## What is Your Forage Management Grade?

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## Objective

- Through group interaction and presentation discuss many issues regarding hay production and utilization.

## So where does one begin. . .

http://websoilsurvey.nrcs.usda.gov/app/

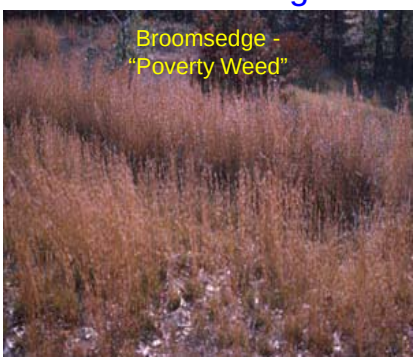

## What is it?

## Soil Testing
## Why?

- Proper quantity of lime and fertilizer applied for crop growth
- Stand establishment
- Yield improvement

http://www.agry.purdue.edu/ext/soiltest.html

## What's Wrong?



## What's Wrong?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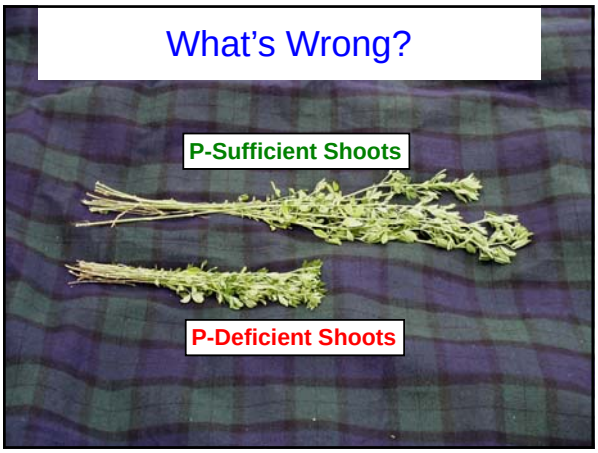



## What's Wrong?

Nitrogen deficiency in oat

. . . concerned about the color and vigor of an alfalfa stand that was seeded the previous August.
. . . grazing by beef cows occurred when the ground was frozen in the winter.
. . .areas in the field the size of large dinner plates have excellent emerald-green color and growth. . . majority of the field is pea-green in color and quite stunted.
What could be causing the poor growth?

- Proper soil pH is essential for the symbiotic relationship between the rhizobia bacteria and the legume
  - pH of 5 has 100 times the number of $H^+$ as a pH of 7
  - addition of ag limestone does not give a snap response

## Soil Fertility Program Comments

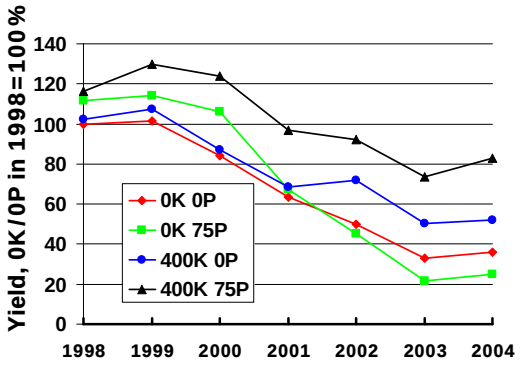
- Know your soil test levels
- Be realistic with yield goals
- Micronutrient levels are best tested with tissue testing
  - Do you really need the Boron on the alfalfa?
- Grass tetany (Low Mg) and milk fever (High K) can be non-catastrophic problems
- 300 lbs. of 12-12-12 doesn't do it folks!
- A little bit more is not always better!
- Foliar feeding a macronutrient nutrient is analogous to feeding you through your skin!
- Manage the nutrients from manure as a resource and not as waste

