Small Farm Pasture Management Series: Soil test interpretation and fertilizer calculation

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Steps 1 Design your Plan

Determine the area:
- Site visit
- Measuring wheel
- Download Software app
- Go to GIS (Find the address or visit your farm)
- Example:
  Moreno farm's have 108,471 sq ft =
  1 acre = 43560 sq ft
  \[ \frac{108,471}{43,560} = 2.49 \text{ acre} \]

Step 2 Planning

- Should you keep your current forage or renovate your pasture?
- Consider
  - Timing
  - Forage option
- Seek appropriate information
- Regarding:
  - Geographic area
  - Season
  - Cost/Profit
  - Seed/material availability

Step 3 Soil test report interpretation

Adams-Evans Test
- Determines the amount of lime required to adjust the soil pH to target level.
- Measures the soil acidity in water and in a buffer solution (pH of 8) to determine soil lime requirement.
- The lower the pH of the buffer solution, the greater the amount of lime needed.
- Soils that contain more clay minerals and organic matter typically require greater amounts of lime to raise the pH.

http://journals.iaea.org/pdf/issue/19/513/180.pdf
Step 3 Soil test report

- After measure soil properties: (UF/IFAS Analytical Services Laboratories)
- PH Level Considerations (1-14)
  - < 5 Strongly acid
  - 5.5-6.5 moderately acid
  - 6.5-7.5 slightly alkaline
  - 7.3-8.2 slightly alkaline
  - > 8.2 Strongly alkaline

Cost of Skipping Lime (Range Cattle Research and Education Center in Ona) 1998-2007

- Compared fertilizer application, with and without lime:
  - A 30% decrease in forage production over one season
  - 2,700 lbs of lost dry matter
  - 1,452.5 lbs of TDM
  - It would require approximately 32 bags of a 20% ranges cubes to replace these nutrients.
  - $15 per bag (approximately $288 per ton)
  - Decrease root/stolon mass
- Create favorable conditions for:
  - Male crickets
  - Weed infestations

Lime Recommendation

- Recommended lime application rates are based on the soil sample’s pH specific to the forage.
- Soils with high buffering capacity (high organic matter and contents)
  - Require more lime to reach the target pH
- Soils with low buffering capacity (Central Florida sandy soils):
  - Require less lime to raise the pH
  - Require more frequent lime applications to maintain pH

Rule of Thumb

‘Rule of Thumb’ one ton of lime will raise the pH one unit is a generalized approximation

- Not always reliable due to the inherent differences in soil characteristics.
- pH 5.0 + 1 Ton of Lime = increase 1 unit of pH = pH 6.0
- 1 Ton = 2,000 lbs price 20/ton + Delivery
**Step 5 Fertilizer application**

- Apply N as early as possible with regards to warm temperature.
- Central Florida apply in late-February or early March to maximize the supply of grass at this critical spring period.
- N Bahiagrass spring fertilization can reduce your feed cost significantly and increase livestock profitability by about compared to feeding concentrates.
- **High N: splits application:** March & late-summer

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**Timing Bahiagrass Fertilizer Application**

- Fertilizer should usually be applied at the beginning of the growing season.
  - Warm-season perennial grasses (February to March).
  - Some pasture grasses may be given an additional application of N in late season (June).

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**Cheapest source of N**

- Common sources of N:
  - Ammonium nitrate (33% N).
  - Ammonium sulfate (21%N: 24%S)
  - Ammonium sulfate cheaper and supplies S

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**Applying fertilizer**

- Low N option (for grazed pastures only):
  - 50-60 lb N/A with no P or K.
- Medium N option:
  - 100 lb N/A with 25 lb phosphate (P2O5) if soil tests low in P and 25 or 50 lb Potassium alone K2O/A if soil test medium or low in K.
- High N option (2 splits Applications) (Hay):
  - 160 (80 + 80) lb N/A with 25 lb P2O5 /A if soil tests medium or 40 lb P2O5 /A if soil tests low in P, respectively.
  - Apply 40 or 80 lb K2O/A if soil tests medium or low in K, respectively.
**Phosphorous application**

- Only the nutrients that are needed by the crop should be included in the fertilizer.
- Example:
  - If a soil test indicates that phosphorus is adequate, no phosphorus should be included in the fertilizer.
- Soil tissue test is required:
  - <0.15 P application is required
  - 25 lbs P

**Potassium**

- Low, medium, or high?
  - Low 80 lbs/acre
  - Medium 40 lbs/acre
  - High 0 lbs (no application required)

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**Lime and Fertilizer Recommendations**

- **Phosphorous (P)**
  - L = 60
  - M = 100
  - H = 150
  - Pounds of fertilizer required = Total pounds needed of fertilizer per acre

- **Ammonium Nitrate (33%/A)**
  - L = 60/0.33 = 182 lbs/acre
  - M = 100/0.33 = 303 lbs/acre
  - H = 150/0.33 = 454 lbs/acre

- **Ammonium Sulfate (21%/A)**
  - L = 60/0.21 = 286 lbs/acre
  - M = 100/0.21 = 476 lbs/acre
  - H = 150/0.21 = 712 lbs/acre

- **Lime**
  - L = 60
  - M = 100
  - H = 150

**Sources:**
- Triple Super Phosphate 0-45-0
- Phosphate (P2O5) 14.2%/P = 25/0.437 = 57 lbs/acre

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**Limpograss**

- Popular grass stockpiled for winter feeding
- Apply 300 lb of 20-5-10/A in early spring
- Graze close (6") at the beginning of summer to prevent buildup of coarse stems. Apply another 50 lb N/A in late-September just before stockpiling

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**Summary application (Wilfrido Farm)**

- Moreno’s Farm
  - 2-40 Acres
  - 15-20 lbs per acre (Bahia grass)
  - Producer needs 50 lbs of Bahia grass seeds to plant 2.5 acres.
  - Liming
    - “Rule of thumb”

- **N**
  - Depending on grazing intensity will the application of N:
    - L = 60 lbs N
    - M = 100 lbs N
    - H = 150 lbs N
  - P
    - Fertilizer (Fertilizer N and P) only
    - <0.15% of P is required fertilizer (Bahia only)

- **K**
  - L = 800 lbs/acre
  - M = 400 lbs/acre
  - H = no application is required
References:

- Planting Dates, Rates, and Methods of Agronomic Crops:  
  http://edis.ifas.ufl.edu/pdffiles/AA/AA12700.pdf
- Annual Warm-Season Legumes for Florida and the US Gulf Coast: Forage Yields, Nutritional Compositions, and Feeding Value:  
  http://edis.ifas.ufl.edu/pdffiles/AN/AN25900.pdf
- http://edis.ifas.ufl.edu/ax489
- http://smallfarms.ifas.ufl.edu/livestock_and_forages/specific_forages.html
- http://edis.ifas.ufl.edu/topic_forage
- Fertilizing and Liming Forage Crops:  
  http://edis.ifas.ufl.edu/pdffiles/AG/AG17900.pdf