# Grass

- Includes grasses and grass-like plants, sedges, rushes and lilies
- 1 Cotyledon or seed leaf - monocot
- Growing point internal-whorl
- Parallel leaf veins
- No secondary growth – no branching







## Orchardgrass

- Leaf sheaths and stems flattened
- Leaf crosssection is V shaped





Orchardgrass

- Bunch grass

- Scattered winterkill in NYS





Orchardgrass  
- Early maturing grass



# Timothy

- Bunch grass
- Round stemmed





# Timothy





# Tall Fescue



- Stiff leaved grass almost plastic-like
- Bunch grass but has rhizomes so may fill in slowly



# Tall Fescue







# Perennial Ryegrass







Reed canarygrass



# Reed canarygrass

- Wide Leaf
- Grows best with lots of soil moisture





Reed canarygrass  
- Sod forming





- Rhizomes



- Large ligule



Reed  
Canarygrass







## Smooth brome grass

- Has distinctive *M* or *W* constriction in leaf
- Rhizomes, forms a sod



# Quackgrass





# Quackgrass



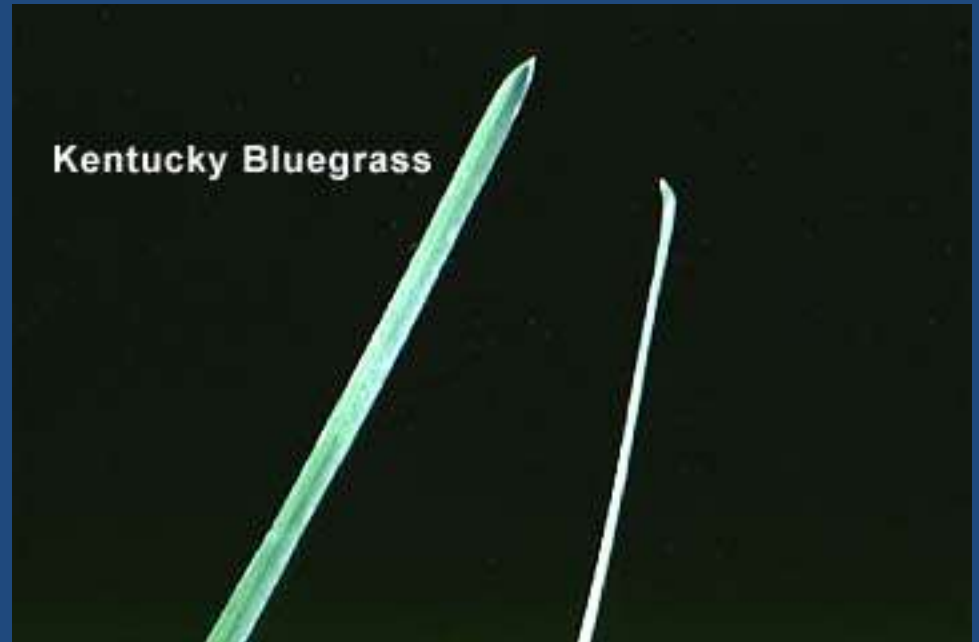


# Meadow Foxtail





# Bluegrass





# Legume



- Dicot
  - Two leaf seedling
  - Leaf veins net like
  - New growth can come from new buds in above ground portion of plant
- Seed in pod
- Roots have nodules
  - Use an inoculant





# Alfalfa





# Red Clover

“V”  
watermark







White  
Clover





# Alsike Clover





# Birdsfoot Trefoil





















# Evening One Agenda

- ✓ What do I have?

- ✓ Species

- ☐ Soil type

- ☐ Soil testing

- ☐ What do I do with it?

