46-1 Do Soybeans Respond to Management? Identifying Which Management Factors Have the Greatest Impact on Soybean Yields.

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Soybean (Glycine Max) grain yields are the final products of numerous factors that affect crop growth and development during the growing season; therefore, it is critical to understand the interactions of these factors evaluated as a whole in order to efficiently maximize yield and exploit the yield potential of modern soybean varieties grown under increased levels of management. The objective of this experiment is to evaluate the synergies between several management practices when combined under high input systems, or the consequences of not including a particular factor and the impact that it contributes in both standard and high input management systems. Each management factor was evaluated in an addition, omission design, where individual treatments are either added individually to a standard package, or omitted from a high input package where all management factors are implemented together. The major management factors that were evaluated are fertility, foliar protection, seed treatment and row spacing. There are four fertility treatments, including a) natural fertility (none), b) 84 kg P_2O_5 ha^{-1} as Micro Essentials SZ (12-40-10S-1Zn), c) 84 kg ha^{-1} of K_2O as Aspire (0-0-58-0.5B), or d) the two fertilizers combined together. The foliar protection [none vs. foliar protection (R3 fungicide and insecticide mix) was applied prophylactically at the R3 growth stage while seed treatment (none or basic compared to a full seed treatment) was applied to the seed and varied depending upon seed brand. Treatments were planted at a targeted 395,000 seeds ha^{-1} in 51 and 76 cm row spacing across two varieties and six replications per trial for 11 site years total between three locations in 2014 and 2015. High input treatments included both fertilizer additions, foliar protection, full seed treatment, and 51 cm row spacing whereas standard management includes no additional fertility or foliar protection, 76 cm row spacing and no or basic seed treatment**.** Row spacing, maturity and individual agronomic management treatments each resulted in highly significant yield increases of 374, 70 and up to 357 kg ha^{-1} respectively. Narrower row spacing resulted in greater yield responses from agronomic management, where a 252 kg ha^{-1} (6%) yield increase occurred in standard management while a 451 kg ha^{-1} (10%) yield increase occurred in high input management. These results show that multiple management factors can increase soybean yield both individually, as well as when added together in a management system.