



NITROGEN FERTILITY FOR SOYBEANS FACT SHEET

This is one in a series of fact sheets from the Mississippi Soybean Promotion Board and the soybean checkoff. Each sheet presents a brief overview of a topic important to Mississippi soybean production. More information on each topic can be accessed through the link at the bottom of the sheet. To see other fact sheets, click [here](#).

Biological N₂ fixation (BNF) and residual soil N supply the nitrogen needs of both low- and high-yielding soybean crops.

The amount of N supplied by BNF to the soybean plant averages about 60%, and this is not sufficient to replace the N removed from the field in soybean seed. The remainder of the N supplied to a soybean crop comes from nitrate and ammonium N in the soil.

Estimates are that soybeans produce an average of 12.7 lb of seed/lb of N uptake. This translates to about 4.7 lb of N assimilated per bushel of seed produced. For 50 and 75 bu/acre seed yields, this will be about 235 and 355 lb N/acre assimilated in the aboveground portion of the plant, respectively.

The concentration of N in soybean seed is about 6.34%, or 3.3 lb (dry weight basis) of N/bu of seed produced in a high-yield environment. Thus, a 75 bu/acre seed yield will remove about 248 lb N/acre from the field. The N removal in soybean seed is similar in both high- and low-yield environments.

BNF decreases exponentially with the addition of N fertilizer, and the addition of N fertilizer to soybeans will result in large, significant reductions in number of nodules on soybean roots.

Addition of high rates of N fertilizer to soybeans will result in small to moderate yield increases. Thus, BNF is not sufficient to maximize soybean seed yield, but replacing fixed N with N fertilizer is not profitable.

The preponderance of research results reported in the literature show that applying starter N fertilizer (10-25 lb N/acre) or N fertilizer during soybean reproductive stages either will not increase yield, or results in only a small yield increase that will not cover the cost of the N fertilizer. Instances where this may not be the case are when soybeans are grown on soils that have documented extremely low residual soil N or where soybeans are planted behind wheat that produced large amounts of wheat straw that is not burned or removed after wheat harvest.

Adding starter N fertilizer to soybeans will delay or impede nodulation, and thus can delay the onset of BNF that normally would have occurred in the absence of this starter N.

If a producer determines that soil conditions support the application of N fertilizer during reproductive development, then the N application at this time should be immediately followed by irrigation or rain to ensure its immediate uptake.

Soybean plants growing in moisture-deficit conditions may appear N-deficient, but the lack of water has suppressed BNF and this will not be remedied by application of N fertilizer to dry soil.

The preponderance of research results reported in the literature indicate that the likelihood of a favorable yield response to the application of N to soybeans in any environment or at any time from planting through reproductive development is low at best, and is neither predictable nor profitable.

Click [here](#) for a detailed discussion of this topic.

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