Balancing Bermudagrass Hay Quality with Phosphorus Removal

Producing bermudagrass hay from fields receiving poultry litter provides both high quality forage for ruminant livestock and a means of removing environmentally sensitive nutrients, especially phosphorus (P). While growers seek a reasonable balance between high forage production and quality by cutting every 28 to 35 days, the impact of harvest management on controlling soil P is not widely known.

In the May–June 2018 issue of *Agronomy Journal*, researchers report on multi-year studies from two locations in east-central Mississippi where three harvest intervals and two stubble heights were evaluated on ‘Tifton 44’ bermudagrass. Each spring, plants were provided 4 ton ac\(^{-1}\) poultry litter supplemented with 60 to 98 lb ac\(^{-1}\) fertilizer N, depending on location.

The team found a commonly used practice, cutting every 35 days at low stubble height, provided a reasonable balance between optimizing forage nutritive value and P removal. The forage cut every 35 days had a comparatively small decrease in crude protein as stubble height decreased from 3.5 to 1.25 inches. Cutting every 49 days at low stubble height maximized P removal at approximately 25 lb ac\(^{-1}\) regardless of location. This knowledge is vital to farm income, which is not driven by manure management, but livestock output.


**Convert Soil Tests to Soil Phosphorus Supply**

Phosphorus (P) shortage in highly weathered tropical soils is a major constraint for agricultural productivity. Ascertaining accurate information about the continually changing temporal and spatial distribution of P within such soils is a never-ending challenge for farmers to meet each crop’s P nourishment requirement.

For crop growth and maturation, soil P exists in two pools designated as weakly adsorbed P (readily available) and tightly adsorbed P (slowly available), but unfortunately they cannot be directly measured. The historical problem of soil tests made with chemicals to extract P from soil is that they only extracted a portion of the soil P, and furthermore, the percentage from each P pool is unknown and varies with soils.

In the March–April 2018 issue of *Agronomy Journal*, researchers measured the percentages of P pools extracted by two extractants in the laboratory. A weak test (Olsen method) extracted only the weakly adsorbed P, and a strong test (modified Truog method) extracted both P pools. The three extraction percentages of P pools were found to be predictable from soil mineralogical composition.

As long as the three extraction percentages become known, soil tests can be converted into the amount of P in the two pools to quantify soil P supply. Hence, P recommendation can be designed as a universal formula (crop demand minus soil P supply) in order to optimize yields and minimize the impact of agriculture on the environment.


A set of weak and strong soil P tests and the three extraction percentages for the conversion of the two tests to soil P pools.

*Regrowth of hybrid bermudagrass after cutting at different heights. Photo courtesy of John Read.*