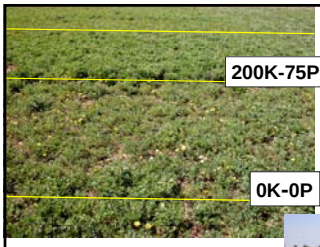
| Nutrient Sufficiency Ranges for Alfalfa | |
|---|---|
| Element | Alfalfa<br>Top 6 inches sampled prior to initial flowering. |
| | ----------Percent %---------- |
| Nitrogen | 3.76-5.50 |
| Phosphorus | 0.26-0.70 |
| Potassium | 2.01-3.50 |
| Calcium | 1.76-3.00 |
| Magnesium | 0.31-1.00 |
| Sulfur | 0.31-0.50 |
| | ----------parts per million (ppm)---------- |
| Manganese | 31-100 |
| Iron | 31-250 |
| Boron | 31-80 |
| Copper | 11-30 |
| Zinc | 21-70 |
| Molybdenum | 1.0-5.0 |

| Sufficient Nutrient Concentrations of Forage Tissue | |
|---|---|
| | Grasses |
| | Uppermost leaves before heading |
| Element | Sufficiency Range[1] Percent |
| Nitrogen (N) | 3.21-4.20 |
| Phosphorus (P) | 0.24-0.35 |
| Potassium (K) | 2.61-3.50 |
| Calcium (Ca) | 0.51-0.90 |
| Magnesium (Mg) | 0.11-0.30 |
| Sulfur (S) | 0.21-0.25 |
| Manganese (Mn) | 51-150 |
| Iron (Fe) | 51-200 |
| Boron (B) | 8-12 |
| Copper (Cu) | 3-5 |
| Zinc (Zn) | 20-50 |
| [1] Range is only valid for crop, plant part, and stage indicated. | |

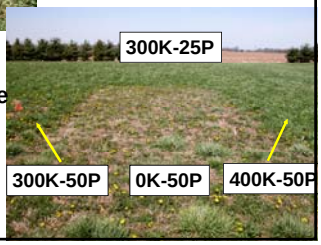
Source: Ohio State, ANR-5-99

## Yield was increased by 0K/75P in 1998 to 2000, but resulted in the lowest yields in 2002 to 2004




**April 2, 2003**



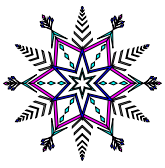

**Severe stand losses have occurred where P has been applied without K**

A soil test indicates that 100 pounds of $P_2O_5$ and 300 pounds of $K_2O$ per acre need to be applied to my alfalfa. How much DAP (18-46-0) and muriate of potash (0-0-60) should be applied? Are there better times of the season to apply the fertilizers? Should you add boron? What concerns might I have with inclusion of nitrogen as a fertilizer source?

- 100/.46 = 217 lbs of 18-46-0
  300/.60 = 500 lbs of 0-0-60
- Avoid luxurious consumption of K by not applying in early spring
  Apply to stubble to reduce damage caused by the applicator
  Good times to consider application are after the first harvest and after the last growing season harvest
- Apply B if tissue test indicates a need; most likely on low organic matter or unglaciated soils
- Reduced contribution of N from N fixation
  Encouragement of weeds and forage grass
  Reduction of soil pH

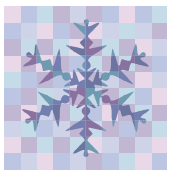
You purchased alfalfa seed in late summer from your seed supplier. In early April you call the seed supplier as you cannot see any alfalfa. What might have happened?

- Winter injury is high risk when the ideal date of late-summer seeding is ignored.



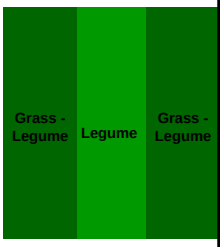
## Seeding – Date of Seeding

- Differences among cool-season grasses and legumes vs. warm-season grasses
- More risk if too early or too late
  - Use proper words;
    Is it really a fall seeding?



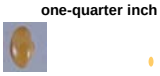
## Seeding – Equipment Used

- Seedbed needs
  - Firm
  - Weed free
- Seeders
  - Uniformly distribute seed
  - Easy calibration
    - Separate seed boxes preferred
  - Row width less than 7 inches
  - Ability to deliver chaffy seed?
    - (example: big bluestem)




## Seeding – Depth of Seeding


Take the time to evaluate correct depth




## Seeding – Inoculation of Legumes

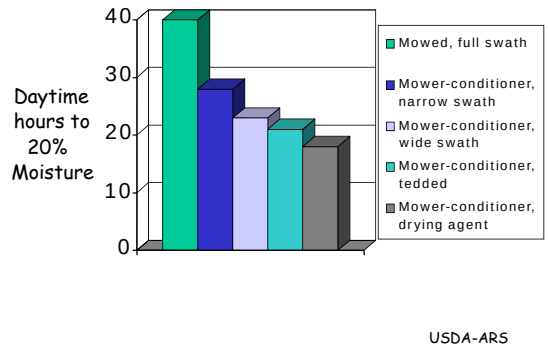
- Is the seed pre-inoculated with rhizobia?
- Has the expiration date passed?


