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Changes in Bahiagrass Fertilization Recommendations

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Fertility management for bahiagrass pastures is an evolving process. Since 1990, fertilizer recommendations for bahiagrass have been changed in order to address scientific, economic, and technological considerations of pasture fertilization. These changes included optimum soil pH levels, phosphorus fertilization and division of the State into north and south regions.

Over the last decade, phosphorus fertilization and soil testing calibrations for phosphorus fertilizer recommendations have become important topics of pasture fertilization. That is because phosphorus not only represents an expensive input but also may impact the environment when mismanaged. Research in Florida has shown that bahiagrass may produce satisfactorily without phosphorus fertilization. That is likely due to the apparent ability of bahiagrass to access phosphorus from deep soil depths. However, continuous grazing and/or haying production in absence of phosphorus fertilization may lead to phosphorus deficiency, which in turn may reduce forage production. There have been several reports in Florida indicating yield decline in bahiagrass pastures that received no phosphorus fertilization for several years. Under these circumstances, it appears that soil phosphorus "reserves" had been completely depleted and the overall pasture sustainability could be at danger because of soil nutrient deficiency. However, the key for most producers was to distinguish situations where phosphorus is needed to improve bahiagrass production.

Although most Florida sands exhibit very low phosphorus concentrations in the top surface soil, adequate concentrations are often found in deep soil depths. Soil test alone has been shown to poorly predict bahiagrass phosphorus requirements. This is mainly because a soil test typically examines the top 6 inches of the soil profile, which may not reflect the total soil phosphorus pool present at deeper soil depths. The challenge for

agronomists and soil scientists was to develop additional tools to better predict phosphorus requirements in established bahiagrass pastures. In this context, plant analysis in combination with soil test has proven to be a useful diagnostic tool to manage soil fertility. Although using the concept of plant nutrient analysis has been long used in many agricultural systems, incorporating this concept into existing forage nutrient management programs in Florida require special attention. Research is still needed to fine-tune the correlation between tissue and soil test phosphorus and bahiagrass response to fertilization. It is possible that recommendations may still be subjected to modification as research data from different regions of the State become available.

The following represents a brief summary of the main changes in the IFAS fertilization recommendations for bahiagrass pastures presented by the Pasture Fertilization Task Force (Pasture Fertilization Committee Members: John Arthington (Chair), Maria Silveira, Joao Vendramini, Rao Mylavarapu, Lynn Sollenberger, Yoana Newman, Cheryl Mackowiak, Pat Hogue, and Doug Mayo.).

1. **Optimum soil pH**

   Root development and nutrient availability are affected by soil pH. Thus, it is essential that soil pH is addressed before considering nitrogen and/or phosphorus fertilizer application. Optimum soil pH for bahiagrass is 5.5. Soil test is now recommended for both north and south regions of the State. Soil samples should be periodically taken and analyzed to determine soil pH. Excessively high pH is as undesirable as low pH. Thus, it is important that soil is tested at least once every three years to determine pH and lime requirements. The frequency of soil sampling will depend on several factors including soil type, nitrogen application rate, nitrogen fertilizer source, and forage utilization (grazing versus haying). It is also important to allow enough time for the lime material to react with the soil particles and bring the pH to the desirable ranges. Because of the low solubility of the majority of the liming materials, these should be applied from 3 to 6 months prior to fertilizer application.

2. **Soil test**

   Despite the limitations described previously, soil test continues to be an important nutrient management tool. Again, it is important the soil sample truly represents the area of interest. Thus, proper sampling is a crucial step. Soil samples should be submitted to a reputable laboratory for analysis. Caution should be exercised when submitting soil samples to "out of State" laboratories. Because IFAS recommendations are based on an analysis procedure known as "Mehlich-1" or "double-acid", it is important that the laboratory where the soil samples will be analyzed uses the same method. If the producer decides to use the UF/IFAS Extension Soil Testing Lab, note that new analysis codes were created for bahiagrass pastures. In case the producer is interested in phosphorus recommendations, both soil and forage tissue samples must be submitted to the UF/IFAS Extension Soil Testing Lab at the same time. If only soil samples are sent to the lab, the soil test report will provide the soil phosphorus levels in the

soil but will not include phosphorus recommendations. Alternatively, if the producer is only interested in testing the soil for pH, Ca, Mg and K levels, soil samples alone can be sent to the lab.

3. **Tissue test**

   In order to better predict bahiagrass phosphorus requirements, we recommend that soil and tissue samples are submitted to the lab at the same time. Similar to soil sampling, collection and handling of tissue samples are crucial steps. The part of the plant to be sampled, maturity stage and time of sampling are also important factors that can affect plant nutrient composition. Forage grasses and hay fields should be sampled prior to seed head emergence or at the optimum stage for forage utilization. As the plant matures, nutrient concentrations decline, so it is critical that plants are sampled at the proper stage of maturity. The four uppermost leaf blades should be sampled. Do not sample seeds since they are not useful for assessing nutrient status of forage crops and may introduce large errors in the report interpretation. If deficiency symptoms are suspected, plants showing these symptoms should be sampled and analyzed separately from "normal" or healthy appearing plants. It is very important that issue samples are immediately sent to the lab after collection. That minimizes changes in the nutrient concentrations in the plant tissue.

Phosphorus recommendations for established grazing bahiagrass in the laboratory report will be based on both soil and tissue test results and the nitrogen fertilizer option chosen by the producer. Nitrogen options should be chosen based upon economic considerations of each individual production system. The tree fertilization options are presented below:

- **Low-Nitrogen Option.** Apply 50 to 60 lb N/A in the early spring. Apply 25 lb P2O5/A if your soil tests Very Low or Low in P and tissue P concentration is below 0.15%. Do not apply P if tissue P concentration is at or above 0.15%, even if the soil tests Very Low or Low in P. For Medium and High soil P levels, neither P application nor tissue analysis is recommended since there will be no added benefit of P fertilization on bahiagrass yields.

- **Medium-Nitrogen Option.** Apply 100 lb N/A in the early spring. Apply 25 lb P2O5/A if your soil tests Very Low or Low in P and tissue P concentration is below 0.15%. Do not apply P if tissue P concentration is at or above 0.15%, even if the soil tests Very Low or Low in P. For Medium and High soil P levels, neither P application nor tissue analysis is recommended since there will be no added benefit of P fertilization on bahiagrass yields. Apply 50 lb K2O/A if your soil tests Very Low or Low in K and none if it tests Medium or High.

- **High-Nitrogen Option.** Apply 160 lb N/A in two applications of 80 lb N/A in early spring and early summer. Apply 40 lb P2O5/A if your soil tests Very Low or Low in P and tissue P concentration is below 0.15%. Do not apply P if tissue P concentration is at or above 0.15%, even if the soil tests Very Low or Low in P. For Medium and High soil P levels, neither P application nor tissue analysis is

recommended since there will be no added benefit of P fertilization on bahiagrass yields. Apply 80 lb K2O/A if your soil tests Very Low or Low in K and 40 lb K2O/A if it tests Medium. No K should be applied if your soil tests High or Very High in K. The fertilization rates suggested in this option are high enough to allow bahiagrass pasture to achieve well above average production. Management and environmental factors will determine how much of the potential production is achieved and how much of the forage is utilized. A single cutting of hay can be made without need for additional fertilization.