THE EVALUATION OF THE MODIFIED CURVED SEED TUBE VERSUS THE STANDARD STRAIGHT SEED TUBE COMMONLY USED AT THIS TIME.

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Introduction/Objectives

The straight seed tube has been the recommended standard tube for sugarbeet planters for many, many years. John Deere introduced a new curved seed tube that is supposed to have significant advantages over the previous curved seed tube that has been available to sugarbeet growers. Growers and John Deere Dealerships have been asking if the new curved seed tube can be left in the planter and used for all the crops they plant in hopes of eliminating one more step when switching from one crop to another.

The new curved seed tube was evaluated on the planter test stand in the winter of 2006-2007. It was found that with visual observations on the grease belt that there seemed to be little or no differences between the straight and curved seed tubes as far as speed, seed size and seed spacing accuracy was concerned. With this in mind a field study was conducted at Prosper, North Dakota during the 2007 growing season to evaluate the new "improved" curved tube versus the straight seed tube.

Materials and Methods

One field experiment was established on a Beardon Perella silt loam (coarse-silty, frigid Aeric Calciaquoll) at a research site near Prosper, ND. The trial was planted into a smooth, moist, firm seedbed. Planting was arranged in a randomized complete block design with four replications. Individual treatment plots measured 11 feet wide and 30 feet long. Soil nitrogen levels were adjusted with fertilizer to approximately 130 lbs/acre of available residual soil test plus added fertilizer N.

Eight treatments were established in this experiment. The treatments consisted of straight vs. curved seed tubes, Pro 50 vs. Pro 200 seed size and 4 vs. 6 mph planting speeds.

Rhizomania resistant variety, Beta 1305R, was planted on May 16, 2007 with a John Deere MaxEmerge II planter. Sugarbeet was placed 1.25 inches deep, and was planted to stand at a 4 ½ -inch in-row seed spacing. A 22-inch wide row spacing was used. Counter insecticide was surface band applied at 10.9 lbs/A, and incorporated with a drag chain at planting. Stand count and distance between seed measurements were taken after germination. Three post emergence micro-rate herbicides, two cultivations and hand labor was used as needed for weed control. Three fungicide applications, Eminent, Supertin/Topsin and Headline were applied for Cercospora leaf spot control.

Harvest of the middle two rows of each six row plot, was completed on September 27/2007. Yield determinations were made and quality analysis performed at the American Crystal Sugar Quality Lab, East Grand Forks, MN.

Results and Discussion

Table 1 shows the main effect of planter operating speed averaged across both tubes and seed types. Plant population, sugar percent, tons per acre, RSA and Revenue per acre, Net Sugar, RST and Rev per Ton were not significantly different. However the stand was 11 beets per 100 foot of row greater at 4 mph which corresponds very closely to an expected difference in revenue per acre of $30 that was observed at 4 mph. Sugar percent and RSA though not significantly different were greater but not significantly so at 4 mph than at 6 mph. Net sugar percent, RST and Revenue Per Ton were all greater but not significantly so at 4 mph and SLM was significantly lower at 4 mph.

Table 1. Main effect of planter speed on sugarbeet yield and quality.

Speed		Sugar %	SLM	Net Sugar	Yield Ton/A	RSA	RST	Beets 100ft	gross $/ton	Gross $/acre
4		16.7	1.26	15.4	28.3	8702	308	167	34.12	962.62
6		16.5	1.34	15.1	28.5	8622	303	163	32.95	936.60
Lsd		.39	.06	0.44	1.85	539	8.6	12	1.97	69.02
		NS	*	NS	NS	NS	NS	NS	NS	NS

The effect of seed size averaged across planter speeds and seed tube types is shown in Table 2. None of the parameters measured resulted in significant differences between seed types. Yield, sugar percent, RST, RSA, revenue per ton and revenue per acre were all slightly greater with the PRO 200. The SLM was slightly lower with the PRO 200 seed. This data might indicate that the PRO 200 has slight advantages in seed spacing or other planting characteristics compared to the PRO 50 size seed that may result in better defoliation and harvestability.

Table 2. Main effect of seed size on sugarbeet yield and quality.

