

Western Illinois University/ School of Agriculture

2012 Soybean Planting Rate Study

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Introduction:

In organic soybean production, seeding rate is important not only for establishing the potential for good yields, but also for weed control. Some organic farmers feel it is important to plant more than 200,000 seeds per acre which is considerably higher than is generally recommended for conventional production on comparable row spacing. A 2012 study located at the Allison Organic Research Farm was performed to help answer questions related to optimal soybean seeding rate.

Methods:

The field used for this study (4-1) was used for corn production in 2011. The corn stalks were sized with a vertical tillage tool on 3/15. A strong stand of weeds was terminated with a Howard Rotavator on 5/19 and the field was fit for planting with 2 passes of a field cultivator on 6/5 and 6/6 to ensure close to 100% weed termination.

Great Harvest Organic soybeans (GH 349) were planted with a 4 row (30" spacing) Buffalo planter on 6/8. Two seeding rates (174,000 vs. 224,000) were planted in an unreplicated side-by-side comparison. The low rate plot was 8 rows wide whereas the high rate plot was 16 rows. Both plots were the full field length (1180').

Excellent weed control was achieved through the following regime. The field was rotary hoed twice (6/21 and 6/27) at 11 mph and row crop cultivated twice (7/3 and 7/30). A modified IH 153 cultivator was used for the first cultivation and a Buffalo cultivator was used for the second cultivation. The field was walked to remove a small number of escapes.

Six sub-plots (3 per treatment) were harvested on the south end of the field on 10/31/12 using a KEM plot combine. Each sub-plot was 5' wide and ranged from 32' to 42' in length.

Results:

Table 1 illustrates the average yield for the lower soybean population (174,000/a) was 57.1 bu/a. The average yield for the higher soybean population (224,000/a) was 51.9 bu/a. This yield difference of 5.2 bu/a was statistically significantly with alpha set at 0.10, but was not significant with alpha set at 0.05 (95% confidence).

Table1. Treatment Yields

Treatment (Soybean Planted Population)	Yield (Bu/A)	Yield (Bu/A)
174,000/a	57.1 ^a	57.1 ^a
224,000/a	51.9 ^a	51.9 ^b
	Alpha (0.05) = 5.8	Alpha (0.10) = 4.4

Discussion:

This study occurred during one of the worst droughts in recorded history (~ 20% of normal rain fall (May-July) so soil moisture was a major factor impacting both crop and weed growth. A past soybean population study in 1998 with more normal rainfall showed a strong positive relationship between yield and population, but its top final population was only 167,000 plants/a. More information regarding this past study can be viewed via the online resource [New Ag Network](#), "Organic Soybean Population Studies", posted Oct. 15th, 2008. Final stand counts were not obtained in the 2012 study, but we are confident the final stand of the higher population treatment was greater than 167,000/a. The lower yield observed for the higher population in 2012 was likely due to greater moisture competition between soybean plants. With more normal rainfall, the previously observed trend of higher yields at higher populations may have held true but is important to consider that 1) the greater weed suppression at higher soybean populations is less important when good weed control is achieved through other means 2) 224,000/a on 30" rows may result in so much crowding that factors other than moisture limit yield 3) 224,000/a may not be the most profitable system even if it results in the highest yield.

The reduced population not only boosted income by \$145/a with the increase in yield, but also saved \$13.57/a seed cost based on 2012 retail prices. The income increase is based on 2012 fall delivery prices. Keep in mind the economics could easily change during a more typical year.

Conclusion:

Additional studies are needed before we can recommend > 200,000/a population for organic soybean production on 30" rows. We would like to evaluate target populations of 150,000, 175,000, 200,000 and 225,000/a (confirmed by early and late stand counts) in future studies. Based on studies to date, a soybean population of around 175,000/a appears to be optimum for organic production on 30" row spacing on soils similar to the Allison Farm.