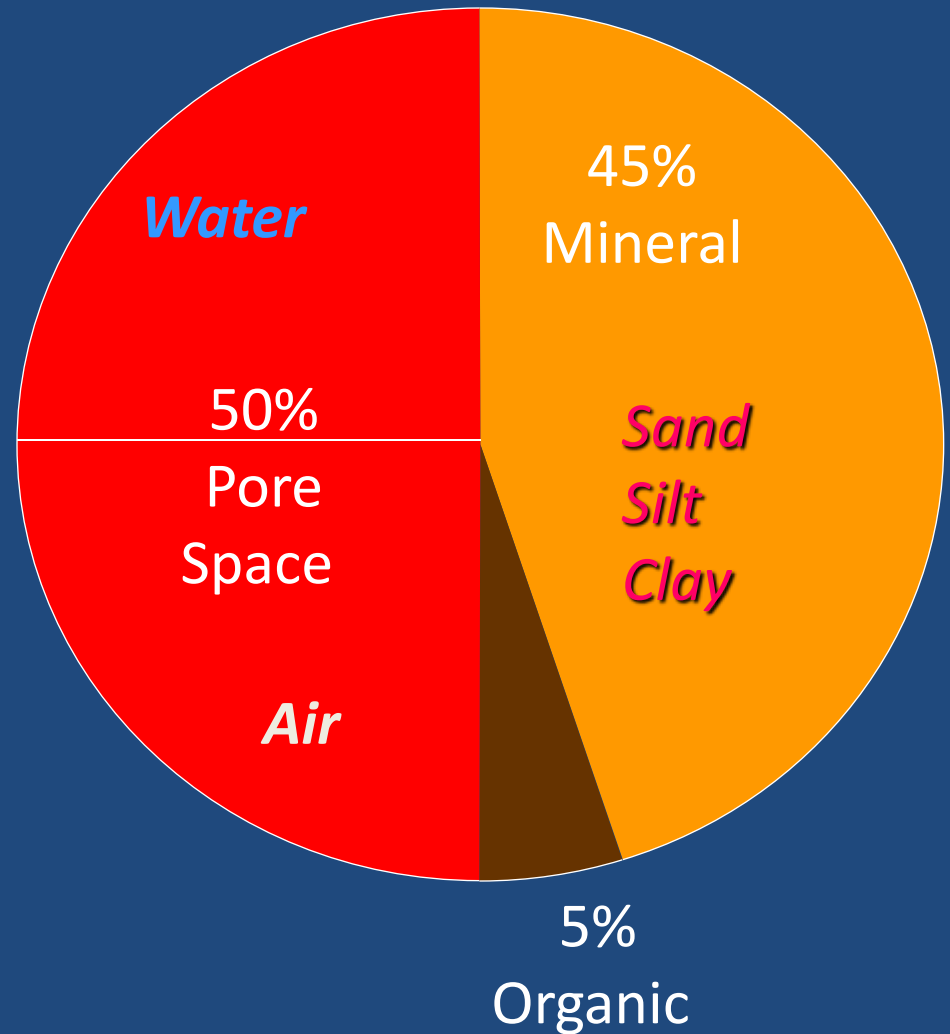
- ☐ Improve fertility

- ☐ Improve cutting management



# Soil

- Typically half solid and half space
- Pores about equally contain air and water
- Nutrients held on solids
- Plant available nutrients are in soil solution(water)





# Sands

# Loams

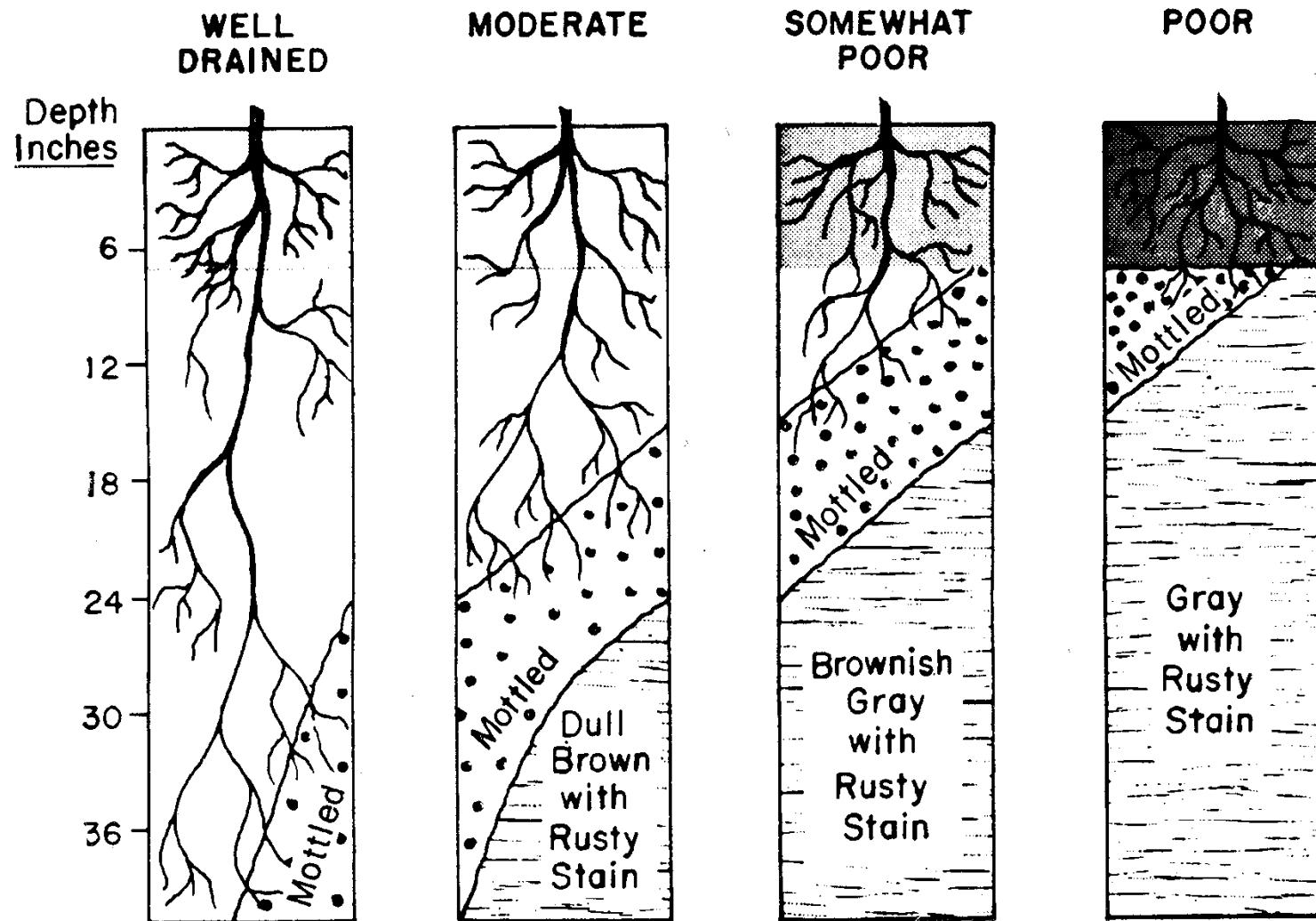
# Clay



- Good
  - water drains away
  - roots need air
  - warm up early in the spring
- Bad
  - water drains away
  - less organic matter
  - don't hold nutrients

- Good
  - hold moisture
  - holds nutrients
  - higher organic matter
- Bad
  - hold moisture
  - slow to warm up in the spring











