

Hettinger Soybean Seeding Rate Study

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Over the past decade soybean seeding rate recommendations in the corn-soybean belt have been reduced from 180,000 - 240,000 seeds per acre to 125,000 - 170,000. Much of this is due to increasing cost of soybean seed and soybeans tremendous ability to compensate for lower densities with increased branching and pod number. Yield per acre for soybeans remains relatively constant across population. This is because the number of seeds produced per plant is inversely related to the number of plants per acre. In general, numerous studies in the Midwest have shown 100,000 relatively uniformly spaced plants at harvest will produce the maximum economic return under most conditions. There have been many studies on soybean seeding rates in the Midwest, but there is little information on seeding rates for dryland soybeans in the semi-arid high plains.

A study was initiated in 2018 with nine seeding rates, 20,000 to 180,000 in 20,000 increments in both drilled (7") and row (30") configurations at Hettinger, North Dakota. In 2018 and 2019 the variety Proseed 30-20 was used and in 2020-2022 ND17009GT was used. The trials were planted with an 8 row 7" inch spacing plot drill equipped with John Deere 90 ProSeries openers (2022) or a 9 row 7" inch spacing plot drill equipped with Acra Plant ADU double disk openers (2018-2021). The 30" rows were planted with a two-row plot planter equipped with John Deere 1700 row units. Weed control was obtained by a pre-emergence herbicide application of BroadAxe and post-emergence application of glyphosate. The trial was harvested with a Kincaid 8XP small plot combine. Data was recorded on flowering, height, maturity date, yield, test weight, seed size seed protein and seed oil content.

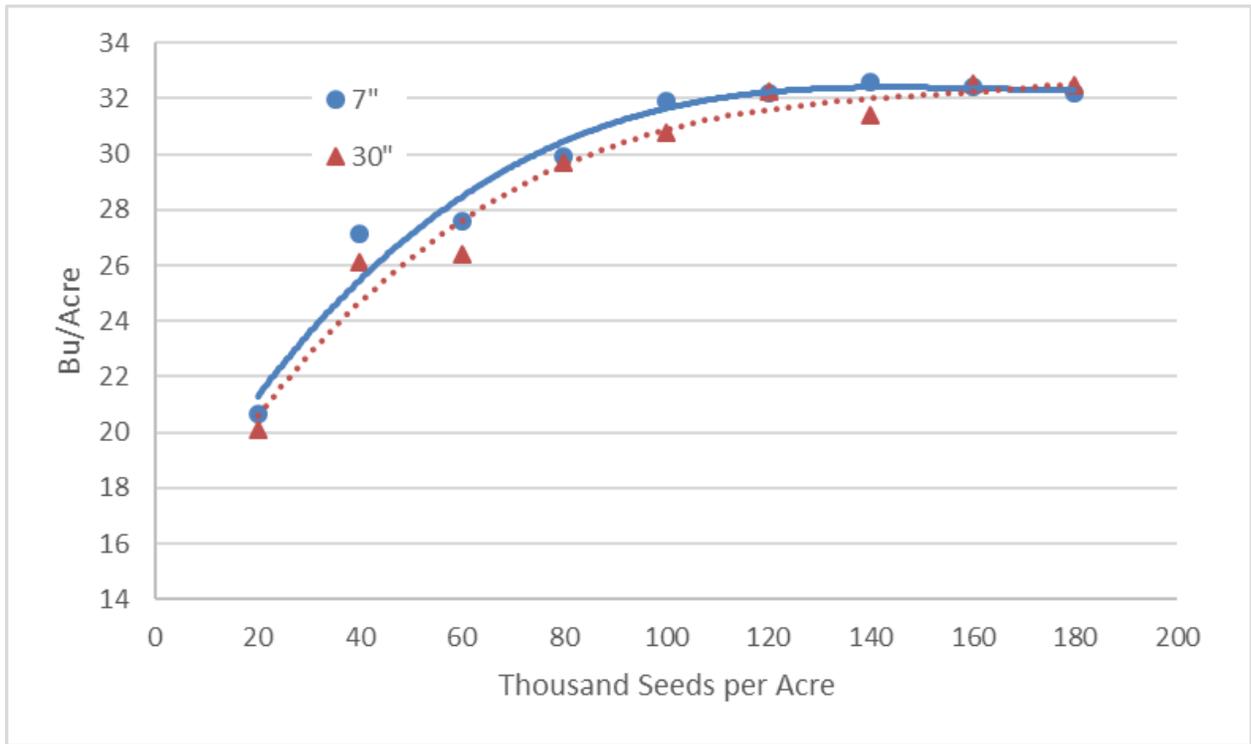
The following charts and table present the results of this study averaged over the past five years.