Twenty acres to be sown to alfalfa and orchardgrass . . .
desired seeding rate is 10 lbs Pure Live Seed per acre of alfalfa and 3 lbs Pure Live Seed per acre of orchardgrass. . .
alfalfa has a purity of 99.9 percent and a germination of 85 percent, while the orchardgrass has a purity of 95 percent and a germination of 90 percent.
How much seed of each type will need to be ordered?

- % Germination x % Purity = % Pure Live Seed
  - Alfalfa .999 x .85 = .849 = 84.9 % Pure Live Seed
  - Orchardgrass .95 x .90 = .855 = 85.5 % Pure Live Seed
- lbs. Pure Live Seed per Acre / %PLS = lbs. bulk seed per acre
  - Alfalfa 10/.849 = 11.8 lbs bulk seed per acre
  - Orchardgrass 3/.855 = 3.5 lbs bulk seed per acre
- Alfalfa 11.8 lbs bulk seed per acre x 20 acres = 236 lbs
  Orchardgrass 3.5 lbs bulk seed per acre x 20 acres = 70 lbs

What strategies should one consider to reduce the incidence of rain-damaged hay? Indicate which strategies are first priority considerations.

- being more aware of weather
- using a properly set mower-conditioner
- making silage/balage instead of dry hay
- proper use of tedding
- using a drying agent at mowing on legumes
- using organic acid preservatives when baling wet hay



## What is “balage”?

- "Balage" is forage crop silage in a plastic-wrapped bale

## The Major Advantage

- Better manage the weather factor
  - Probability of 3 consecutive dry days during the week of May 17-23 is only 55% and increases to 74% for 2 consecutive dry days during the same period of time.

    (From: Probabilities of sequences of wet and dry days in Indiana. North Central Regional Publication 161)

## Other Advantages

- Reduced harvest loss can increase forage quality
- Lower purchased feed costs due to higher feed value in balage

## Quality comparisons of tall fescue-red clover forage baled dry prior to or after 1.25 in. of rain, or wrapped as balage

| | Forage Treatment | | |
|---|---|---|---|
| Variable | Dry | 1.25 " rain | Balage |
| Dry Matter, % | 86.5 | 89.8 | 53.4 |
| Crude protein, % | 10.7 | 10.0 | 11.8 |
| TDN, % | 56 | 48 | 60 |
| RFV | 77 | 64 | 94 |
| NDF, % | 69 | 75 | 59 |
| NEm, Mcal/lb | .59 | .50 | .67 |

S. Indiana Purdue Agricultural Center, 2001

## Other Advantages

- Reduced storage loss as compared to hay stored outside and directly on the ground
- Reduced trips across a field as tedding and raking are not necessarily needed

## Tradeoffs

- More bales have to be made and handled as there is less dry matter in each bale
- Plastic disposal is another chore
- Bales should be fed within a year of harvest because the plastic will break down and the bales will begin to spoil

## Bale-Wrapping Equipment

- Platform wrapper
  - less initial expense,
  - marketed more easily as individual bales
  - less spoilage loss if damage to the plastic of an individual bale occurs as compared to plastic damage to a bale wrapped in-line

## Bale-Wrapping Equipment

- In-line Tube Wrapper
  - less plastic cost (approximately half)
  - less time needed to wrap each bale

## Principles to Success

- Crop quality
- Moisture content
- Bale density
- Bale shape
- Time between baling and wrapping
- Bale binding
- Plastic
- Storage
- Feeding