# Know your soil types

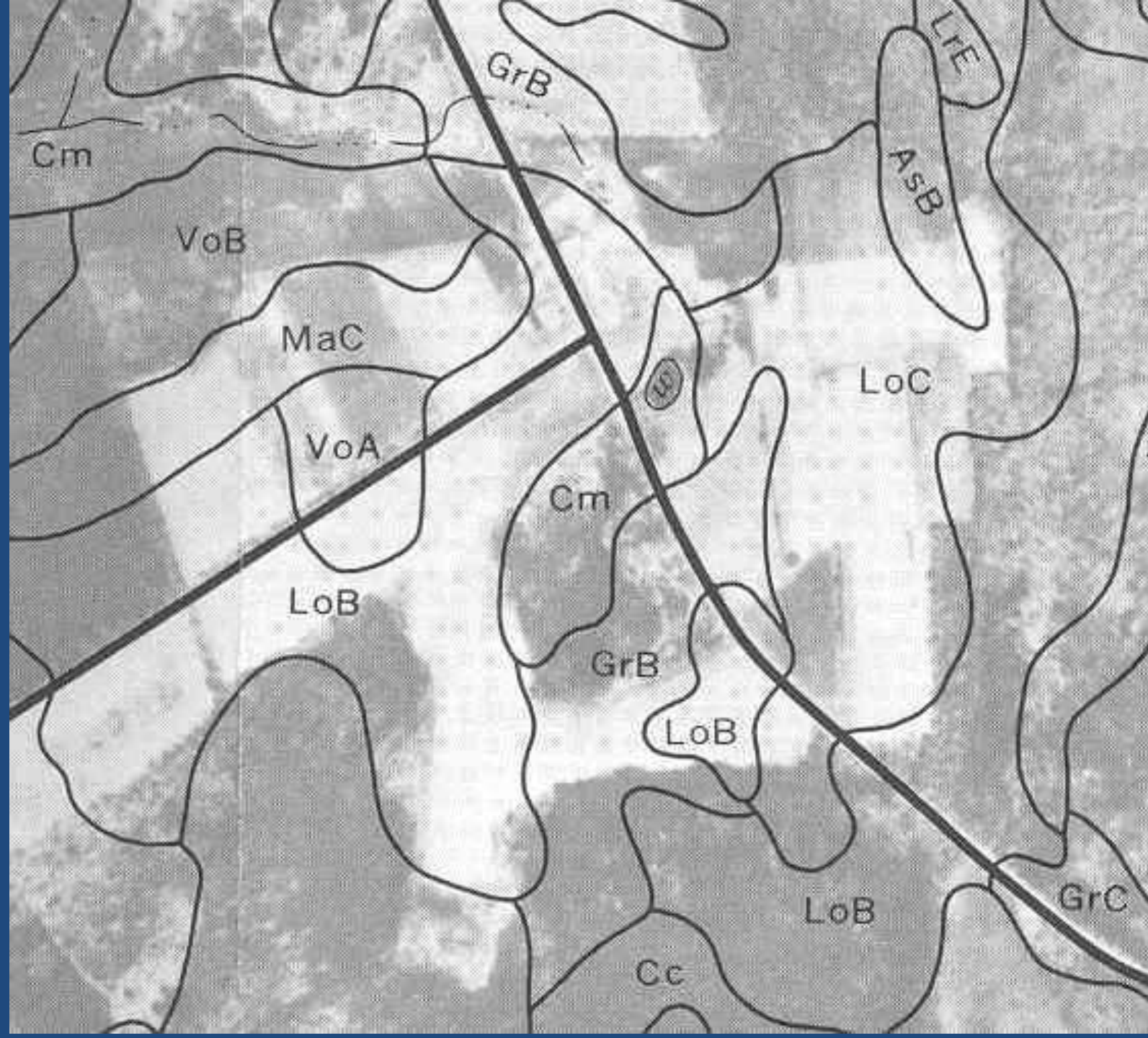
- Soils have a specific soil name (soil series)
- Named based on the local it was found in
- Will tell you drainage class
- Need for Cornell specific nutrient recommendations