Comparing row spacings the only significant difference in traits in the five-year summary was 30" rows were 3" taller and .3% higher in seed oil content. In 2018, 2020 and 2021, there was no difference in yield between 7" and 30" rows, while in 2019, 7" rows yielded 5.5 Bu/Acre higher than 30" rows and in 2022 30" rows yielded 2.9 Bu/Acre more than 7".

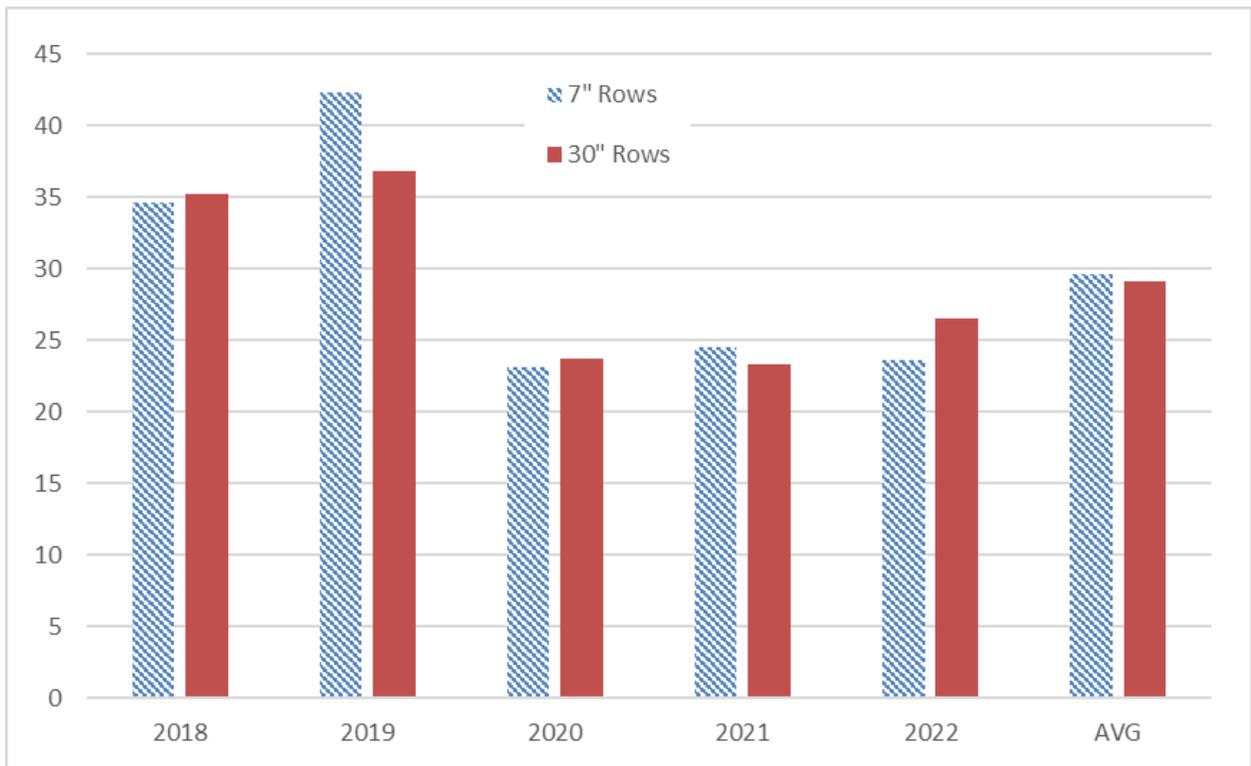
When looking at population averaged over row spacing, very low populations were slightly taller, lower in test weight and larger in seed size than 60,000 and higher rates. For seed protein and oil content, as seeding rate increased, oil content decreased and protein increased in 2018, 2019 & 2020. In 2021 and 2022 oil and protein were similar across populations.

