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SOYBEAN PRODUCTION SYSTEMS

Thin Soybean Stands: *Should I Replant, Fill In, or Leave Them Alone?*

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EXPERT REVIEWED

One of the most difficult early-season management questions that soybean growers ask is "Should I replant this poor soybean stand or leave it alone?"

The answer depends on a number of factors, and growers quickly need to make accurate stand and potential yield loss estimates to determine the most profitable course of action. This publication examines the important factors growers must consider when making replant decisions and provides tools and strategies they can use to help them make those decisions.

Identify the Causes of Low Plant Population

The first step all growers should take before making any replant decision is to identify what caused the poor stand. Did the seed fail to germinate or did it germinate, then die? What caused poor emergence? Cool, wet soil? Poor seed quality? Inaccurate planter calibration? Seeding too deep or too shallow? Soil crusting? Herbicide injury? Insect feeding? Disease?

Identifying the cause is important because if conditions have not changed, then replanting will simply repeat the problem.

Early planting is a common source of poor stand problems. Germination can be slow in early-planted fields. What's more, planting in moist, cold soils (below 50ºF) can result in uneven, sporadic, or delayed emergence, giving the false sense of a poor stand (Wuebker et al., 2001).

Delayed germination or emergence can make seed more susceptible to disease and other pressures. Seed treated with fungicide will not hasten emergence, but can provide some protection in cool soils for up to three weeks if emergence is delayed.

If the plant population seems low in an early-planted field, scout the field by digging up seeds and checking for germination. Look for swollen seeds, plus radicle and hypocotyl growth that would indicate whether a seed is beginning to germinate or is close to emergence. Remember: depending on growing conditions, it can take six to 36 days for soybean seeds to reach the VE growth stage.

After plants emerge, weather, animals, insects, or diseases can cause poor stands. Again, the important thing is to scout each field to determine what caused the thin stand. If necessary, call on a specialist who can provide an accurate diagnosis. Only then can growers determine whether replanting or other actions are required for successful stand establishment.

Determine Stand Density

Growers also need a good estimate of the stand before deciding to replant. There are two common methods for estimating plant populations: counting plants in a row and using the hula hoop method.

No matter which method you use, be sure to count only live plants. Any plant with a stem broken off below the cotyledonary node is considered dead. Plants with missing leaves can recover, but stem damage is more detrimental. Even plants with bruised stems may have difficulty surviving.

Counting Plants in a Row

To determine the stand by counting plants in a row, count the number of plants in a length of row equal to 1/1,000th of an acre (see Table 1). For row widths not shown in Table 1, use this equation:

$$\frac{43{,}560 \div \text{Row Width (in feet)}}{1{,}000} = \text{Length of Row Equal to 1/1,000th of an Acre}$$

Make at least five counts from different areas of the field, calculate the average, then multiply by 1,000 to get the plant population per acre.

Table 1. *Use this table to determine how much row is equal to 1/1,000th of an acre.*

Row Width (inches)	Length of Row Needed to Represent 1/1,000th of an Acre
30	17 feet, 5 inches
20	26 feet, 2 inches
15	34 feet, 10 inches
10	52 feet, 3 inches
7.5	69 feet, 7 inches

Adapted from Purdue Extension publication ID-179, Corn & Soybean Field Guide

Using the Hula Hoop Method

To determine the stand using the hula hoop method, use any perfectly round hoop (hula hoop, wire, barrel hoop, etc.) with a known diameter. Toss the hoop in at least five randomly selected locations within a field or where the plant stand is low. Count the plants within each hoop, calculate the average, then multiply it by the appropriate factor from Table 2.

If your hoop's diameter is not listed in Table 2, use this equation to calculate your hoop's factor (remember, the radius is half the distance of the diameter):

$$\text{Factor} = \frac{43{,}560}{(\text{Hoop Radius in Inches}^2 \times 3.14) \div 144}$$

Table 2. *This table provides factors for various hoop diameters for calculating the number of plants per acre using the hula hoop method. For example, if a hoop has a diameter of 21 inches, multiply the number of plants inside the hoop by 18,119 to determine the number of plants per acre.*

Diameter of Hoop (inches)	Factor
18	24,662
21	18,119
24	13,872
27	10,961
30	8,878
33	7,337
36	6,165

Adapted from Purdue Extension publication ID-179, Corn & Soybean Field Guide

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Figure 1. *The Hula hoop method for determining soybean stands involves counting the number of plants inside a perfectly round hoop.*

Calculating Expected Yield

Once the plant population is known, growers can use Table 3 to estimate the expected yield percentage. If specific field locations are a concern, separately determine the stand in those areas.

Table 3. *Use this table to estimate soybean yields. For example, if the plant population is 60,000 plants per acre and a drill was used, then yield will be 92 percent of normal.*

Population	Yield as Percent of Normal	
Plants/Acre	**Drill** (7.5-inch rows)	**Planter** (30 inch rows)
160,000	100	100
120,000	100	100
80,000	96	100
60,000	92	94
40,000	87	88
20,000	77	81
10,000	58	72

Adapted from Purdue Extension publication ID-179, Corn & Soybean Field Guide

Replant Decision

The decision on whether to replant a field should be based on expected returns. A replant is, in effect, a late planting and that will decrease potential yield (Table 4). Growers also need to consider and evaluate the cost of seed, fuel, machinery, pesticides, labor, and other expenses. Using the replant worksheet (Table 5) can help growers consider all these factors to determine whether replanting is the best economic decision.