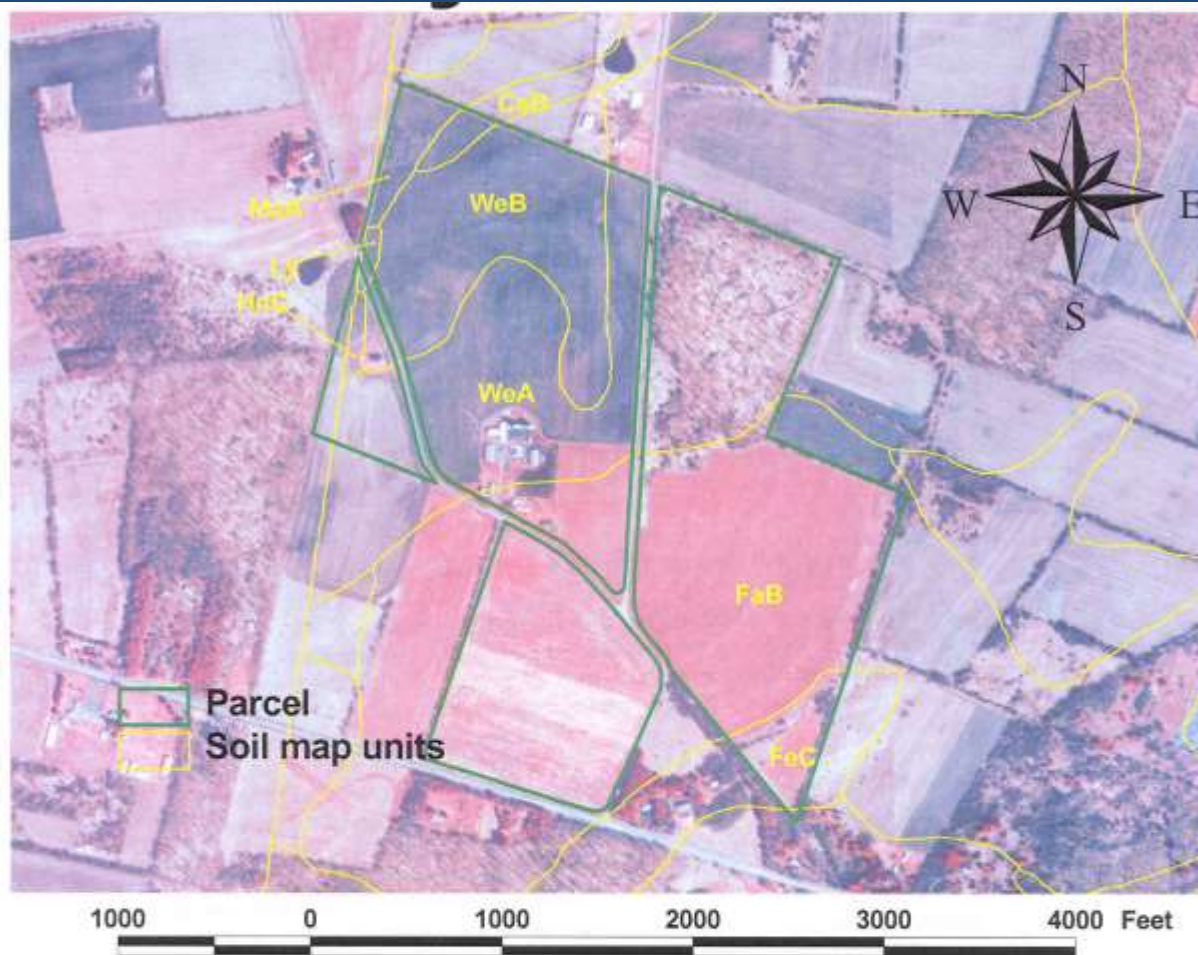
# Where you can obtain

- Local Soil and Water Conservation District office and
- Natural Resources Conservation Service office
- Soil Survey books
- <http://websoilsurvey.nrcs.usda.gov/app/>









Musym	Count	Sum Acres
CsB	2	52.9590
FaB	3	1293.0600
FeC	1	24.7010
HnC	1	0.7940
Ly	2	1.2320
MaA	1	10.3350
WeA	3	501.5310
WeB	2	55.6400



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- ▶ [National Soil Characterization Data](#)
- ▶ [Soil Geochemistry](#)

The simple yet powerful way  
to access and use soil data.

**START  
WSS****Welcome to Web Soil Survey (WSS)**

Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site is updated and maintained online as the single authoritative source of soil survey information.

Soil surveys can be used for general farm, local, and wider area planning. Onsite investigation is needed in some cases, such as soil quality assessments and certain conservation and engineering applications. For more detailed information, contact your local

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Area of Interest (AOI)

**Soil Map**

Soil Data Explorer

Download Soils Data

Shopping Cart (Free)

Printable Version

Add to Shopping Cart

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Map Unit Legend

Herkimer County, New York, Southern Part (NY615)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BoC	Bombay very fine sandy loam, 8 to 15 percent slopes	0.4	0.5%
CsB	Conesus silt loam, 2 to 8 percent slopes	2.9	3.8%
FaC	Farmington silt loam, 0 to 8 percent slopes	16.2	21.4%
HtA	Hornell silt loam, 0 to 3 percent slopes	2.3	3.0%
HyC	Hudson silt loam, loamy substratum, 8 to 15 percent slopes	3.2	4.2%
RbA	Rhinebeck silt loam, loamy substratum, 0 to 3 percent slopes	1.0	1.3%
WaA	Wassaic silt loam, 0 to 3 percent slopes	6.4	8.4%
WaB	Wassaic silt loam, 3 to 8 percent slopes	30.3	40.0%
WaC	Wassaic silt loam, 8 to 15 percent slopes	9.6	12.7%
WaD	Wassaic silt loam, 15 to 25 percent slopes	3.5	4.7%
<b>Totals for Area of Interest</b>		<b>75.8</b>	<b>100.0%</b>

Legend

Scale

(not to scale)







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(NY615)**

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HtA	Hornell silt loam, 0 to 3 percent slopes	2.3	3.0%
HyC	Hudson silt loam, loamy substratum, 8 to 15 percent slopes	3.2	4.2%
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WaD	Wassaic silt loam, 15 to 25 percent slopes	3.5	4.7%
<b>Totals for Area of Interest</b>		<b>75.8</b>	<b>100.0%</b>



## Properties and qualities

*Slope:* 3 to 8 percent

*Depth to restrictive feature:* 20 to 40 inches to lithic bedrock

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 1 percent

*Available water capacity:* Low (about 4.0 inches)

## Interpretive groups

*Farmland classification:* All areas are prime farmland

*Land capability (nonirrigated):* 2e

*Hydrologic Soil Group:* C



# Evening One Agenda

- ✓ What do I have?

- ✓ Species

- ✓ Soil type

- ☐ Soil testing

- ☐ What do I do with it?

- ☐ Improve fertility

- ☐ Improve cutting management



If you use no fertilizer or  
manure this year will your  
crops still grow

?

