

David Hallauer  
District Extension Agent, Crops & Soils

### **Nitrogen Application to Soybeans**

References differ slightly in the exact amount of nitrogen a soybean crop might need to reach desired yield levels, with most suggesting 200 or more pounds of N being the minimum for a 50-60 bushel per acre crop. Fortunately, a combination of soil and atmospheric fixation split that nitrogen need, with both typically contributing fairly equally to the total amount needed.

While that 50-60 bushel per acre yield level is pretty good, we know there are fields yielding well above that, begging the question: do those high yield environments require additional N? The short answer: not really.

Work done about 10 years ago at the North Central Kansas Experiment Field near Scandia looked at high yield soybeans and whether additional nitrogen might help push yield levels higher. The Scandia field provides a high yield environment while also offering the chance to compare results in both dryland and irrigated environments. They applied five different N rates (zero up to 160 pounds of actual N/A) to soybeans at beginning pod.

The results: while dryland yields exhibited a fairly wide range (73 to 89 bu/A), neither they nor the irrigated soybeans (90-99 bu/A yield range), the application of late-season N fertilizer in neither environment significantly increased soybean yield. Despite the increasing N demand required from high yielding soybeans – and the ability of rhizobia to keep up with late season N needs sometimes compromised - the soybean plant's ability to overcome and adapt was highlighted again by this work. Protein content? That's a different story for a different day.

If the fact results are from NC Kansas and not our different soil type/greater rainfall regions of NE Kansas, the response of soybeans to nitrogen has been inconsistent at best no matter where tested. South Dakota State found little value to added N in soybeans. Research conducted in Iowa has shown that N application at planting does not improve yield and only decreases nodulation while increasing the plant's dependency on the soil for nitrogen.

Work from the University of Nebraska is a little more encouraging, but still too inconsistent to provide standard year in/year out recommendations. They instead provide some very good advice as research continues on this important topic: *If you are considering an N application in soybean, keep expectations at a reasonable (low) level and give priority to fields with consistently high yields in previous years.* (Source: Is Soybean Yield Limited by Nitrogen Supply? 2018). It's good advice as we keep an eye on future research that can help define soybean N needs even further.