## Crop Quality

- **Good fermentation is dependent upon a supply of readily fermentable carbohydrates. Overly mature forage will have less nonstructural carbohydrate**
- **Expense associated with wrapping a large round bale, excellent or poor in forage quality, is approximately $3 a bale. Wrapping low quality forage is a poor investment because plastic cost as a percentage of hay value is high**

## Moisture Content

- **Best range of moisture content for proper fermentation is 50 to 60 percent. Uncut forage will be around 75 percent moisture.**
- **Generally the crop needs to wilt 6 to 24 hours to reach ideal moisture content to make balage. Wilting time will be dependent upon crop type, yield, swath density and environmental conditions at harvest.**

## Bale Density

- A dense, tight bale improves fermentation as less pore space will be occupied by air. Proper fermentation requires an anaerobic environment.

## Bale Shape

- Bales should have similar outer dimensions so fewer air pockets result.

## Time Between Baling and Wrapping

- Bales should be wrapped as soon as possible after baling; ideally within 4 hours.

## Bale Binding

- Need to use plastic or untreated sisal twine, or plastic net wrapping. Avoid treated sisal twine.

## Plastic

- Tightly wrap each bale with six to eight layers of good-quality, 1-mil-thick plastic that is resistant to sunlight.

## Storage

- **On a well-drained site**
- **Inspect bales often for the presence of holes in the plastic. Patch holes with ultraviolet light-protected plastic tape**
- **Storing individually wrapped bales on end reduces holes caused by wildlife since there is more overlap of wraps on the ends of the bale.**

## Feeding

- Utilize the bales within a year to reduce storage loss. Unwrap plastic on the balage just prior to feeding to the livestock.

# What is it?

You review the following yield information as you consider the purchase of potato leafhopper resistant alfalfa seed. What do you think?

Statistically Highest Yielding Varieties 2004 Tons Dry ( Matter / Acre)

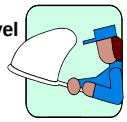
| Sprayed Susceptible Varieties | | | No Spray Resistant Varieties | | |
|---|---|---|---|---|---|
| 2004 | 2005 | 2006 | 2004 | 2005 | 2006 |
| 9.3 | 10.5 | 9.7 | 9.1 | 9.8 | 9.6 |

## Potato Leafhopper Resistant Alfalfa




## My Thoughts on Potato Leafhopper Resistant Alfalfa

- **Recent releases are much better than first releases because of greater resistance level**
- **Excellent "insurance policy" for**
  - **producers that will not spray**
  - **suffer yield loss often**
- **Good choice if selling hay to customers wanting non-insecticide treated hay**
- **Remember there is a $ cost to scout and spray a field.**



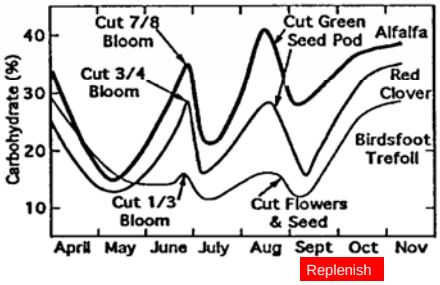
## Weed Control Thoughts

- Are herbicides labeled for the desired crop?
- Have a crop rotation/herbicide use plan
  - Plant-back restriction concern
- Be aware of harvest and grazing restrictions
- Use of a companion crop
  - Preferably harvest as forage
  - Is it needed?
    - Erosion reduction?
    - Weed control?
    - Forage resource?
  - Evaluate cost carefully of some choices (triticale, field peas, etc.)

Read the Label

Purdue publication WS-16

You have a three-year old stand of alfalfa that has seen an increase in warm-season annual grass encroachment. What should be done to reduce the presence of the weeds?



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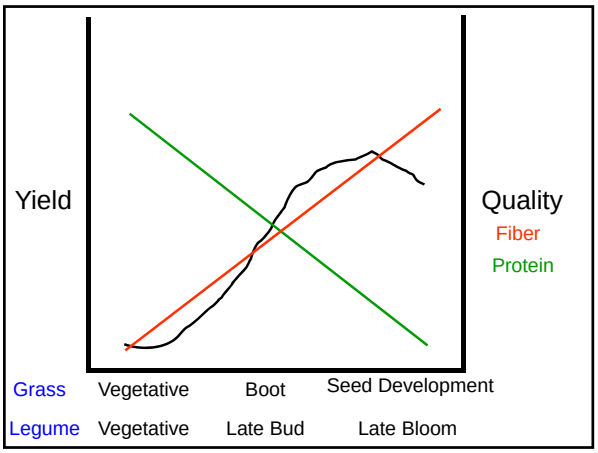



## Forage Testing Returns $$

- Reduced supplement cost without sacrifice in animal performance

or

- Increased supplement cost which will increase animal performance value more than the cost of the supplements.