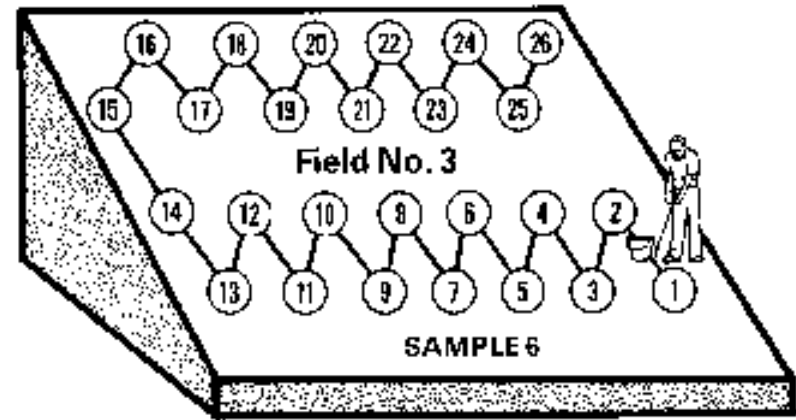
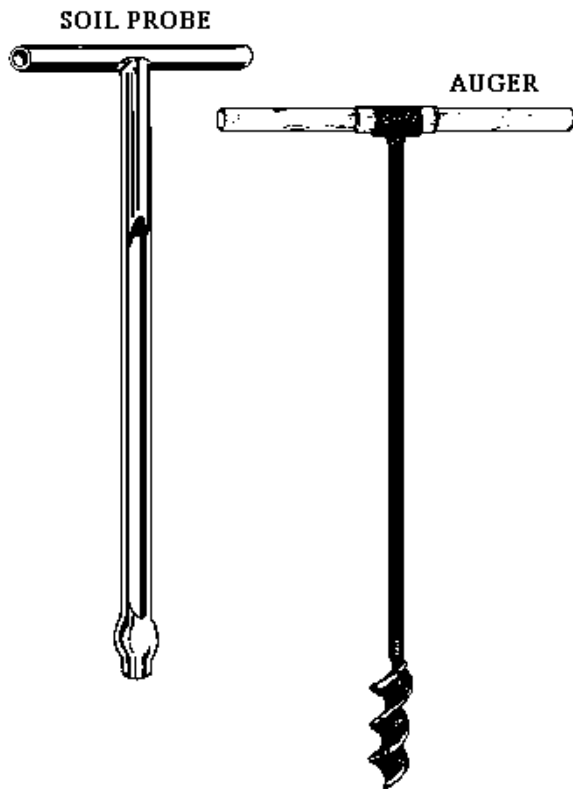


# How much from the soil?

- Don't care!
- Experience
- Soil Testing
  - has its limitations
  - as good as info you provide



Take samples to  
plow depth or 5-6  
inches



Take representative  
samples throughout the  
field

Take one composite  
sample for analysis



LY	CNAL Bag No.	SAMPLE ID	Other Tests	Sample Date	Soil Name REQUIRED	Tillage Depth <sup>1</sup>	Artificial Drainage <sup>2</sup>	% Legume last yr <sup>3</sup>	

<sup>1</sup> Tillage Depth

Please write 1, 2, 3, or 4 (1 = no till, 2 = 1-7 inches, 3 = 7-9 inches, 4 = greater than 9 inches)

<sup>2</sup> Drainage

Please write 1, 2, 3, or 4 (1 = None, 2 = Inadequate, 3 = Adequate, 4 = Excellent)

<sup>3</sup> % Legume

Please write 1, 2, 3 or 4 (% Legume 1 = 0% 2 = 1-25% 3 = 26 - 50% 4 = 51-100%)




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Forage sample kits and sample sheets at 1-800-344-2097 X-2142 or email: [supply@cornell.edu](mailto:supply@cornell.edu)

Perennial Agronomic Crops							
CODE	Initial Establishment - pre-plant	CODE	Topdressing Established Stands	CODE	Initial Establishment	CODE	Topdressing Established Stands
ALE	Alfalfa	ALT	Alfalfa	CVE	Crownvetch	CVT	Crownvetch
AGE	Alfalfa-grass	AGT	Alfalfa-grass	GRE	Grasses	GRT	Grasses (brome, timothy)
ABE	Alfalfa-trefoil-grass	ABT	Alfalfa-trefoil-grass	GIE	Grass-intensive management	GIT	Grass-intensive management
BTE	Birdsfoot-trefoil	BTT	Birdsfoot-trefoil	PIE	Pasture-rotation grazed	PIT	Pasture-intensive management
BGE	Birdsfoot-trefoil-grass	BGT	Birdsfoot-trefoil-grass	PGE	Pasture w/Improved grasses	PNT	Pasture w/native grass
BCE	Birdsfoot-trefoil-clover	BCT	Birdsfoot-trefoil-clover-grass	PLE	Pasture w/legumes	PGT	Pasture w/Improved grass
CLE	Clover	CLT	Clover	WPE	Waterways, Pond, Dike	PLT	Pasture w/legumes
CGE	Clover - grass	CGT	Clover - grass			WPT	Waterways, pond dikes
Annual Agronomic Crops							
CODE		CODE		CODE		CODE	
BSP	Barley-spring	BUK	Buckwheat	RYC	Rye-cover crop	SOY	Soybeans
BSS	Barley-spring w/legume	COG	Corn-grain	RYS	Rye- seed production	SUN	Sunflower
BWI	Barley-winter	COS	Corn-silage	SOG	Sorghum-grain	TRP	Triticale, Peas
BWS	Barley-winter w/legume	MIL	Millet	SOF	Sorghum-forage	WHT	Wheat
BDR	Beans-dry	OAT	Oats	SSH	Sorghum sudangrass hybrid	WHS	Wheat w/legume
		OAS	Oats seeded w/legume	SUD	Sudangrass		
Miscellaneous Crops - Results only. No interpretations or nutrient guidelines will be provided for IDL or OTH crop codes.							
CODE	CROP	CODE	CROP	Go to the Agro-One Tab at <a href="http://www.dairyone.com">www.dairyone.com</a> for the complete list of crop codes.			
IDL	Idle Land	OTH	Crops not listed				
OPTIONAL TESTS, Results only. No interpretations will be provided for optional tests. (Please enclose check for the total cost of all tests requested)							
Test		Cost per sample (\$)		<b>Note:</b> Heavy metal and cation exchange capacity (CEC) testing are available through the Cornell Nutrient Analysis Lab (CNAL) Please contact CNAL directly at 1-607-255-4540, <a href="mailto:soiltest@cornell.edu">soiltest@cornell.edu</a> or <a href="http://cnal.cals.cornell.edu">http://cnal.cals.cornell.edu</a>			
(836) pH in 0.01M CaCl <sub>2</sub>		\$5.00					
(837) Soluble salts		\$5.00					
(838) No-till pH (0-1 inch)		\$5.00					
(861) Nitrate (PSNT)		\$6.00					
(840) Boron (Hot water)		\$10.00					



