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Soybean Replant Decisions

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Replant decisions are made each year by some producers of soybeans. The replant decision is difficult and made harder because of many interacting factors: crop growth & development, plant response to reduced populations, weather conditions, calendar date, uniformity of the existing stand, cost/price relationships; and most importantly, in the final analysis = the potential yield of the existing stand vs. the potential yield of a replanted stand.

One should follow a set procedure of steps when making a replant decision:

1. Estimate the possible yield of a full stand at the original planting date
2. Determine population and uniformity of the existing stand
3. Estimate the potential yield of the existing stand
4. Estimate the potential yield of replanted full stand, on the replant date
5. Estimate the costs of replanting
6. Compare the value of leaving the reduced stand to a replanted stand

Estimating Potential Yield of the Original Full Stand

This is the producer's anticipated yield for the field under normal management practices.

Determine the Population and Uniformity of the Existing Stand

Quick visual estimations often underestimate the existing populations. Accurately estimating a population is key to the replant decision. Several areas of the field need to be sampled. Not only should the population be estimated, but within-row gaps need to be included in the notes taken. Make at least 10 random counts where the stands appear uniform.

There are two ways of determining soybean plant population (density):

1. With a tape measure, mark off an appropriate row length equal to 1/1000th of an acre. Record the average stand counts as "plants per foot of row". Use table A below to determine the field's estimated population.

Row Width	Length of row to equal 1/1000th of an acre
38"	13 feet, 9 inches
36"	14 feet, 6 inches
30"	17 feet, 5 inches
20"	26 feet, 2 inches
15"	34 feet, 10 inches
10"	52 feet, 3 inches
7"	74 feet, 9 inches

Table A: Plant population for common row widths, based on plants per foot of row

Plants/foot of row	Plants per acre (Population) ----- Row Width -----						
	38"	36"	30"	20"	15"	10"	7"
1	13,800	14,500	17,400	26,100	34,800	52,300	74,700
2	27,500	29,000	34,800	52,300	67,900	104,500	149,300
3	41,300	43,600	52,300	78,400	104,500	156,800	224,000
4	55,000	58,100	69,700	104,500	139,400	209,100	298,700
5	68,800	72,600	87,100	130,700	174,200	261,400	373,400
6	82,500	87,100	104,500	156,800	209,100	313,600	
7	96,300	101,600	122,000	183,000	243,900		
8	110,000	116,200	139,400	209,100	278,800		
9	123,800	130,700	156,800	235,200	313,600		
10	137,600	145,200	174,200	261,400			
11	151,300	159,700	191,700	287,500			
12	165,100	174,200	209,100	313,600			
13	178,800	188,800	226,500				
14	192,600	203,300	243,900				
15	206,300	217,800	261,400				

2. Narrow row widths are sometimes easier to determine plant population by using the "hula-hoop" method. This method can be used rapidly to count plants. Toss, or roll, a hula hoop into the area to be counted, and then allow it to fall at random. Count the number of plants inside the circle. Average at least 10 counts to determine a reliable stand count. Use table B below to determine plants per acre.

Table B: Plant population using the "hula hoop" method

		Plants (Thousands) per Acre Hula Hoop Inside Diameter								
Plants Counted	One (1) Square Yard	30"	31"	32"	33"	34"	35"	36"	37"	38"
1	4,840	8,900	8,300	7,800	7,300	6,900	6,500	6,200	5,900	5,500
10	48,400	89,003	83,005	78,002	73,002	69,005	65,001	62,004	59,003	55,000
11	53,240	97,904	91,305	85,802	80,302	75,905	71,501	68,204	64,903	60,500
12	58,080	106,804	99,606	93,602	87,602	82,806	78,002	74,404	70,803	66,000
13	62,920	115,704	107,906	101,402	94,902	89,706	84,502	80,605	76,704	71,500
14	67,760	124,605	116,206	109,202	102,202	96,607	91,002	86,805	82,604	77,000
15	72,600	133,505	124,507	117,002	109,502	103,507	97,502	93,005	88,504	82,500
16	77,440	142,405	132,807	124,803	116,802	110,408	104,002	99,206	94,404	88,000
17	82,280	151,306	141,108	132,603	124,103	117,308	110,502	105,406	100,305	93,500
18	87,120	160,206	149,408	140,403	131,403	124,209	117,002	111,606	106,205	99,000
19	91,960	169,106	157,709	148,203	138,703	131,109	123,503	117,807	112,105	104,500
20	96,800	178,007	166,009	156,003	146,003	138,010	130,003	124,007	118,006	110,000
21	101,640	186,907	174,310	163,803	153,303	144,910	136,503	130,208	123,906	115,500
22	106,480	195,807	182,610	171,604	160,603	151,811	143,003	136,408	129,806	121,000
23	111,320	204,708	190,911	179,404	167,903	158,711	149,503	142,608	135,706	126,500
24	116,160	213,608	199,211	187,204	175,204	165,612	156,003	148,809	141,607	132,000
25	121,000	222,508	207,512	195,004	182,504	172,512	162,503	155,009	147,507	137,500
26	125,840	231,409	215,812	202,804	189,804	179,413	169,003	161,209	153,407	143,000
27	130,680	240,309	224,113	210,604	197,104	186,313	175,504	167,410	159,308	148,500
28	135,520	249,209	232,413	218,405	204,404	193,214	182,004	173,610	165,208	154,000
29	140,360	258,110	240,713	226,205	211,704	200,114	188,504	179,810	171,108	159,500
30	145,200	267,010	249,014	234,005	219,005	207,015	195,004	186,011	177,008	165,000
31	150,040	275,910	257,314	241,805	226,305	213,915	201,504	192,211	182,909	170,500
32	154,880	284,811	265,615	249,605	233,605	220,816	208,004	198,411	188,809	176,000
33	159,720	293,711	273,915	257,405	240,905	227,716	214,504	204,612	194,709	181,500
34	164,560	302,611	282,216	265,205	248,205	234,616	221,005	210,812	200,610	187,000
35	169,400	311,512	290,516	273,006	255,505	241,517	227,505	217,013	206,510	192,500
36	174,240	320,412	298,817	280,806	262,805	248,417	234,005	223,213	212,410	198,000
37	179,080	329,312	307,117	288,606	270,106	255,318	240,505	229,413	218,310	203,500
38	183,920	338,213	315,418	296,406	277,406	262,218	247,005	235,614	224,211	209,000
39	188,760	347,113	323,718	304,206	284,706	269,119	253,505	241,814	230,111	214,500
40	193,600	356,013	332,019	312,006	292,006	276,019	260,005	248,014	236,011	220,000