Seed Size		Sugar %	SLM	Net Sugar	Yield Ton/A	RSA	RST	Beets 100ft	gross $/ton	Gross $/acre
200		16.7	1.3	15.4	27.7	8497	307	163	33.94	938.00
50		16.5	1.3	15.2	29.1	8826	304	166	33.13	961.21
Lsd		0.4	0.06	0.4	1.9	539	8.6	12	1.97	69.02
		NS	NS	NS	NS	NS	NS	NS	NS	NS

The main effect of seed tube type on sugarbeet yield and quality is shown in Table 3. None of the parameters measured were significantly different between seed tube types. There was a trend for only plant population to be greater with the curved seed tube. However Sugar Percent, RST, and Revenue Per Ton, Revenue Per Acre, Recoverable Sugar Per Acre, Yield and Net Sugar all trended higher with the straight tube. These observations might indicate that spacing in the field was better with the straight tube even though final stands were lower. Better in-field spacing might allow better harvesting and defoliation to be accomplished. Overall differences tended to be small.

Table 3. Main effect of seed tube type on sugarbeet yield and quality.

Tube Type		Sugar %	SLM	Net Sugar	Yield Ton/A	RSA	RST	Beets 100ft	gross $/ton	Gross $/acre
Curved tube		16.5	1.3	15.2	28.0	8501	304	168	33.14	925.19
Straight tube		16.6	1.3	15.4	28.7	8822	307	162	33.93	974.02
Lsd		0.4	.07	0.4	1.85	539	8.6	12.0	2.08	69.02
		NS	NS	NS	NS	NS	NS	NS	NS	NS

The individual treatment data for the two types of seed tubes is presented in Table 4. There were no significant differences for sugar percent and no definite trends for sugar per cent for seed tube type, but in three of 4 treatments sugar percent was higher at 4 mph than 6 mph. There were no significant differences observed for SLM. However, loss to molasses was never less at 6 mph compared to 4 mph for any of the eight treatments.

The data in Table 4 shows that tons per acre were lower for the PRO 50 at 4 mph with the straight tube compared to 4 mph with PRO 50 and the curved tube. Stands were very similar for both tubes in all cases. Revenue per ton is better at 4 mph versus 6 in three of 4 treatments, Revenue per ton is better in all comparisons with the straight tube although not significantly different.

Comments

The results of this study show that the new curved seed tube being offered for sale by John Deere seems to be much improved compared to the old curved seed tube. The old curved tube had obvious projections of pieces of plastic into the seed tube that interfered with the seed drop and frequently caused a serious lack of uniformity in seed placement as well as more doubles and skips. This lack of seed uniformity at times resulted in lower stands and more difficulty in doing the best possible job of defoliation and harvest. We would certainly be willing to repeat this study in 2008 in an attempt to verify these results. Every attempt would be made to reduce the CV's further in another experiment. Results to this point would appear to indicate that the new curved seed tubes perform about as well as the the straight tube for yield and quality parameters.

Table 4. Effect of speed, seed size and seed tube type on sugarbeet yield and quality.

Tube Type	Seed Size	Speed MPH	Sugar %	SLM	Yield Ton/A	RSA	RST	Beets 100ft	gross ton	Gross acre
ST	50	4 mph	16.48	1.2	28.80	8799	306	173	33.56	965.47
		6 mph	16.79	1.3	29.15	8994	309	149	34.27	997.83
	200	4 mph	16.76	1.2	27.55	8574	311	160	34.68	959.27
		6 mph	16.53	1.3	29.35	8921	304	166	33.21	973.52
CT	50	4 mph	16.48	1.3	29.25	8854	303	171	32.99	961.46
		6 mph	16.25	1.4	29.18	8658	298	173	31.72	920.09
	200	4 mph	16.94	1.3	27.45	8580	313	163	35.27	964.27
		6 mph	16.41	1.3	26.28	7914	301	165	32.60	854.95
Ave.			16.58	1.3	28.38	8662	306	165	33.54	949.61

Measurements of variability in seed spacing were made on the middle two rows of each treatment. Fifteen feet of each row was counted. The histograms for each seed tube with Pro 50 seed at 4 mph is shown on table 5. The target spacing was 4 ½ inches between seeds. A greater percent of seed was near the target spacing with the straight tube.