A100511

**A**

A100511 jbf



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# Example 1

Lab Sample ID: **Example 1**

Field/Location:

Date Sampled:

Date Tested:

Statement ID:

Description:

**A**

Element	lbs/acre*	Very Low	Low	Medium	High	Very High
Phosphorus (P)	2	██████████				
Potassium (K)	138	██████████	██████████	██████████		
Calcium (Ca)	3,209	██████████	██████████	██████████	██████████	
Magnesium (Mg)	266	██████████	██████████	██████████		

Element	Value	Element	Value	Element	Value
Soil pH	5.7	Manganese (Mn), lbs/acre	28.2	% OM	6.1
Buffer pH	5.6	Zinc (Zn), lbs/acre	1.2		
Iron (Fe), lbs/acre	10.4	Aluminum (Al), lbs/acre	97.5		

## Crop History (1 = last year, etc.)

Year	Crop
3	Grasses Maintenance
2	Grasses Maintenance
1	Grasses Maintenance

## Sample Information Summary

Soil Name: Valois	Crop Code: GRT
Tillage Depth: 1 - 7 inches	Type: Pre-Plant
Drainage: Not Specified	
% Legume: Not Specified	

## Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

Year	Crop	tons / acre		lbs / acre	
		Lime	N Range	P2O5 Range	K2O
1	Grasses Maintenance	3.00	50 - 75	40	30.00
2	Grasses Maintenance	0.00	50 - 75	40	30.00
3	Grasses Maintenance	0.00	50 - 75	40	30.00

**Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.**

\* Morgan analysis results reported in pounds per acre.

Nutrient recommendations provided by Cornell University. For assistance interpreting your report, contact your local Cooperative Extension office at 607-334-5841 or <http://ce.cornell.edu/Pages/Default.aspx> for a complete list of Cornell Cooperative Extension offices.

Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

Yr1: Lime rate is for 100% ENW. To calculate actual rate: rate to use = recommended rate/ENW (of lime source) x 100.



Element	lbs/acre*	Very Low	Low	Medium	High	Very High
Phosphorus (P)	2	██████████				
Potassium (K)	138	██████████	██████████	██████████	██████████	
Calcium (Ca)	3,209	██████████	██████████	██████████	██████████	
Magnesium (Mg)	268	██████████	██████████	██████████		

Element	Value	Element	Value	Element	Value
Soil pH	5.7	Manganese (Mn), lbs/acre	28.2	% OM	6.1
Buffer pH	5.6	Zinc (Zn), lbs/acre	1.2		
Iron (Fe) , lbs/acre	10.4	Aluminum (Al), lbs/acre	97.5		

## Lab Results

### Crop History (1 = last year, etc.)

Year Crop

3 Grasses Maintenance  
2 Grasses Maintenance  
1 Grasses Maintenance

### Sample Information Summary

Soil Name: Valois  
Tillage Depth: 1 - 7 Inches  
Drainage: Not Specified  
% Legume: Not Specified

**Lime**  
Crop Code: GRT  
Type: Pre-Plant  
**recommendation**

### Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

Year Crop

1 Grasses Maintenance  
2 Grasses Maintenance  
3 Grasses Maintenance

tons / acre

Lime

3.00  
0.00  
0.00

lbs / acre

N Range

50 - 75  
50 - 75  
50 - 75

P2O5 Range

40  
40  
40

K2O

30.00  
30.00  
30.00

**Management**  
**Recommendations**

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

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Yr1 Lime rate is for 100% ENV. To calculate actual rate: rate to use = recommended rate/ENV (of lime source) x 100.

**Fertilizer**  
**recommendations**

**Crop History (1 = last year, etc.)**

Year	Crop
3	Grasses Maintenance
2	Grasses Maintenance
1	Grasses Maintenance

**Sample Information Summary**

Soil Name: Valois	Crop Code: GRT
Tillage Depth: 1 - 7 Inches	Type: Pre-Plant
Drainage: Not Specified	
% Legume: Not Specified	

**Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)**

Year	Crop	tons / acre	lbs / acre		
		Lime	N Range	P2O5 Range	K2O
1	Grasses Maintenance	3.00	50 - 75	40	30.00
2	Grasses Maintenance	3.00	50 - 75	40	30.00
3	Grasses Maintenance	0.00	50 - 75	40	30.00

**Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.**

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**tons / acre**

**lbs / acre**

Lime

N Range

P2O5 Range

K2O

3.00

50 - 75

40

30.00

Yr1 Lime rate is for 100% ENV. To calculate actual rate: rate to use = recommended rate/ENV (of lime source) x 100.

