SOYBEAN PRESENTATIONS

Effect Of Soybean Row Spacing On Yield: Twin-Row vs. Narrow- And Wide-Rows

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The effect of soybean row spacing on yield has been extensively researched. Predominate row spacing for soybean grown in the US is often between 7.5 and 30 inches, with some grown in typical cotton row spacings of 38 or 40 inch rows in the cotton production regions of the US. Soybean grown in narrow rows (20 inches or less) often canopy quicker and require less herbicide inputs for weed control. Soybean grown in 30 inches or less often yield similarly, and often outyield soybean grown in 38 or 40 inch rows. There is new interest in soybean row spacings with the advent of twin-row technology. Information regarding growth and yield potential of twin-row vs. narrow- and narrow-row soybean in the midsouthern US is needed.

A split-plot design experiment with treatments arranged in a randomized complete block was conducted on a Sharkey clay soil at the Delta Research and Extension Center in Stoneville, MS in 2006. Main plot was soybean variety (Asgrow 4403 and Asgrow 4201) consisting of two indeterminate maturity group IV selections. Sub-plot was planting system consisting of 1) drill (10 inch rows), 2) narrow (20 inch rows), 3) twin (two rows spaced 10" apart on a forty inch center), and 4) and wide (single 40 inch row). Within plating system, seeding rate was investigated at 135,000 and 160,000 seed/Acre. Each system was planted on a raised 80 inch bed to facilitate surface drainage and furrow irrigation during the growing season. The number of rows planted on each 80 inch bed were six (drill), four (narrow and twin), and two (wide-row), respectively. The experiment was planted in early April, 2006. At the same plant populations (130,000 and 155,000 plants/Acre), plants in the wide-row system intercepted 20% less light compared to the other three planting systems. Soybean yields were higher by 9 to 12% in the drill, narrow-row, and twin-row systems (81 to 83 bushels/acre) compared to wide-row system (74 bushels/acre). Increased yields (in these three systems were attributed to more pod production per plant (50 pods/plant) compared to the wide-row system (43 pods/plant). Increased pod production in drill, narrow, and twin-row system resulted in approximately _ million more pods/Acre compared to the wide-row system. Seeding rate had no effect on yield across both varieties and all planting systems. Where adequate seedbeds are present, optimal yields can be obtained for soybean production systems of the midsouth US at normal seeding rates of 100,000 to 125,000 plants/Acre, indicating there is no need to increase seeding rates above recommended rates unless the seedbed is rough or seed are drilled.

Findings of this research suggest if sufficient surface drainage and means to facilitate irrigation is in place, there is no advantage of growing twin-row soybean over some type of narrow-row system and there is no need to increase seeding rates above current recommendations for narrow- or wide-row patterns. An advantage with twin-row soybean is higher yields similar to a narrow-row system can be obtained while being grown on a constructed raised bed similar to that of a wide-row. Facilitating surface drainage is crucial for crop production systems of the delta region of the midsouth US. Twin-row soybean can boost yields over wide-row soybean and can be grown on a raised bed to further improve yields over a flat-planted narrow row. The issue to increasing yields for narrow-row soybean is not going to twin-rows but implementing sufficient drainage so that irrigation and rainwater can be moved from the field quickly.

Precision Agriculture Approaches To Nutrient Management Of Cotton

Presented by Dr. Kevin Bronson
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Precision agriculture technologies have developed rapidly in the last 10 years, and have also dropped in price considerably. Cotton is an intensively managed crop that is a prime candidate for precision agriculture approaches to nutrient management. These include management zone based soil sampling and fertilizer application, remote sensing based fertilizer management, yield monitoring and spatial statistics. Management zones can be based on soil type and or landscape position. Global positioning system (GPS)-referenced electrical conductivity (EC) maps can greatly aid the producer in identifying soil type and or yield zones. The remote sensing approach of canopy level spectral reflectance can determine need of inseason N in irrigated cotton. Accounting for spatial covariance in yield data can give better estimates of the effects of fertilization and thus aid profitability.

Variable-rate fertilization

The current commercially available variable-rate fertilization systems for ground applicators cost only about $ 3000. These consist of a controller, servo/variable-rate valve, flow meter, ground speed radar. Also required is a palmtop computer (~ $ 350) or tablet computer ($2000), software (~ $ 500), and GPS ($100 to $2500).

Several years of study in West Texas, LEPA-irrigated cotton indicates that reduction/savings in P fertilizer can be achieved with variable-rate P management compared to single, blanket-rate approaches, without hurting lint yields (Bronson et al., 2003). Our research assessing variable-rate N shows little reduction in N fertilizer use compared to blanket-rates of N. However, after a year of two of variable-rate N management, greater lint yields were observed with variable-rate compared to blanket-rate N (Bronson et al., 2006).

Management zone approach

The key to making variable-rate fertilization profitable is to keep down soil sampling and soil analyses costs. This usually entails “zone-based” soil sampling, based on soil texture, landscape position, EC maps, or and or yield maps (Bronson et al., 2005; Ping et al, 2006). Below is an example of an EC map made with a Veris 31200 system. High EC is usually related to high clay, which in turn usually indicated greater soil fertility and yields (Bronson, et al., 2005).

Remote sensing approach

Remote sensing of canopy reflectance has great potential to guide in-season N fertilization in irrigated cotton. This can be done by aircraft or satellites, but our research in West Texas has focused on ground-based measurements. Our early work was based on sensors that measured spectral reflectance of natural light. The disadvantage of this is that readings are restricted to within 2 hours of solar noon, and to cloudless days. Recently, several inexpensive (~$3000) sensors with their own built-in, active light sources have been developed. Typically, these sensors measure canopy reflectance at two wavelengths, one visible waveband (eg. green, red, or amber) and one near infrared waveband). Visible reflectance is highly correlated with N status of the leaf, and NIR reflectance relates to biomass, plant height and or leaf area (Chua et al., 2003; Bronson et al., 2005). In practice we calculate a ration of the NIR to visible waveband reflectance. These ratios can predict need of in-season N fertilization or fertigation, when the ratio in the area of interest falls less than 95 % of the ratio in a well-fertilized reference area. Our research has demonstrated that savings of 10 to 25

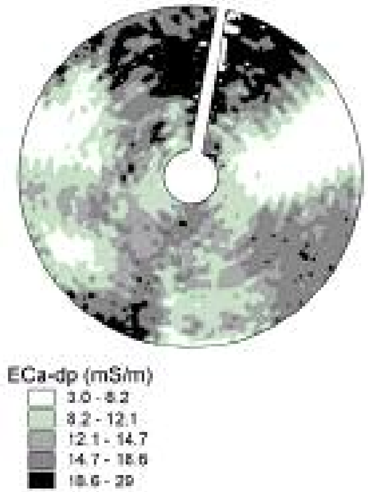

Figure 1. Electrical conductivity on 120- acre cotton field in Cotton Center, Hale County, Texas

% in N fertilizer applications can be achieved with remote-sensing based N fertilization of irrigated cotton, compared to soil test based N management, without reducing lint yields (Chua et al., 2003).

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