

# Phosphorus Removal in Harvested Sod in Central Florida

Joseph Walter, Agricultural Extension Agent, Brevard County Extension Service, Cocoa, FL

Pete Deal, Rangeland Management Specialist, USDA Natural Resources Conservation Service, Kissimmee, FL

Randy Bateman, Agricultural Extension Agent, Osceola County Extension Service, Kissimmee, FL

Krista L. Kirby, Agricultural Extension Agent, Manatee County Extension Service, Palmetto, FL

Dr.

Maria Silveira, Asst. Professor, Dept. of Soil and Water Science, Range Cattle Research and Extension Center, Ona, FL

## ABSTRACT:

Ranchers in central Florida are facing increasing pressure from the public and regulatory agencies to reduce the use of nutrients, particularly Phosphorus (P) in their operations. Most of the regulations are aimed at reducing the amount of Phosphorus used in the production of agricultural crops. These regulations encourage or require the use of nutrient budgets to document and track the imports and exports of Phosphorus to agricultural lands. Regulatory agencies are also encouraging ranchers to increase the amount of phosphorus exports as agricultural products. In addition, some recent regulations require that Ranchers show that there is no net increase of Phosphorus if they apply certain soil amendments.

Nutrients budgets are relatively easy to create when hay or silage is harvested. However, it is difficult to create nutrient budgets when sod is harvested because of the lack of reliable estimates on the amount of phosphorus contained in harvested sod. Consequently, it is not possible to accurately estimate the amount of phosphorus removed when sod is harvested.

To address this issue the Florida Grazing Lands Conservation Coalition (FGLC) funded a project to determine the amount of phosphorus removed when sod is harvested. The goal of the project was to quantify the amount of phosphorus removed when different types of sod are harvested. The project investigated St. Augustine Grass (*Stenotaphrum secundatum*) and Bahiagrass (*Paspalum notatum*) sod harvested for use in landscape plantings and the revegetation of roadsides and other disturbed areas.

## PROJECT:

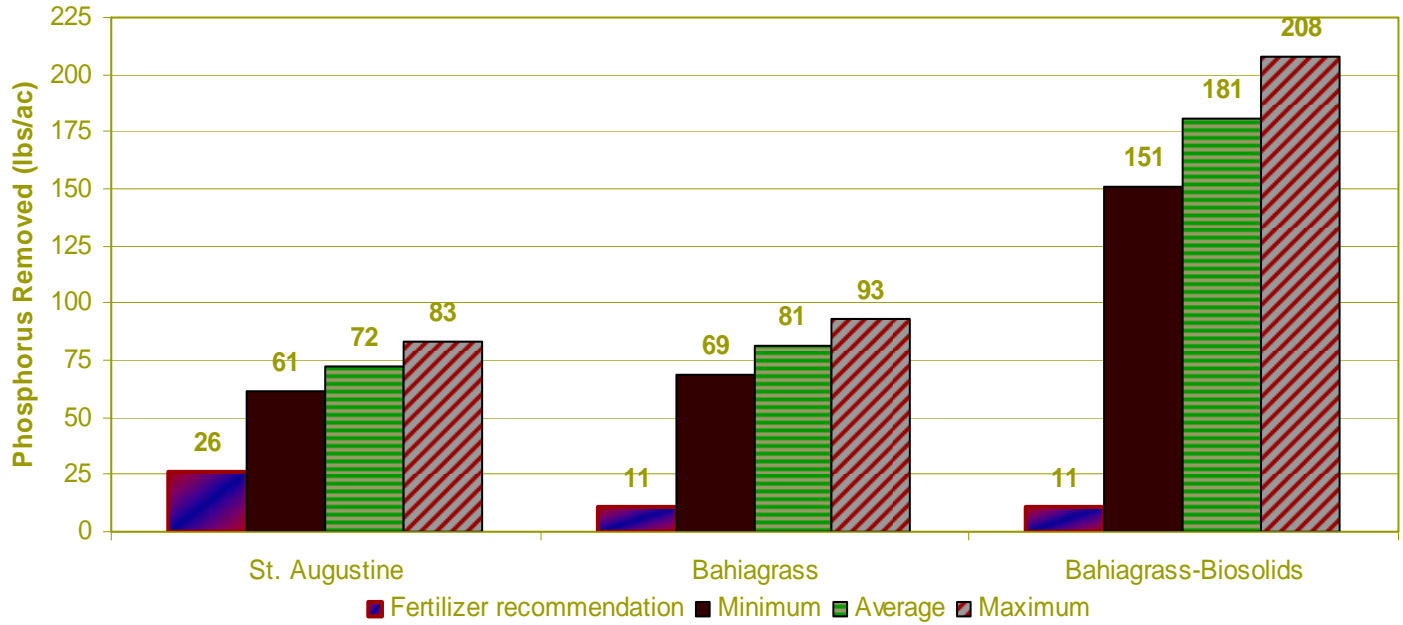
- Fifty-two (52) pieces of sod were collected from 12 central Florida production fields in April 2009.
  - Four (4) samples were collected from each production field.
  - Samples were collected from sites used to produce:
    - St. Augustine grass (*Stenotaphrum secundatum* (Walt.) Kuntze) sod for use in urban landscapes.
    - Bahiagrass (*Paspalum notatum* Flugge) sod for use in urban landscapes
    - Bahiagrass sod used for erosion control along roadways.
- Four (4) fertility management regimes were represented in the sampling project.
  - Landscape Quality St. Augustine grass: Commercial fertilizer applied frequent intervals throughout the year. Sod harvested on 10 to 12 month intervals
  - Landscape Quality Bahiagrass: Commercial fertilizer applied frequent intervals throughout the year. Sod harvested on 12 to 24 month intervals