## Example 2

Lab Sample ID: **Example 2**

Field/Location:

Date Sampled:

Date Tested:

Statement ID:

Description:

**A**

Element	lbs/acre*	Very Low	Low	Medium	High	Very High
Phosphorus (P)	2	██████████				
Potassium (K)	183	██████████	██████████	██████████		
Calcium (Ca)	3,216	██████████	██████████	██████████	██████████	
Magnesium (Mg)	290	██████████	██████████	██████████		

Element	Value	Element	Value	Element	Value
Soil pH	5.9	Manganese (Mn), lbs/acre	28.7	% OM	5.5
Buffer pH	5.7	Zinc (Zn), lbs/acre	1.1		
Iron (Fe), lbs/acre	24.6	Aluminum (Al), lbs/acre	91.3		

### Crop History (1 = last year, etc.)

Year	Crop
3	Corn-Silage
2	Corn-Silage
1	Clover-Grass Seeding

### Sample Information Summary

Soil Name: Red Hook	Crop Code: CGT
Tillage Depth: 1 - 7 inches	Type: Maintenance
Drainage: Not Specified	
% Legume: 50% - 100% Legume	

### Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

Year	Crop	tons / acre		lbs / acre	
		Lime	N Range	P2O5 Range	K2O
1	Clover-Grass Maintenance	2.00	0	40	0.00
2	Clover-Grass Maintenance	0.00	0	40	0.00
3	Clover-Grass Maintenance	0.00	0	40	0.00

**Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.**

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# Evening One Agenda

## ✓ What do I have?

- ✓ Species

- ✓ Soil type

- ✓ Soil testing

## □ What do I do with it?

- Improve fertility

- Improve cutting management



# Improving pH - Lime

- Apply lime and nutrients to soil test recommendations
- Lime recommendations is based on lime with 100% ENV (Effective Neutralizing Value)
- Example:
  - If lime ENV is 75% and you need 3 ton of lime how many tons do you apply:
  - $3 \text{ ton} \div .75 = 4 \text{ tons to be applied}$

# Improving Fertility – Adding Plant Nutrients

- Use fertilizer and/or manure
  - Example: If you need 75 lbs N, 40 lbs  $P_2O_5$  and 30 lbs  $K_2O$  per acre, what fertilizer do you buy?
    - Go to fertilizer dealer and tell them to mix you the fertilizer you need
- Or
- Use a known analysis like 19-19-19 and apply the pounds that get you close



# Improving Fertility – Adding Plant Nutrients (continued)

- Example
  - If you need 75 lbs N, 40 lbs  $P_2O_5$  and lbs 30  $K_2O$  per acre, what fertilizer do you buy?
  - Go to fertilizer dealer and tell them to mix you the fertilizer you need

Or

- If you need 75 lbs N, 40 lbs  $P_2O_5$  and lbs 30  $K_2O$  per acre, what fertilizer do you buy?

# Thoughts on fertility...

- Lack of nitrogen fertilization is one reason why grasses still tend to be under appreciated
  - Reason for “I don’t get any second cutting”
  - Nitrogen can raise protein and lower fiber levels
- Is field grass or legume
  - Decide which it is, don’t view as a mix
  - Fertilize accordingly







# Nitrogen

- Typically need 50 lbs actual N for every ton of anticipated dry matter yield
- Can be combo with manure to achieve desired N.
- You may not be able apply enough manure to supply nitrogen for intensive management
- Why you may need to consider having legumes in the stand which produce their own N and give some off for grasses



# Nitrogen

- For grasses in an intense 3-4 cutting system you need 200 -225 of actual N in applications spread out over the summer
- Example (lbs actual N):  
100 lbs at green up in the spring, 50 lbs after 1<sup>st</sup> cutting and 50 lbs after 2<sup>nd</sup>.
- Less intense for hay may not apply any in spring but apply after first cutting to stimulate second cutting growth





# Cutting for quality

- Quality of feed comes from when you cut; plant maturity
- How much quality do you need?
  - What animals are you feeding
  - What animal performance do you need
- Tend to use NDF (Neutral Detergent Fiber) as quality indicator:
  - Less is More: Less fiber means more energy
  - But for optimal plant and animal performance tend to shoot for an optimal NDF level

# Desired % NDF at feed out given a pure stand:

Species	Desired % NDF	Alfalfa height to achieve desired % NDF
Grass	50	15-17
Alfalfa-grass 50-50 mix	44	22-23
Alfalfa	40	28-30



# Best Indicator of Alfalfa NDF Status in the Field

Begin cutting  
when alfalfa is  
28 – 30 inches



# Best Indicator of Grass NDF Status in the Field

- Begin cutting grass when nearby alfalfa is 15-16 inches tall













# Can I just measure the grass?

Species	Desired % NDF	Grass height to achieve desired % NDF
Orchardgrass	49-50	19-20
Reeds Canarygrass	49-50	21-22

Gets you close still not as good as alfalfa



**May 16**



A close-up, slightly high-angle shot of a lush green field. The grass is tall and dense, with many long, narrow blades. Interspersed among the green blades are numerous small, yellowish-brown seed heads or panicles, which appear to be in various stages of growth. The lighting is bright and even, suggesting a sunny day. The overall texture is very busy and organic.

