

Organic Soybean Population Study

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This study was initiated to evaluate the impact of population density on soybean grain yield, seed quality and weed suppression. Four target populations (75,000, 150,000, 175,000 and 225,000 seeds/acre) were replicated 3 times. The highest and lowest populations were outside the range of populations commonly used in both conventional and organic production systems. Seed quality was an important aspect of this study because of the stricter quality standards required for food grade soybean markets.

Methods:

The experimental plots (4 rows x 960 ft) were planted in field 2B to a food grade soybean variety (Iowa 3001) on 6/27/98 spacing. The experimental site was located at the Allison Organic Research and Demonstration farm (Roseville, IL) and followed a three year crop rotation (corn-soybean-small grain/red clover). Mechanical weed control consisted of multiple shallow tillage passes

Table 2. Effect of Soybean Population on Seed Quality

Intended Soybean Population	Final Soybean Population	% of soybean seeds Unblemished/ Excellent appearance	% of Soybean seeds with brown stain	% of Soybean seeds with purple stain	% of Soybean seeds with green stain	% of Soybean seeds with damage	% of Soybean seeds with splits
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Summary of the Subsequent :

A similar soybean population study was also performed in 1999 with higher yields, but less favorable results. This study was also planted to Iowa ridge-till rows and in field 1B. This experiment

Discussion and Conclusions:

Our results suggest that there are multiple advantages to planting high populations of soybeans in organic production systems. In contrast, recent studies (e.g., Whigham (1998) and Nafziger (2003) indicate that conventional producers can increase profitability by planting at lower seeding rates than previously recommended.

Apparent differences in optimal soybean populations for organic and conventional production systems relate to differences in seed cost and role of competition in weed suppression. Weed suppression in organic soybean production relies heavily on rapid canopy closure while conventional soybean production relies heavily on herbicides to eliminate weeds. The cost of higher populations appears to be justified in organic production systems (table 3), at least up to the highest population in this study, due to accompanying benefits such as higher yields, better weed control, and higher quality beans. It is unclear why the higher soybean populations resulted in higher seed quality in 1998. It could be because the soybean plants in the higher population treatments had less competition from weeds, which may have resulted in less stress, insect pressure, and/or disease than treatments with more weeds.

These studies or similar ones will need to be repeated to draw stronger conclusions. We intended the final populations to be higher than was achieved. We are satisfied that our lowest population was low enough, but believe that the highest actual population in this type of study should be above 200,000/a00/ons49.29 479.83 Tm[. W)17(