

ARKANSAS SOYBEAN PROMOTION BOARD

Progress Report

Title: Optimizing the Lime Requirements for Soybeans

Investigators: Leo Espinoza,
Associate Professor - Extension Soil Scientist

Objective 1.

Collaborators will be selected from different locations in Arkansas who submitted soil samples with low pH levels. We will particularly contact those whose samples came back with pH levels of 5.0 or lower.

By the time this project was approved, most of early soybeans had been planted and lime had been applied if call for. A couple of fields were located, one with initial soil pH of 4.6 and the other initial soil pH of 5.0. Plans were in place to apply different rates of lime as proposed. However, after more intensive soil sampling, a significant amount of variability in soil pH was found across both fields, with some potential treatment strips calling for 0 ton/A lime, while other strips calling for up to 2 ton/A lime. These two sites would certainly benefit for a variable rate application. It was decided that they would not be good locations for the test.

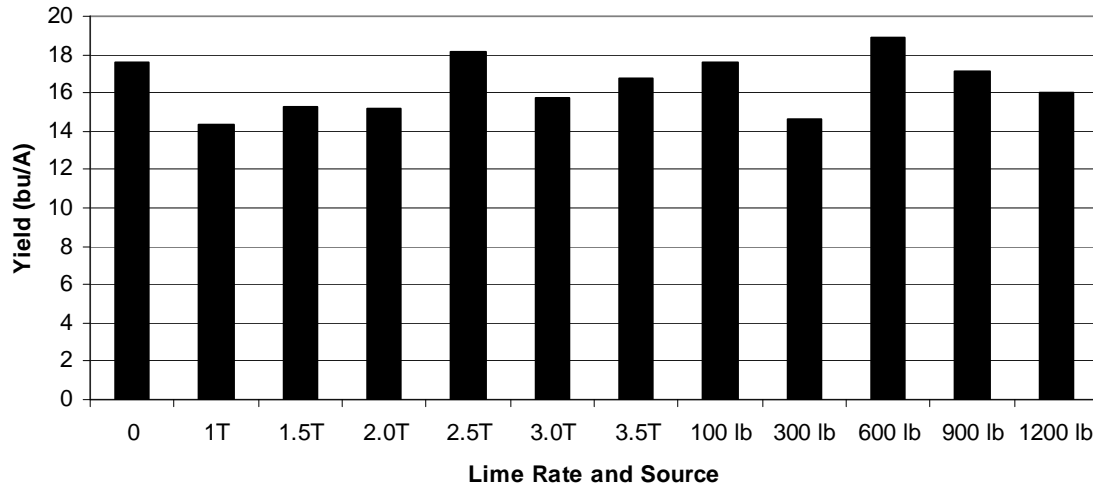
At the Lon Mann Cotton Station, near Marianna, a field has been selected where we will attempt to artificially lower the pH by adding elemental sulfur. This site would be used to conduct more detailed study such as differences between incorporation and surface broadcasting, and the assessment of alternative methodology to derive lime recommendations.

Elemental sulfur was applied at the rate of 1.5 ton S/acre. Soil pH was lowered from 5.5 - 6.3 to a range of 4.5 – 5.1. An additional location was selected at the Southeast Research Station at Rohwer. Lime was applied at the rate of 2 ton/elemental sulfur and should be ready for the 2008 season.

Objective 2.

Ag lime will be compared to pelletized lime at collaborator's fields and at the Lon Mann Station. Rates of pelletized lime will be equivalent to 300, 600, 900, 1200, and 1500 lb per acre, while those for Ag lime will be the ones described in objective 1. Size of plots may vary according to location, with treatments replicated 4-5 times and arranged as randomized complete block designs. Differences among mean treatments will be assessed with mean comparison procedures and regression models.

Treatments were applied on May 2, 2007. Soybean was planted in June 26, 2007 at a rate of 90,000 seeds per acre. 2 rows were drilled on top of beds 30 inches apart.



The above graph shows yield response according to lime rate and source. It appears from the observed results that lime had not been effective at neutralizing soil acidity by the end of the cropping season, regardless of lime source.

Objective 3.

Areas approximately 200 sq.ft. will be established at selected locations to monitor soil pH fluctuations on a long term basis. These areas will be maintained weed free and fallow, with samples collected at 4 weeks intervals and analyzed for water and salt pH (tentatively 0.01M CaCl₂) and available nutrients. The resultant information should provide important information on the natural variability in pH and nutrient levels as well.

Three locations were selected where soil samples are taken on a 3 week interval. Such locations are The Southeast Research Station near Rohwer, The Lonn Mann Cotton Research Station near Marianna, and the Northeast Research Station near Keiser. Sample collection began in early September and will continue for the duration of this study. The selected areas are approximately 300 square feet in size, receive no fertilizer applications and are kept free of weeds.

If the equipment is available (VERIS pH sensor), different soil sampling schemes will be tested for their ability to describe soil pH variability across fields. These schemes would include grid sampling, soil type sampling, composite sampling and the Veris pH sensor.

A potential collaborator, who owns a Veris machine with on-the-go pH sensor has been identified. Collaborative work will start in 2008.