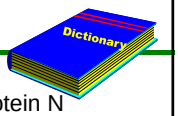
## Forage Test and Balance Rations

- Representative sampling critical
  - 2 cores from 10 large bales or 1 core from 20 small square bales
- Use a certified lab
  - http://foragetesting.org/
- Understand forage quality terminology
- Learn to balance rations based on the needs of the animal or seek the expertise of a nutritionist

## Easy to Remember "Ideal" Lactating Cow Hay Quality 20-30-40 Dry Matter Basis

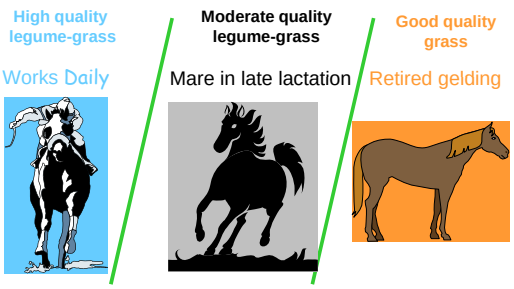
- 20 percent Crude Protein
- 30 percent Acid Detergent Fiber
- 40 percent Neutral Detergent Fiber
- > 150 Relative Feed Value

## Forage Quality Terms




- Crude protein
  - a mixture of true protein and nonprotein N
  - (Nx6.25)
- Neutral Detergent fiber
  - cell wall contents (cellulose, hemicellulose, lignin, ash)
- Acid Detergent Fiber
  - highly indigestible and slowly digestible (cellulose, lignin, ash, pectin)
- Relative Feed Value
  - index used to rank forages by potential intake of digestible dry matter

. . . 15-year old gelding and a 5-year old mare that will foal. . . hay types to consider are:
a) orchardgrass with a Relative Forage Quality of 100 and crude protein content of 10 percent
b) alfalfa with a Relative Forage Quality of 190 and a crude protein content of 23 percent
c) alfalfa-orchardgrass mixture with a Relative Forage Quality of 150 and a protein content of 16 percent.




You can purchase hay with similar forage analysis from three different suppliers for $2.50, $3.00 or $3.50 a bale. What are considerations to deliberate as you make a choice of purchase?

- Visual appraisal similar, too?
  - Mold
  - Presence of weeds
  - Leaf to stem ratio
- Bale weight
  - example - A 60 lb bale may be less $ per ton as compared to a 50 lb bale at lower $ per bale
- Transportation cost

Alfalfa Fall Dormancy of 9 in the Midwest USA
Using an early-maturing orchardgrass in a mixture with alfalfa
Clover root curculio
Smooth bromegrass in a mixture with alfalfa - harvest 4 times a year.
Relative Forage Quality of 100 for a lactating dairy herd

- winter injury
- reduced quality of the mixture if harvested when alfalfa is ready for harvest
- path for entry of pathogens
- cannot tolerate > 3 harvests as it is a jointing grass
- reduced intake and digestibility of the forage

## Hay Producer Score Sheet

| Statement | Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree |
|---|---|---|---|---|---|
| Next to family and religion, producing and marketing hay is the most important thing that I do. | | | | | |
| I can produce hay profitably "on paper" with reasonable assumptions about yield, quality and input costs. | | | | | |
| I have a marketing plan. Who? What? When? Where? Why? How? | | | | | |
| I can communicate with employees, customers and potential customers. | | | | | |
| More than half of my business is repeat customers. | | | | | |
| I use forage testing as a marketing tool. | | | | | |
| I can grow the business or know when to expand or reduce hay acreage. | | | | | |
| I seek counsel from professional resources when evaluating concerns of production and marketing? | | | | | |