Getting Started—What Everyone Should Know:

Soil Test! The soil test is the first step in efficient fertilizer use and improved forage production. For soil forms and bags contact your County Extension Office or visit http://soiltesting.tamu.edu. The objective in sampling is to obtain small composited samples of soil that represent the entire area to be fertilized or limed. Several tools can be used to collect samples: a trowel, a spade, an auger or a soil probe. Traditionally, soil samples are collected to a depth of 6 inches. This depth is measured from the soil surface after plant materials are pushed aside. In fields up to 40 acres, collect at least 10 to 15 cores of soil per composite sample. In smaller areas five to six cores may be adequate. Do not oven dry the samples because high drying temperatures can alter test results.

Soil pH:
Soil pH is a measure of hydrogen ion activity in the soil solution. The soil pH scale extends from 0 to 14; thus soil pH in the range of 6.6 to 7.3 is rated neutral. Soils are considered acidic between pH 0-6.5. Soils with pH values above 7.4 are rated as alkaline. Although a decrease in soil pH from 6.0-5.0 does not appear significant, there is a 10-fold increase in soil acidity for every whole unit change in soil pH. Optimum nutrient uptake by most crops occurs at a soil pH near 7.0. The availability of fertilizer nutrients such as nitrogen, phosphorus and potassium generally is reduced as soil pH decreases. Soil pH also affects the types, concentrations and activities of soil microorganisms. As pH drops below 5.5, the population of soil microbes is reduced.

Lime:
All limestones are not the same and may react more or less efficiently based on the particle size and neutralizing value of the limestone material. Smaller particles have more surface area, react more rapidly to change soil pH, and thus have a higher efficiency rating (ER). Particles larger than 0.080 inches in diameter do not react with the soil to effectively change pH. The ability of a limestone to neutralize soil acidity also depends upon its calcium carbonate equivalence (CCE) or neutralizing value, which is expressed as a percentage. Pure calcium carbonate is the standard and has a CCE of 100%. Dolomitic limestones contain both calcium and magnesium carbonates. Effective Calcium Carbonate Equivalence (ECCE) combines the fineness efficiency rating (ER) and the calcium carbonate equivalence (CCE) to estimate the percentage of effective limestone in a given product. Limestone rates recommended by soil testing laboratories are based on use of 100% effective limestone. Agricultural grade limestones have an ECCE value of 50-70%. Therefore, if a soil test recommendation for lime is 1.0 ton/acre, the actual application rate of a limestone with an ECCE value of 60% would be 1.67 tons/acre (1 ton/0.60 = 1.67). Liquid lime is a combination of a very fine limestone in water with 1 to 2 % clay to form a suspension that is about 50 to 60% solids. Liquid lime is usually more expensive per ton than limestone applied dry due to increased costs for finely ground materials, freight and product application.

Seedbed Preparation:
Preparation of the soil to allow for proper movement of moisture and nutrients through the soil and prevent weed competition is critical for the success of your forage.

Site preparation is something that must be begun weeks, or even months ahead of the anticipated planting date.

Begin by removing existing vegetation, either through mechanical or chemical means.
Begin initial seedbed preparation approximately 2 weeks after herbicide application.
Identify a reliable source of seed well before planting time.
Plow, till, disc to break up the soil. Drag the soil to level.
Any recommended phosphorus should be applied at this time so it can be incorporated into the soil.
Any recommended limestone can be incorporated in the soil during land preparation.
Plant seed according to specific recommendations for that forage species/variety.
Roll the seedbed to ensure good seed-soil contact.
Pay close attention to weed competition and control with appropriate herbicides.

Legume Inoculation:
The purpose of inoculation is to make sure that there is enough of the correct type of bacteria present in the soil so that a successful legume-bacterial symbiosis is established. A number of seed companies offer forage seed that is pre-inoculated. Pre-inoculated seed is usually seed that has been coated with variable mixtures of the appropriate bacteria, peat, minerals, limestone and some type of sticker to hold the mixture together on the seed. If you plan to inoculate the seed yourself it is necessary to purchase the appropriate inoculant from a reputable supplier. The inoculant should be clearly labeled as to which crops it is to be used on. In addition, the inoculant should be labeled with an expiration date. Over time the bacterial population in a commercial inoculant will decline and be less effective. Pay attention to expiration dates on inoculants! In order to insure effective coating of the seed with the inoculant it is recommended to use a sticker such as sugar water solution, milk, soda or some commercial sticking agent.

