Agronomic Maximization of Soybean Yield and Quality: Variety x Management Interactions

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Introduction

Variety selection is the most important management decision that soybean producers can make each year (Conley and Esker, 2010). New varieties, possessing various trait/genetic backgrounds are continuously being introduced into the market. In addition, the use of multiple inputs (e.g. seed treatments, biological compounds, foliar fungicides and insecticides, etc.) has increased. However, it is not yet well understood how intensive management (i.e. multiple input use) interacts with variety selection.

Objective

Evaluate current, high-yielding varieties under both high input and standard soybean management practices across the U.S. to better understand how management interacts with variety choice

Methods

Research was conducted at 20 locations across nine states (Figure 1) as part of a three-year, multi-state project initiated in 2012. The experimental design was a randomized complete block with four replications. Six varieties representing high-yield potential optimal for each location were produced under 3 levels of management:

- (1) untreated check (UTC)
- (2) "SOYA" (seed treatment fungicide, insecticide, and inoculant; Ratchet®; Task Force 2®; nitrogen fertilizer; BioForge®; Headline®; Warrior II®)
- (3) "SOYA" minus Headline®

Yield component measurements were collected to potentially explain possible yield differences. Prior to harvest, the number of plants and pods were counted from 1 m of row. Yields were determined at harvest, and one pound seed samples were collected from each plot to determine seed mass.

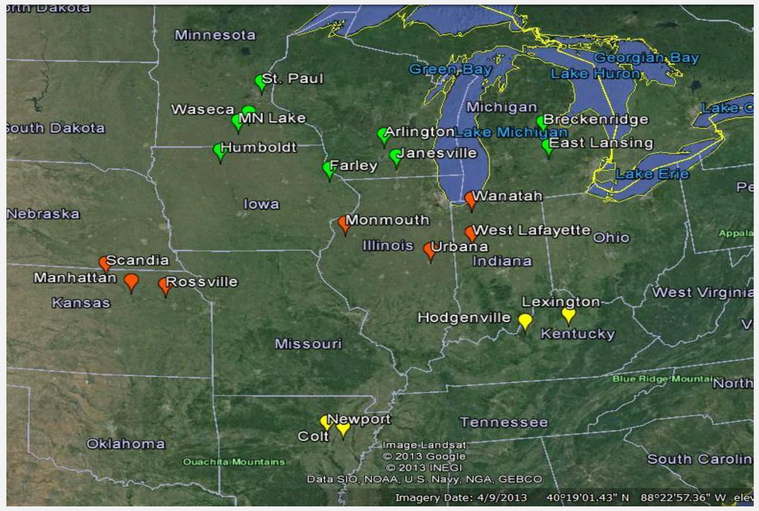

Figure 1. Locations of the field studies within Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, and Wisconsin. Locations were separated into northern (green), central (orange), and southern (yellow) regions.

Results

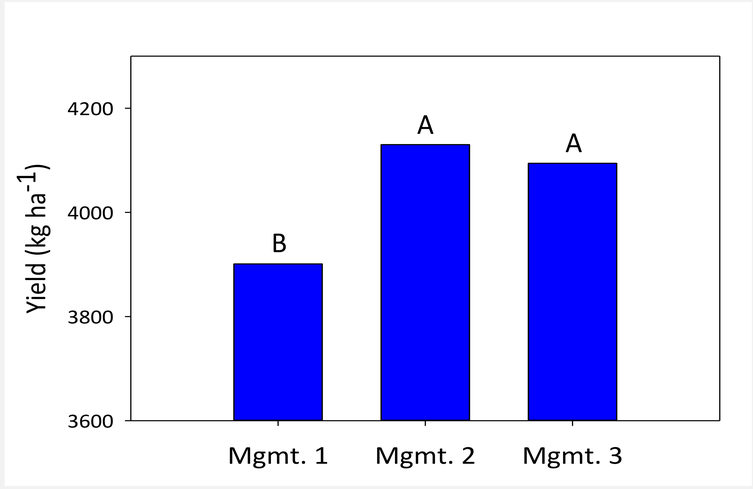

Figure 2. Yield for each level of management across all 20 locations. Columns with the same letter are not significantly different at α = 0.05. Managements 2 and 3 yielded 229 and 193 kg hec^{-1} better than Management 1, respectively.

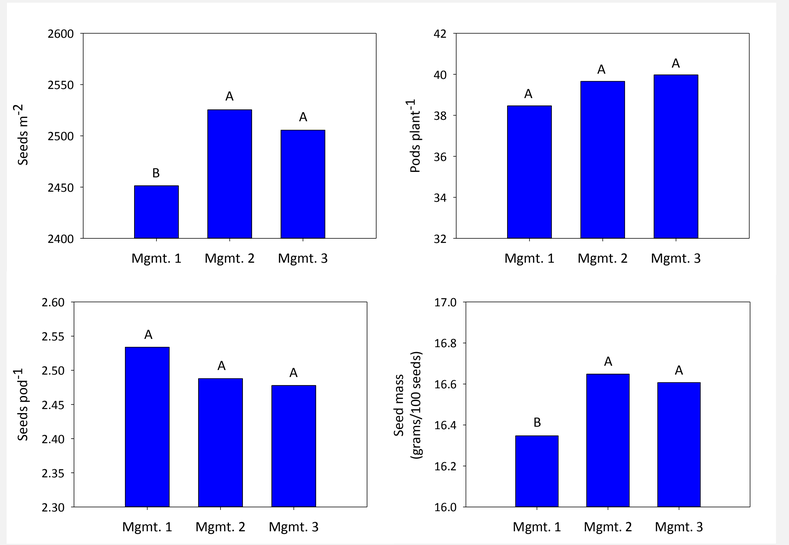

Figure 3. Yield component measurement results across all 20 locations, including seeds m^{-2}(top left), pods plant^{-1}(top right), seeds pod^{-1} (bottom left), and seed mass (bottom right). Columns with the same letter are not significantly different at α = 0.05.

Conclusions

- No variety by management interaction was observed for yield across all locations or within regions
- High input management (Mgmt. 2 and 3) significantly increased yields in the northern and central regions but not in the southern region (data not shown).
- Yield component measurements indicated the increased yield was due to increased seeds m^{-2} and seed mass.

Reference

- Conley, S.P. and Esker, P.D. 2010. Soybean variety selection for the 2010 crop: more important than ever. Cool Bean Advisor, University of Wisconsin Agronomy, Soybean Research, University of Wisconsin-Extension. (Available at: http://www.coolbean.info).