SOYBEAN GRAIN COMPOSITION AS AFFECTED BY SOIL pH

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Increasingly sophisticated market demand may provide price premium opportunities for specific soybean grain composition such as high protein and/or high oil content. Management recommendations to foster those specific grain composition outputs are scarce at best. Neither growers nor the processing industry have a good understanding of how soil pH might affect soybean's protein and oil output per acre. These studies objectives are to evaluate the impact of acidic soil pH on soybean protein and oil output per acre.

A total of six randomized complete block pH trials with four replications each were evaluated in 2003 and 2004. Two trials conducted in 2003 (Marshfield 1 and Marshfield 2) and two in 2004 (Hancock and Spooner) were planted following corn. The two Marshfield trials conducted in 2004 were planted into soybean residue. Soil pH treatments ranged from 4.5 to 7.0. Soybean varieties varied with year and location. Grain yield was determined for each plot and grain samples were collected for composition analysis. Grain protein, oil, and fiber content were determined for each plot using near infrared transmittance technology.

As expected, grain yields were higher as pH approached neutrality (See companion Slides). As soil pH increased from 4.5 to 7.0, grain yields increased up to 40%, overall protein content of soybeans grain increased up to 6% points, oil content decreased up to 3% points, and fiber content decreased over 1% point.

Previous literature and over nine thousand samples from 72 trials of our own (data not shown) indicate a trend of decreased protein content when grain yield is increased. Consequently, the positive correlation between yield and protein content in this study is surprising and encouraging. It suggests that management factors such as liming when soil pH is low can potentially be used to enhance grain composition without compromising grain yield.

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