Web Soil Survey (http://websoilsurvey.nrcs.usda.gov)
The web soil survey provides soil data and information produced by the National Cooperative Soil Survey. The web application provides electronic access to relevant soil and related information needed to make wise land use and management decisions. The Web Soil Survey can create a soil map of your property by simply entering in an "Area of Interest" either using an address or GPS coordinates. Not only can you determine the various types of soil on your property but you can measure fence lines, measure ponds, determine the slope of your property, etc.

The roles of N, P, and K:
In general, nitrogen is responsible for increased yield and quality, and as nitrogen rate increase, so does yield. The role of phosphorus and potassium in the plant is maintenance.

Nitrogen: Nitrogen is primarily responsible for vegetative growth. Nitrogen assimilation into amino acids is the building block for protein in the plant.
Phosphorus: Phosphorus is a major component in plant DNA and RNA. Phosphorus is also critical in root development, crop maturity and seed production.

Potassium: Potassium is important for the plant's ability to withstand extreme cold and hot temperatures, drought and pests. Potassium increases water use efficiency and transforms sugars to starch in the grain-filling process.

Interpretation of Soil Analysis:
Keep in mind labs may vary in the way they report information. The following is based on Soil Analysis from the Texas A&M AgriLife Extension Service Soil, Water and Forage Testing Laboratory, College Station, TX. (http://soiltesting.tamu.edu)

A standard soil analysis will provide you with results and fertilizer recommendations on the following soil nutrients: Nitrate-N, Phosphorus, Potassium, Calcium, Magnesium, Sulfur and Sodium. The analysis will provide soil pH along with any limestone recommendations. Fertilizer recommendations are given to the right of the analysis results for each nutrient. Special recommendations or notes are listed at the bottom of the analysis.
(HAVE AN EXAMPLE OF AN ANLYSIS AND LABEL SECTIONS A,B,C… AND DESCRIBE EACH SECTION INDIVIDUALLY?)

Fertilizer:
The three numbers on a fertilizer bag refer to the percentage of total nitrogen (N), phosphate (P_2O_5) and potash (K_2O) in the bag. For example, a 50-pound bag of 15-15-15 will contain 7.5 pounds of N, 7.5 pounds of P_2O_5 and 7.5 pounds of K_2O. (50 x 0.15 = 7.5) Fertilizer recommendations from a soils analysis will never match the exact numbers on a bag of fertilizer. Some fertilizer dealers will custom mix a formulation based on soil analysis recommendations. These dealers commonly blend mixtures in large volumes, typically one ton (2,000 lbs). If your food plot area is small it may not be economical to purchase fertilizer by the ton. Therefore, you may have to purchase fertilizer in 50 lb units. A sensible approach may be to apply a specific nutrient fertilizer. For example, a 50-pound bag of ammonium nitrate (34-0-0) contains 17 pounds of N. One bag of a phosphate fertilizer, such as triple super phosphate (0-46-0), contains 23 pounds of P_2O_5. A bag of muriate of potash (0-0-60) contains 30 pounds of K_2O. Properly inoculated legumes fix nitrogen from the atmosphere via a symbiotic (mutually beneficial) relationship with *Rhizobia* bacteria. Therefore, nitrogen fertilizer is not necessary and may actually increase weed populations if applied.

When planting or managing mixtures, always follow soil test recommendations. As a general rule, you should fertilize according to the plant with the highest nutrient requirements.

TEXAS A&M AGRILIFE EXTENSION

Soil, Water and Forage Testing Laboratory
Department of Soil and Crop Sciences
Texas AgriLife Extension Service

D-494

S13

SOIL SAMPLE INFORMATION FORM

Please submit this completed form and payment with samples. Mark each sample bag with your sample identification and ensure that it corresponds with the sample identification written on this form. *See sampling and mailing instructions on the back of this form.