**June 15**



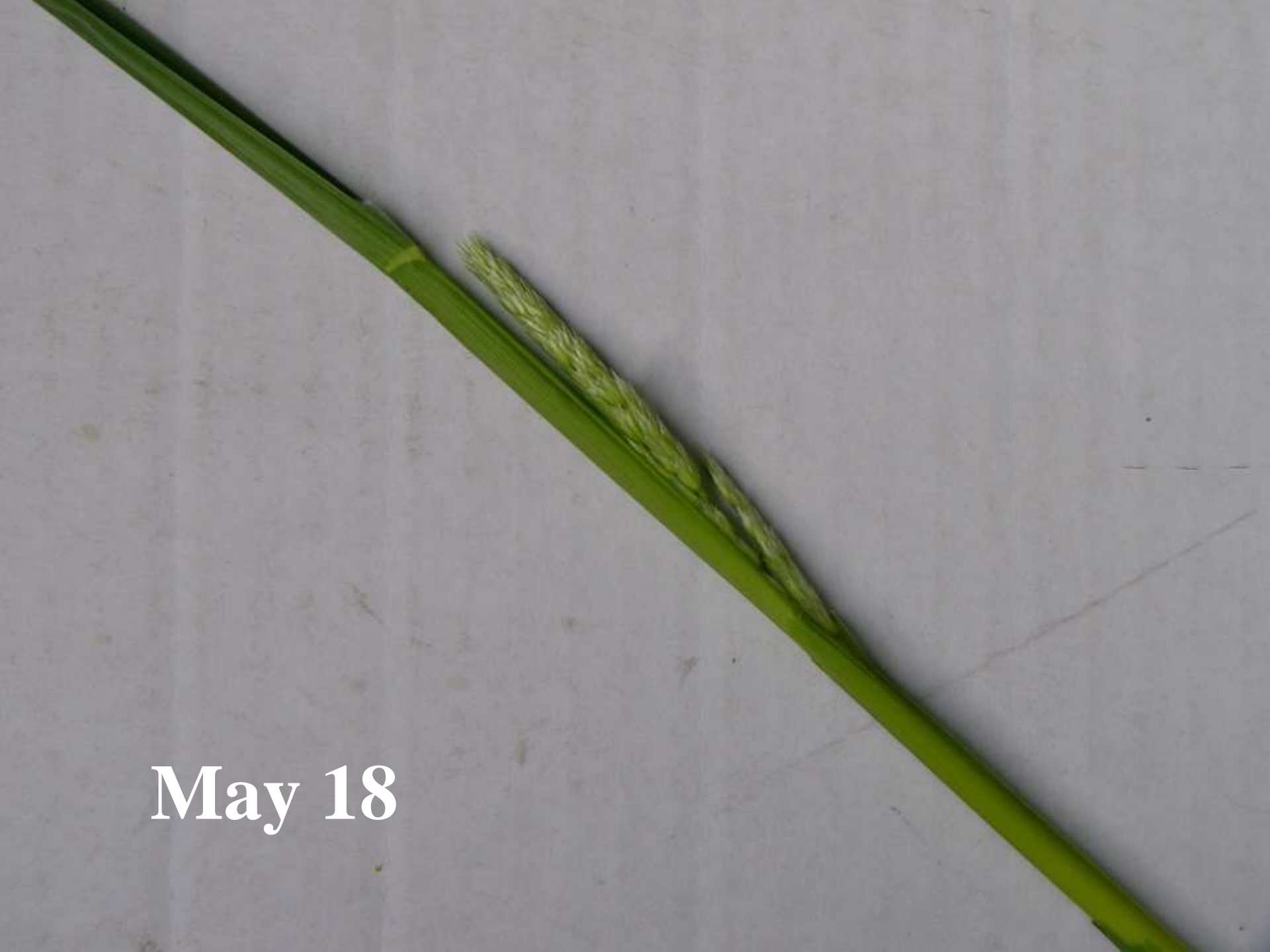


**May 11**



A photograph of a green plant stem, possibly a grass or reed, positioned vertically on a piece of brown, textured paper. The stem is mostly green with some lighter, yellowish-green areas near the base and a small, pale yellow spike-like structure emerging from the side. The background is a plain, brown paper surface with some creases and shadows.

**May 11**



May 18





May 25



# Best Indicator of Alfalfa/Grass NDF Status in the Field

- Assumes 50% mix
- Begin cutting when alfalfa in the field is 23-24 inches tall





# When Using Alfalfa Height as Indicator of NDF and When to cut

- Works across grass species
- Still not sure about subtle differences in N fertility and species maturity
- Start with grassiest fields first



# For this system to work...

- The alfalfa needs to be in the same field or at same elevation close by
- Fields need to be even mix across field.  
Reality!: mostly alfalfa in well drained areas and grass in the poorly drained
- Your harvest and handling system will need to be able to capture the difference.



# Grass Regrowth

- Type of regrowth: culms = stems
  - Regrowth culmless: tall fescue, orchardgrass, bluegrass
  - Regrowth culmed: reed canarygrass, smooth brome grass
  - Regrowth culmed reproductive: timothy, perennial ryegrass

# Apical Dominance

Growth is dominated by growing point at the tip of stem or root.

Removal allows new buds to form and grow.

- Strong
  - Timothy
  - Smooth Bromegrass
- Intermediate
  - Orchardgrass
  - Reed Canarygrass
  - Tall Fescue
- Weak
  - Perennial Ryegrass
  - Kentucky Bluegrass



# Tall grasses

- Orchardgrass, timothy, tall fescue, smooth brome grass. reed canarygrass
- Do not graze, mow or clip closer than 3 inches, reserves and new growth are in the stubble
- With the exception of orchardgrass will not tolerate frequent grazing or cutting

# Summary

- Know what you have
  - Species
  - Soils and Soil Fertility
- Manage your hay crop to make the most of it, reseed only as needed
- Cut timely to achieve the quality that you need