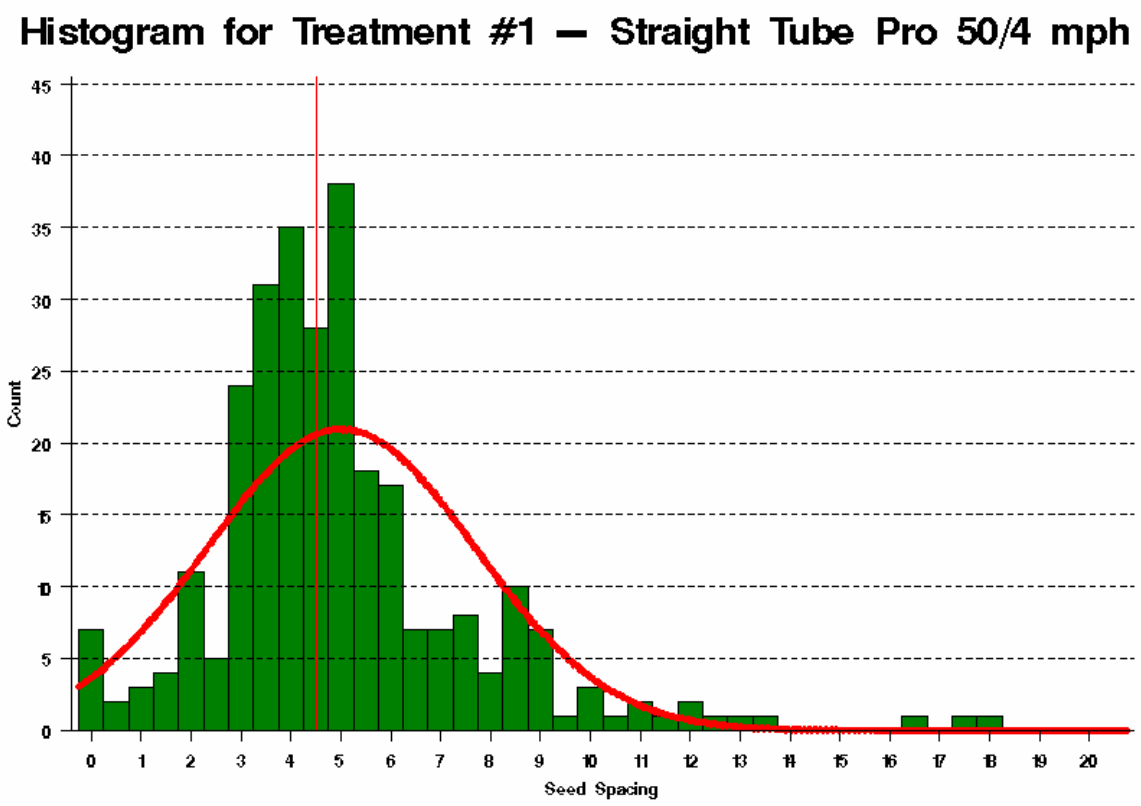
The tube comparison with the Pro 50 seed at 6 mph is shown on table 6. A greater number of seed are within 1 inch of the target with the curved seed tube. A greater number of seed are spaced farther apart with the straight tube.

The histograms showing each tube with Pro 200 seed at 4 mph are on table 7. A greater number of seed are at the target spacing and within one inch of the target with the curved tube. However, slightly more seed were observed to be at 8 inches or greater spacings with the curved tube. The higher count at 9 inches indicates about twice as many skips at the 2 x spacing. Slightly more doubles were observed at zero with the curved tube.

The histograms for each tube with Pro 200 seed at 6 mph are shown on table 8. A greater number of seed were observed placed at the 4 ½ inch target spacing and within one inch of the target with the curved tube. However more doubles were observed (at zero) with the curved tube and more skips than those at about 9 inches apart, than with the straight tube.

Overall minor differences between seed tubes exist. These differences albeit from one field study only would indicate the new curved seed tube is certainly acceptable for use with sugarbeets and other crops. Further evaluations on the test stand would be a recommended way for growers to get more information to make the best possible decision on seed tube choice.

Table 5.