- **Roadside Quality Bahiagrass: Commercial fertilizer applied on annual or less frequent intervals. Sod harvested on intervals greater than 24 months. Crop is managed primarily for grazing, sod is a secondary crop.**
- **Roadside Quality Bahiagrass with Municipal Biosolids applied: Municipal biosolids applied on intervals greater than 24 months. Phosphorus is applied as commercial fertilizer or municipal biosolids. Site is managed primarily for grazing, sod is harvested as a secondary crop.**
- **Samples were collected and transported to the UF/IFAS Range Cattle Research and Education Center (RCREC) near Ona, Florida for analysis. Samples were divide into three compartments to determine the amount of phosphorus in the above-ground biomass, the below-ground biomass, and the soil pool. Plant and soil samples were dried separately and analyzed for total P. To account for possible contamination from soil the samples of plant biomass were ashed prior to analysis.**
- **All samples were obtained from soils mapped as sand or fine sand.**

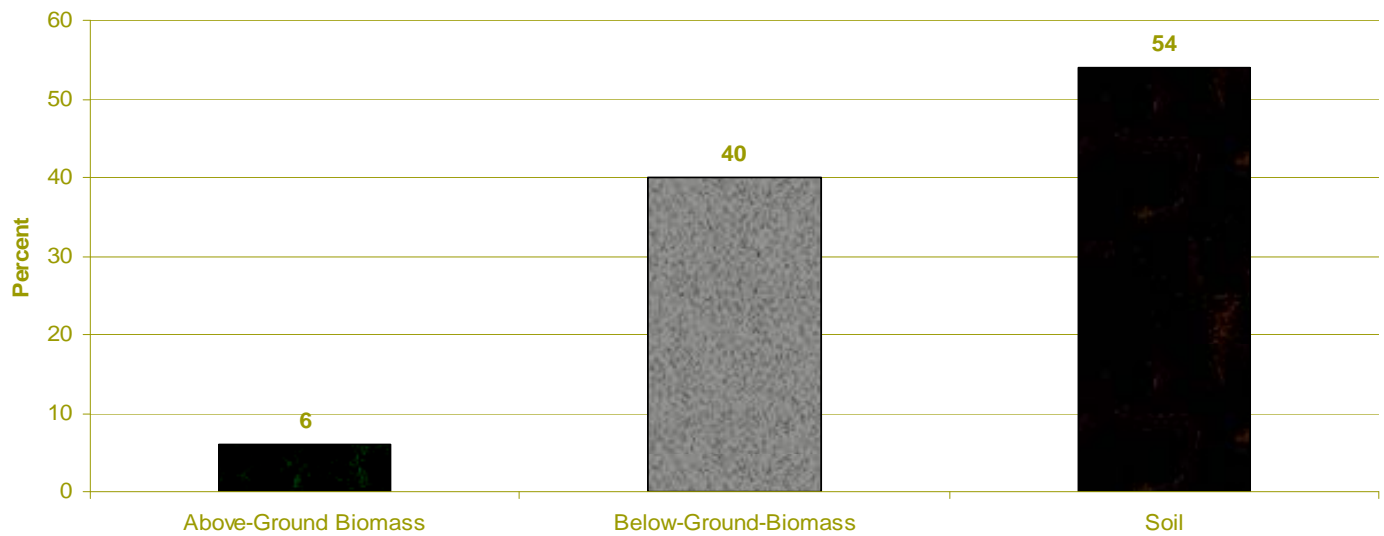
#### **OBSERVATIONS:**

- **P removal rates varied from 60 to 500 pounds of P per acre. This is to approximately 140 to 1,160 lbs of P<sub>2</sub>O<sub>5</sub> per acre. This estimate assumes the entire area will be completely harvested.**
- **Typical sod harvest yields range between 28,000 and 38,000 square feet per acre.**
- **Assuming an medium yield of 33,000 sq. ft./acre, the average P removal is estimate to be:**
  - **St. Augustine grass – 72 pounds per acre (163 lbs. P<sub>2</sub>O<sub>5</sub> per acre)**
  - **Bahiagrass (grown on chemical fertilizer)– 81 pounds per acre (185 lbs. P<sub>2</sub>O<sub>5</sub> per acre)**
  - **Bahiagrass (grown with bio-solids) – 181 pounds per acre (411 lbs. P<sub>2</sub>O<sub>5</sub> per acre)**
- **Soil removed from the site during harvest account for most of the phosphorus removal (54%).**
- **Below-ground biomass contains approximately 40% of the p removed.**
- **Above-ground biomass contains approximately 6% of p removed.**
- **Phosphorus removal rates are significantly higher than current University fertilizer recommendations, SL 129.**
- **Soil removed from the site during sod harvest varied from approximately 58 to 223 tons per acre.**

**Estimated Phosphorus Removal Rates During Typical Sod Harvest  
(33,000 sq. ft per acre = 82.5 pallets per acre)**



**Percent of P Removed by Sod Faction**



## **CONCLUSIONS:**

- 1. Sod harvest can remove significant amounts of phosphorus.**
- 2. Greater amounts of phosphorus was removed from sites that had been fertilized with bio-solids.**
- 3. Sod harvesting can effectively reduce phosphorus build-up on nutrient application sites.**
- 4. Large amount of soil is removed from the site during sod harvest.**

Special Caveat: All samples were obtained following a cold, dry winter, which severely stressed sod production in central Florida. Therefore, additional analysis are recommended to confirm the conclusions of this project.

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