REVAMPING SOYBEAN NUTRIENT UPTAKE, PARTITIONING, AND REMOVAL DATA OF MODERN HIGH YIELDING GENETICS AND PRODUCTION PRACTICES

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Abstract

Soybean [*Glycine max* (L.) Merr.] nutrient uptake and partitioning models are primarily built from work conducted in the early 1960s. Since the 1960s, yields have nearly doubled to 47.5 bu acre^{-1} in 2014 and soybean physiology has been altered with approximately one more week of reproductive growth and greater harvest index's for currently cultivated varieties. These changes in soybean development along with new production practices warrant re-evaluating soybean nutrient uptake, partitioning. This study's objective was to re-evaluate these factors across a wide yield range of 40 to 90 bu acre^{-1}. Trials were conducted at three locations (Arlington and Hancock, WI and St. Paul, MN) during 2014 and 2015. Plant samples were taken at the V4, R1, R4, R5.5, R6.5, and R8 growth stage and partitioned into stems, petioles, leaves, pods, seeds, fallen leaves, and fallen petioles, totaling about 7,000 samples annually. Results indicate that dry matter accumulation at R6.5 was only 84% of the total and that as yield increased the harvest index by 0.2% per bushel. Nutrient uptake for N, P_2O_5, and K_2O was 227, 55, and 153 lb a^{-1}, respectively and crop removal was 188, 44, and 74 lbs. a^{-1}, respectively at a yield level of 60 bu acre^{-1}. Data showed that the extended reproductive growth phase (~7 days), greater nutrient remobilization efficiencies (>70%) and higher nutrient harvest index with increasing yields helped contribute to higher yields without greatly increasing total nutrient uptake.

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