(PLEASE DO NOT SEND CASH)

SUBMITTAL AND INVOICE INFORMATION: This information will be used for all official invoicing and communication.

Name ______________________________ County where sampled ____________________

Address A ______________________________ Phone ____________________

City ____________________ State______ Zip ______ ____________________

CLIENT NAME: Client name will only be included with information above on result reports.

Name ______________________________

Lab Use only

Payment (DO NOT SEND CASH)
☐ Check
☐ Money Order (keep your M.O. receipt)
☐ Credit Card – requires additional form*

Amount Paid $____________________
Make Checks Payable to: **Soil Testing Laboratory**
*Credit card payment forms can be downloaded at http://soiltesting.tamu.edu

SAMPLE INFORMATION (Required)

Laboratory # (For Lab Use)	Your Sample I.D.	Acreage Represented	What are you growing? Crop, Yield Goal, Use	Select only one analysis suite/sample	Growing a forage? How is used?
	B	C	D	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10 E	☐Grazing ☐ Hay ☐Grazing and Hay ☐Min. requirement ☐Establishment F
				☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10	☐Grazing ☐ Hay ☐ Grazing and Hay ☐Min. requirement ☐Establishment
				☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10	☐Grazing ☐ Hay ☐ Grazing and Hay ☐Min. requirement ☐Establishment
				☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10	☐Grazing ☐ Hay ☐ Grazing and Hay ☐Min. requirement ☐Establishment
				☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10	☐Grazing ☐ Hay ☐ Grazing and Hay ☐Min. requirement ☐Establishment

G **Analysis Suites (only one per sample)**

1. **Routine Analysis (R)** — **$10 per sample**
(pH, NO3-N, Conductivity and Mehlich III by ICP P, K, Ca, Mg, Na, and S)
2. **Routine + Micronutrients (Micro)** — **$17 per sample**
(In addition to suite 1, DTPA Zn, Fe, Cu, and Mn)
3. **R + Micro + Hot Water Soluble Boron (B)** — **$24 per sample**
(In addition to suite 2, adds boron)
4. **R + Detailed Salinity (Sal)** — **$30 per sample**
(In addition to suite 1, saturated paste extractable Ca, Mg, K, Na, conductivity, pH and SAR)
5. **R + Micro + Sal** — **$37 per sample**
(In addition to suite 2, includes detailed salinity)
6. **R + Micro + Detailed Limestone Requirement (Lime)** — **$27 per sample**
(In addition to suite 2, adds exchangeable acidity titration test)
7. **R + Micro + B + Lime + Organic Matter + Sal** — **$74 per sample**
(In addition to suite 3, adds organic matter and detailed salinity tests)
8. **R + Textural Analysis** — **$30 per sample**
(In addition to suite 1, adds soil textural analysis)
9. **R + Organic Matter (OM)** — **$30 per sample**
(In addition to suite 1, adds organic matter test)
10. **R + Texture + OM** — **$50 per sample**
(In addition to suite 8, adds organic matter test)

If you need additional tests that may not be a component of the listed suites, please contact the laboratory.
email: soiltesting@ag.tamu.edu or 979-845-4816.

Note: Organic Matter, Detailed Salinity and Texture may require longer processing time.

Pricing valid until 12-31-2013.

The latest form can be downloaded at the laboratory's website: http://soiltesting.tamu.edu

Form S2-0113

A: Name, address, county where sampled, contact information for invoicing as well as for sending soil analysis report.
B. “Your Sample I.D.” It is recommended to label each sample with a name or number so when you receive your soil analysis you know which pasture/management area the report is for.
C. “Acreage Represented” The total area in acres where the sample was collected.
D. “What are you growing” Give information about the forage you intend or are growing in the area of the sample. Such as cowpeas, ryegrass, or a mixture of ryegrass and white clover.
E. Analysis Suite: Select from 1 through 10 for the specific analysis that you need/want. The menu is at the bottom of the form “G.” For deer food plots, we recommend selecting “1. Routine Analysis.”
F. Growing Forage? How is used? For deer food plots select “Grazing.” If this is a new establishment select “Establishment.”
G. “Analysis Suites” Menu of possible analysis from soils laboratory. For deer food plots, we recommend selecting “1. Routine Analysis”