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Soybean on Calcareous Soils

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With the high market value of soybeans in 2009, we saw a large increase in soybean planted throughout Alabama. In some cases, those growers are a new generation of soybean farmers who may not remember the soybean boom of the late 1970s and early 1980s. At that time, the Black Belt region of Central Alabama, was converted from pastures and forests into large-scale soybean production. Many beans were planted on highly calcareous soils (pH 7.5+) or on fields with chalk outcroppings that were calcareous. Severe iron chlorosis stunted soybeans not adapted to these soil conditions. In addition, what little topsoil and organic matter that may have been there originally, washed away under conventional tillage practices on highly erodible lands creating even worse growing conditions as more and more of the underlying chalk was exposed. These soils were abandoned when soybean prices fell and many of these fields went into the Conservation Reserve Program in the late 1980s and 1990s.

Many of these same soils have been planted to soybean in 2009 with the same disastrous results. SOYBEANS SHOULD NOT BE PLANTED ON SOILS WITH A pH ABOVE 7.5 IN ALABAMA. Even if iron chlorosis does not develop, soybean yield potential is very low on these soils. Iron chlorosis will often be worse under dry soil conditions when most of the plant available iron (Fe^{2+}) is oxidized to Fe^{3+}. Certain pesticides may make the situation worst. Foliar sprays containing iron and manganese chelates may green up the plants but the yield potential is still low. Foliar sprays just add to the cost of production. These foliar sprays and seed treatments have been reported to be cost effective in the upper Midwestern U.S. but have not been evaluated under our conditions.

What about those fields with spots of calcareous soils? Again, the yield potential in these spots will always be low. The grower will have to weigh the benefits of planting the entire field including the weak spots versus growing some other crop that is more tolerant to calcareous soils e.g. cotton, corn, sorghum, wheat or forage grasses (or cedar trees and osage orange).

There are varieties which are more tolerant to calcareous soils than others. However, rarely do we have time to evaluate their yield potential before new varieties replace them on the market. This type of research, unfortunately, is not as beneficial to the grower as it was in the 1970s when new varieties developed slowly.

In agriculture, there are some things that just do not make sense. That's why we don't grow commercial citrus in Central Alabama. In the early 1800s, a group of French noblemen tried to grow grapes and olives near Demopolis. They failed because of the climate not the soils. We could grow rice in South Alabama but we don't. It's just too expensive to try and get those soils to hold water. With similar reasoning, we might be able to grow soybeans on calcareous Black Belt soils, but it might just be too expensive to even try.

I keep trying to grow citrus in my back yard. I've been successful a few times and made a few oranges. More often than I'd like to admit, my tender trees have succumbed to winter's frosts not unlike soybeans planted on calcareous soils in Central Alabama.

Soil series likely to be calcareous with pH 7.5+ include Sumter and Demopolis series. Calcareous outcroppings can occur in Oktibbeha, Vaiden, Leeper, Faunsdale, Okolona, Kipling, and Sucarnoochee soils. Research is planned for 2010 to see if soil, foliar, or seed treatments might be cost effective. However, the best advice we can give a soybean producer now is to avoid those soils with a pH above 7.5