Histogram for Treatment #1 — Straight Tube Pro 50/4 mph
Count
Seed Spacing

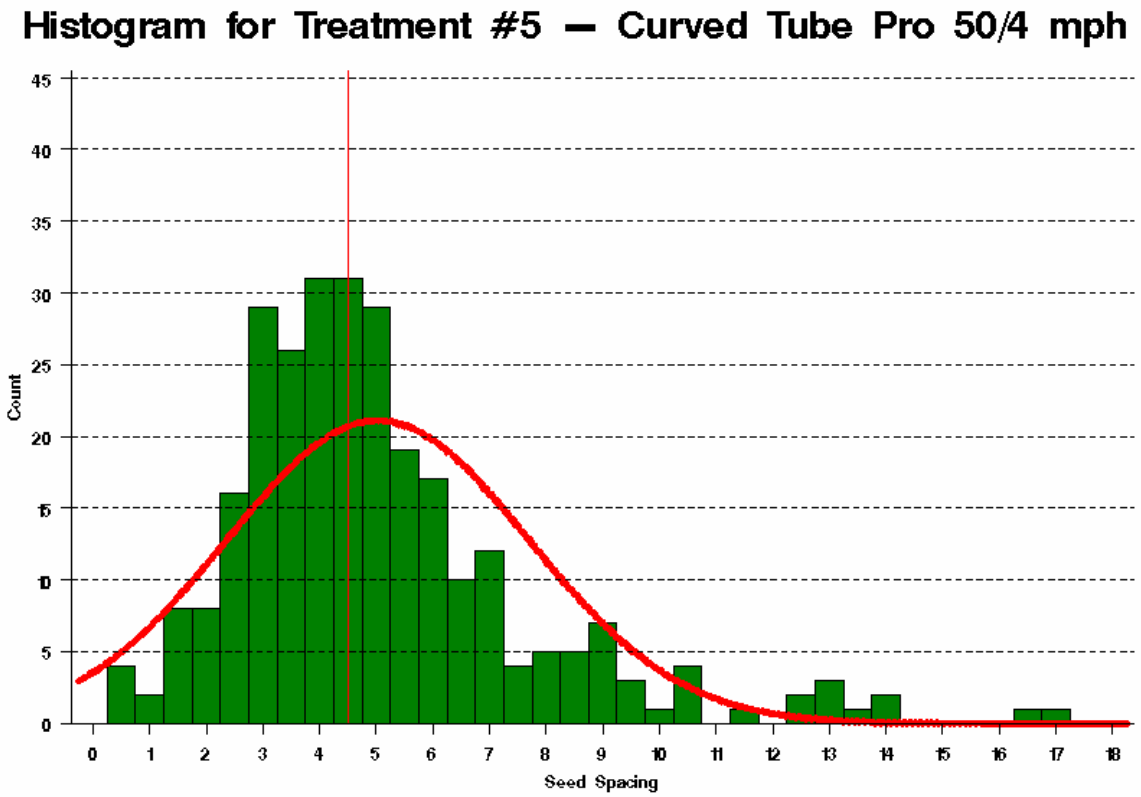
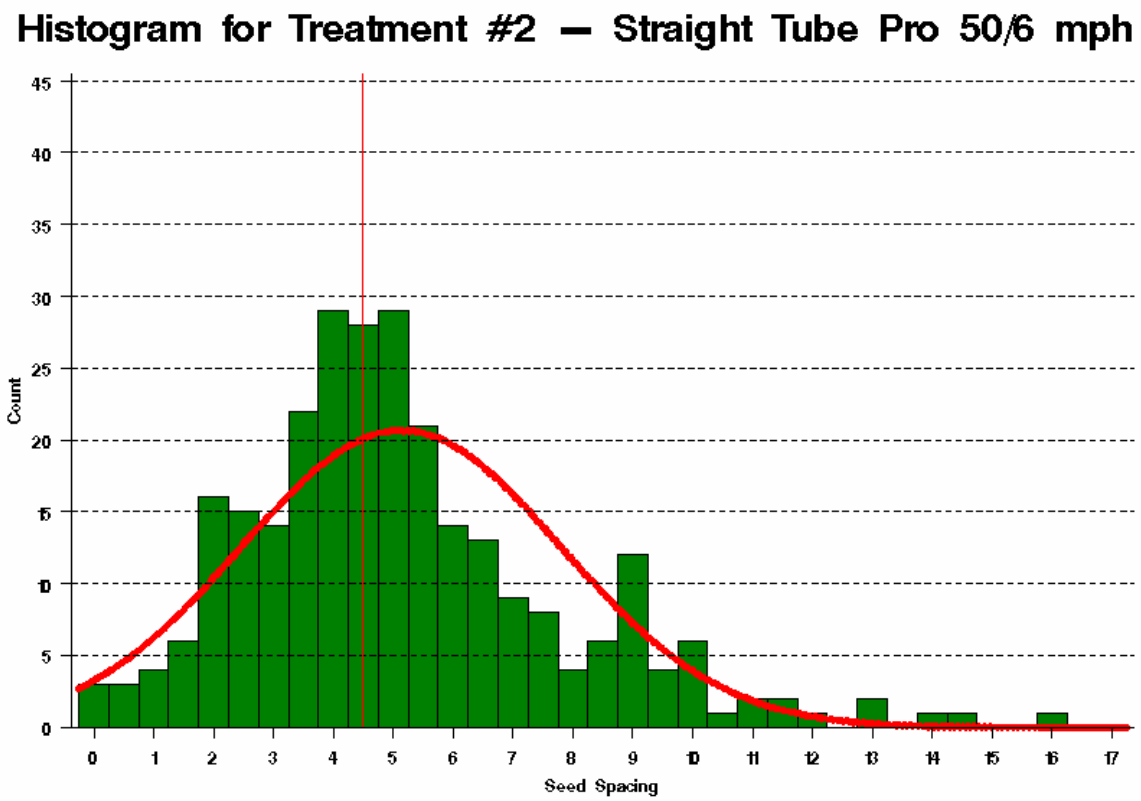

