VARIABLE RATE PRESCRIPTION DEVELOPMENT USING CLEMSON’S DIRECTED-RX SYSTEM

Fig 1: Conventional Method of Variable Rate Prescription Development: Yield goals are determined on a “by zone” basis. Generic yield response data as a function of rate is used to assign rates by zone.

Fig 2: NDVI Sensor-Based N Prescription. Canopy NDVI measured prior to mid-season N application. NDVI is used to calculate an in-season estimate of yield (INSEY) and yield potential (YP0). Nitrogen rich strips are used to calculate a nitrogen response index (RI). YP0 and RI are used to prescribe N rate.

Fig 3: The Clemson “Directed Rx” Variable Rate Prescription Development Concept: Site-specific yield response dictates or “directs” the most profitable rates by soil zone.

Fig 4: Directed Rx uses uniform rate test strips, soil characteristic data (e.g., EC data), and site-specific yield response to generate a “directed” variable rate prescription for a following year. The result: A customized prescription is developed on your land for your land.

Fig 5. 2016 E7 Directed Rx test. True deep EC is an estimate of the EC between 12” and 36” depth. Uniform rate nitrogen strips applied as 25-5 in 8-row strips.

Fig 6. 2016 E7 returns above nitrogen costs (Relative profit) as a function of soil EC, by N rate. Note the 120 lb/ac rate was most profitable at the low EC values (lighter soil) and the 60 lb/ac rate was most profitable at the high EC values. This directs the prescription for the following year.

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Not all fields are good candidates for variable rate nitrogen, but D-Rx test can still benefit growers.

- D-Rx system can increase profitability at similar overall N rates
  - E7 2017: +$15/ac; 3 lb-N/ac
  - 2017 D-Rx (2016) out-performed NDVI-Rx in both fields, but not significantly different.
  - Optimum N rates to maximize profitability are not the same every year.
  - Deep soil characteristics were generally better classification bases than shallow characteristics.

Variable rate seeding showed potential for yield and profit benefits in two consecutive years

- 1.9 bu/ac and 1.1 bu/ac
- $9.6/ac and $8.4/ac

Seed rate trend to maximize profit was not the same in both years

- Number of potential factors
- Application of Y1 Rx in Y2 still profited $3.4/ac more than most profitable uniform rate

Variable rate soybean seeding can certainly be profitable

- ...if you can get the prescription right
- More work needs to be done to understand profit-and-yield-driving factors vs. seed rates

Many SC soybean growers already own variable rate seeding technology

- Generally only used on corn crop
- Development of recommendations for use in soybeans would likely be profitable.