Count the plants inside the hula hoop or square yard. Use the left column for actual plants counted. Find Corresponding population under columns to the right. Example 32 plants counted per square yard equals 154,880 plants per acre 32 plants counted inside a 34" diameter hula hoop equals 220,816 plants per acre.

To assess the potential yield from reduced stands that occur from skips within-row, use this chart:

PLANT SPACINGS	Yield as % of normal
2 ft skips – 50% of row	94
3 ft skips – 50% of row	87
4 ft skips – 50% of row	85

Estimate the Yield Potential of the Existing Stand

Once you have determined the existing stand, the potential yield must be estimated. Remember that yield is greatly influenced by both environment and genetics. The adjacent table is used as a guideline to estimate yield potential. Soybeans can, and do, compensate for low stands. Timing of stand loss and uniformity of stand can result in greater yield losses.

POPULATION (plants/acre)	Yield as % of normal	
	Solid Seed	30" 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

If there is an established **uniform** stand in excess of 80,000 plants/acre, many researchers today would suggest that only a 5% yield loss would occur.

Estimate the Yield Potential of a Replanted Full Stand, On the Replant Date

Once a determination has been made regarding the yield potential of leaving the existing stand, a producer can now make an informed replant decision. In addition to planting date considerations and the yield potential of a replanted field, one must also consider the current and forecasted weather, the "real" costs of replanting (seed, fuel, pesticides, labor, and equipment costs), and possible fall frost injury to a late-planted crop.
In general, the adjacent chart indicates the yield effects from delayed planting for the central Corn Belt.

Planting Date	Yield as % of normal	
	Mid-season variety	Full-season variety
4/20	100	100
4/30	96	94
5/10	92	90
5/20	82	78
5/30	70	NR
6/10	60	NR

Closing Comments

When all is said and done, economics must be positive for a replant decision to move forward. Economically, a soybean stand of 80,000 (or more), healthy, uniformly spaced plants per acre as late as early June is probably worth keeping.

If a reduced stand is saved, weed control becomes the primary priority. Reduced soybean stands allow light to reach the soil, and more weeds will compete with the soybean crop. Monitoring weed pressure, and appropriate use of herbicides to minimize the impact of weeds is warranted.

If replanting, consider intermediate or narrow row widths, and increase seeding rate 10-20%. The use of narrower rows and higher population will increase plant growth efficiency of late-planted soybeans, resulting in more pods/acre and reduced weed competition.

Switching to an earlier than normal maturity may not be needed, unless planting is delayed until late June. In reaching physiological maturity, an 8-10 week delay in planting may only result in a 2-4 week difference at harvest. Soybeans planted in mid-June, or later, flower sooner than normal, and do not grow to the height of earlier planted soybeans. Since flowering is photoperiod induced, one need not switch to an earlier maturity group if planting dates become delayed.

Putting it all together ====

Compare the Value of Leaving the Reduced Stand to That Value of a Replanted Stand

Purdue University has developed this nice little soybean replant worksheet that incorporates the concepts developed above to calculate the gross return between leaving an existing stand, and the gross return of replanting.

1. Base yield for field _____ bu/a
2. Est. of yield as % of normal from reduced stands _____ %
3. Est. of deficient stand yield (Base yield x line 2) ÷ 100 _____ bu/a
4. Projected gross income (line 3 x market price) _____ $/a
5. Weed control cost for poor stand _____ $/a
6. Gross return with no replanting (line 4 minus line 5) _____ $/a
7. Est. of yield as a % of normal from delayed planting _____ bu/a
8. Est. of yield for replanting (Line 1 x line 7) ÷ 100 _____ bu/a
9. Projected gross income from replanting (line 8 x $ price) _____ $/a
10. Cost of replanting (tillage, seed, herbicide, labor) _____ $/a
11. Gross returns from replanting (Line 9 minus line 10) _____ $/a
12. Compare gross returns on line 6 and line 11 to determine whether to replant _____ $

Sources and Additional information

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