The results for yield showed that seeding rates of 100,000 – 180,000 were not significantly different in yield and even the extremely low rate of 20,000 yielded 64% of the 100,000 - 180,000 seeding rates. Over the past five years the 120,000 seeding rate has looked like the best rate at Hettinger. It provides the same yields as the higher rates while still allowing a cushion if there are stand establishment problems.

Yields by Seeding Rate 2018 - 2022.



Yield by Row Spacing, 2018 - 2022.



Soybean Seeding Rate Study - 2018 - 2022								Hettinger, ND
30" Rows vs 7" Rows								
Row Spacing	Mature Date	Plant Height	Moisture	Test Weight	Seed Size	Seed Oil	Seed Protein	Grain Yield
		inches	%	lbs/bu	seeds/lb	%	%	bu/ac
7" Rows	9/15	27	11.3	56.2	3483	29.6	35.4	16.4
30" Rows	9/15	30	11.2	56.1	3342	29.3	35.5	16.6
LSD 5%	NS	1	NS	NS	NS	0.1	NS	NS
Population								
20,000	9/18	29	12.5	55.6	3132	35.4	16.6	20.4
40,000	9/16	29	11.6	56.1	3375	35.2	16.7	26.7
60,000	9/15	28	11.4	56.1	3394	35.1	16.6	27.1
80,000	9/15	28	11.1	56.4	3417	35.3	16.6	29.9
100,000	9/15	28	10.9	56.4	3488	35.7	16.5	31.4
120,000	9/15	28	11.0	56.3	3443	35.5	16.5	32.2
140,000	9/15	28	10.9	56.3	3474	35.5	16.4	31.9
160,000	9/14	28	10.9	56.1	3500	35.3	16.5	32.8
180,000	9/14	28	10.7	56.1	3488	35.9	16.3	32.5
LSD 5%	1	1	0.1	0.1	28	0.1	0.1	0.7
Row Spacing X Population								
7" - 20,000	9/18	28	12.9	55.4	2994	35.5	16.5	20.6
7" - 40,000	9/16	27	11.7	56.0	3432	35.4	16.6	27.2
7" - 60,000	9/16	27	11.3	56.0	3478	35.0	16.6	27.6
7" - 80,000	9/16	27	11.2	56.3	3774	35.4	16.6	29.9
7" - 100,000	9/15	26	10.9	56.5	3603	35.6	16.3	31.9
7" - 120,000	9/15	26	11.0	56.5	3541	35.4	16.5	32.0
7" - 140,000	9/15	26	10.9	56.5	3577	35.6	16.3	32.3
7" - 160,000	9/15	26	11.0	56.1	3657	35.2	16.4	32.9
7" - 180,000	9/14	26	10.7	56.2	3589	35.8	16.2	32.2
30" - 20,000	9/18	29	12.1	55.7	3270	35.3	16.8	20.2
30" - 40,000	9/16	30	11.5	56.2	3318	35.0	16.8	26.2
30" - 60,000	9/15	29	11.5	56.2	3309	35.2	16.6	26.5
30" - 80,000	9/15	29	11.1	56.4	3361	35.3	16.6	29.8
30" - 100,000	9/15	30	10.8	56.2	3373	35.8	16.7	30.9
30" - 120,000	9/15	30	11.1	56.1	3345	35.7	16.5	32.4
30" - 140,000	9/14	30	10.9	56.2	3370	35.5	16.5	31.5
30" - 160,000	9/14	30	10.7	56.0	3343	35.3	16.6	32.7
30" - 180,000	9/15	29	10.7	55.9	3387	36.0	16.5	32.9
Trial Mean	9/15	28	11.2	56.3	3412	35.4	16.5	29.4
LSD 5%	1	1	0.4	0.3	83	0.2	0.4	2.0
C.V. %	1.6	7.6	4.7	0.9	1.7	1.7	1.9	9.6