Table 4. *Use this table to determine the decrease in potential yield caused by late planting. For example, planting a mid-season variety on June 20 will yield only 82 percent as it would if planted at a normal date.*

Planting Date	Yield as Percent of Normal	
	Mid-season Variety	Full-season Variety
May 20	100	100
May 30	96	94
June 10	92	90
June 20	82	78
June 30	70	NR
July 10	60	NR

NR=Not recommended
Adapted from Purdue Extension publication ID-179, Corn & Soybean Field Guide

Table 5. *Use this worksheet to account for all the factors that go into making a replant decision.*

1. Base yield for field		_____ bu./A
2. Estimate of yield as percent of normal from reduced stands (see Table 3)		_____ %
3. Estimate of deficient stand yield [(line 1 x line 2) / 100]		_____ bu./A
4. Projected gross income (line 3 x market price)		$ _____ /A
5. Additional weed control cost for poor stand		$ _____ /A
6. Gross return with no replanting (line 4 – line 5)		$ _____ /A
7. Estimate of yield as a percent of normal from delayed planting (see Table 4)		_____ %
8. Estimate of yield for replanting [(line 1 x line 7) / 100]		_____ bu./A
9. Projected gross income from replanting (line 8 x market price)		$ _____ /A
10. Cost of replanting		
a. Seed	$_____/A	
b. Fuel, machinery, labor	$_____/A	
c. Pesticides	$_____/A	
d. Other costs	$_____/A	$ _____ /A
11. Gross returns from replanting (line 9 – line 10)		$ _____ /A
12. Compare gross returns on lines 6 and 11 to determine whether to replant		

Adapted from Purdue Extension publication ID-179, Corn & Soybean Field Guide

Filling in a Thin Stand

If soybean stands are only thin in certain areas of a field it is a common practice to fill in those areas with a 30-inch row planter (Figure 2). Our data indicate that there is no yield advantage to filling in thin stands (66,000 or greater plants per acre) with rowed beans (Figure 3). That's because the second planting can further damage the original thin stand. Plus, the second planting's yield potential is lower because of the late planting date and faces competition from original stand. Our data show that filling in thin stands will yield the same as if the grower did nothing (Figure 4).

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Figure 2. *When soybean stands are thin, it's common to fill in those areas with a 30-inch row planter as shown here.*

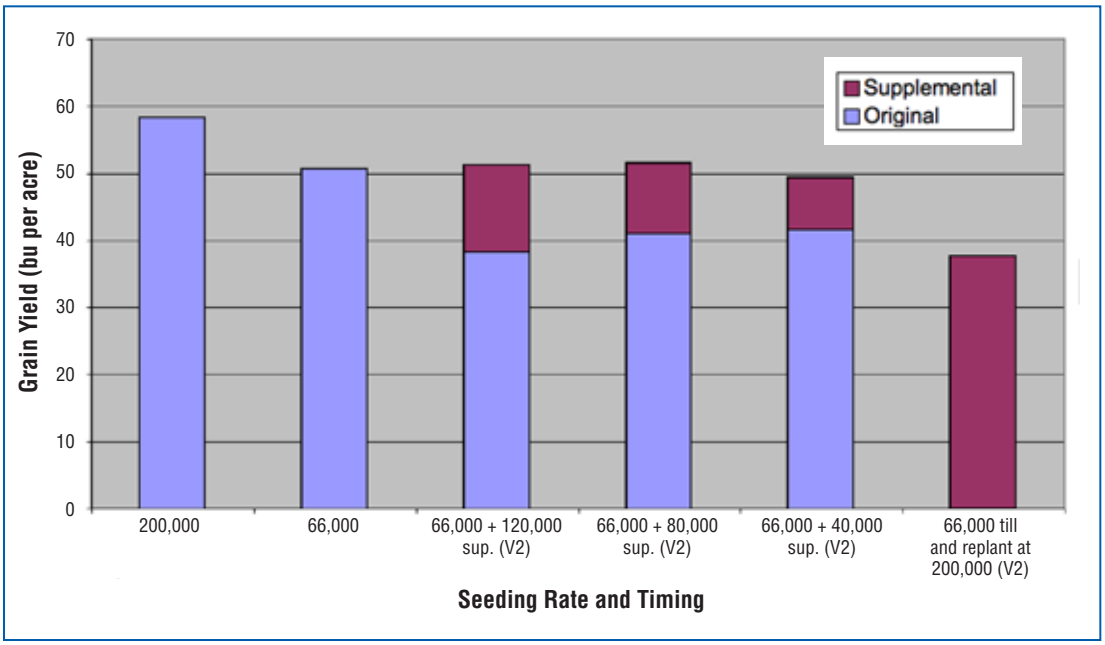

Figure 3. *This graph shows the effects of filling in thin soybean stands (7.5-inch rows) with a 30-inch row planter at V2 soybean (Semmel, Christmas, and Marini, 2002). The purple bars indicate the yields from the original soybean stands, the red bars indicate yields from the added soybeans.*

Totally replanting thin stands also may reduce yields because of the later planting date. Traditionally, the difficulty of weed control has been a factor in favor of replanting thin stands. Modern weed control technology largely eliminates that concern.

Growers should consider the economics of seed input cost — about $31.50 per unit — versus the potential for another pass for weed control — $10.50 per acre (1 quart of glyphosate plus application cost). Furthermore, our research indicates that there is less than a 50 percent chance that an additional weed control pass will be needed in the thin areas as compared to the normal stands unless the area is wet and already has consistently high weed pressure.

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Figure 4. *Supplemental seeding can lead to competition between the early-planted and late-planted soybean.*

References

Corn & Soybean Field Guide. Purdue Extension publication ID-179.

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