Histogram for Treatment #5 — Curved Tube Pro 50/4 mph
Count
Seed Spacing

Table 6.


Histogram for Treatment #2 — Straight Tube Pro 50/6 mph
Count
Seed Spacing
0
5
10
15
20
25
30
35
40
45
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

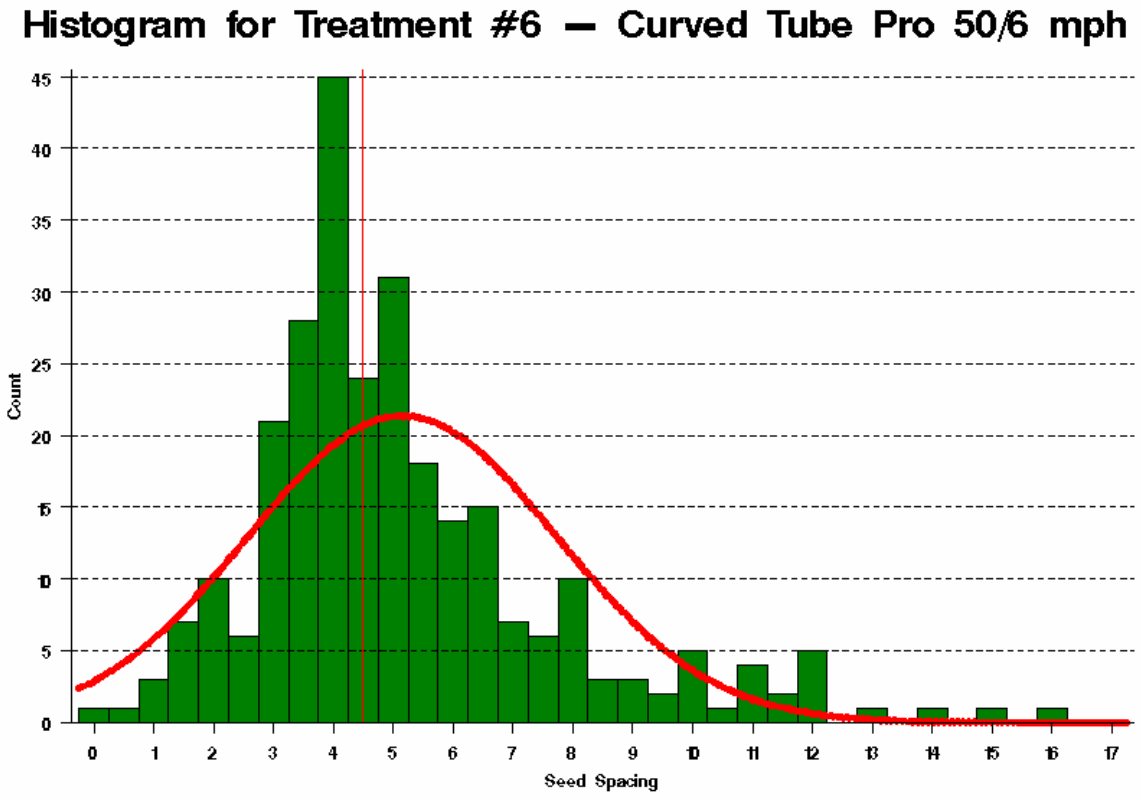
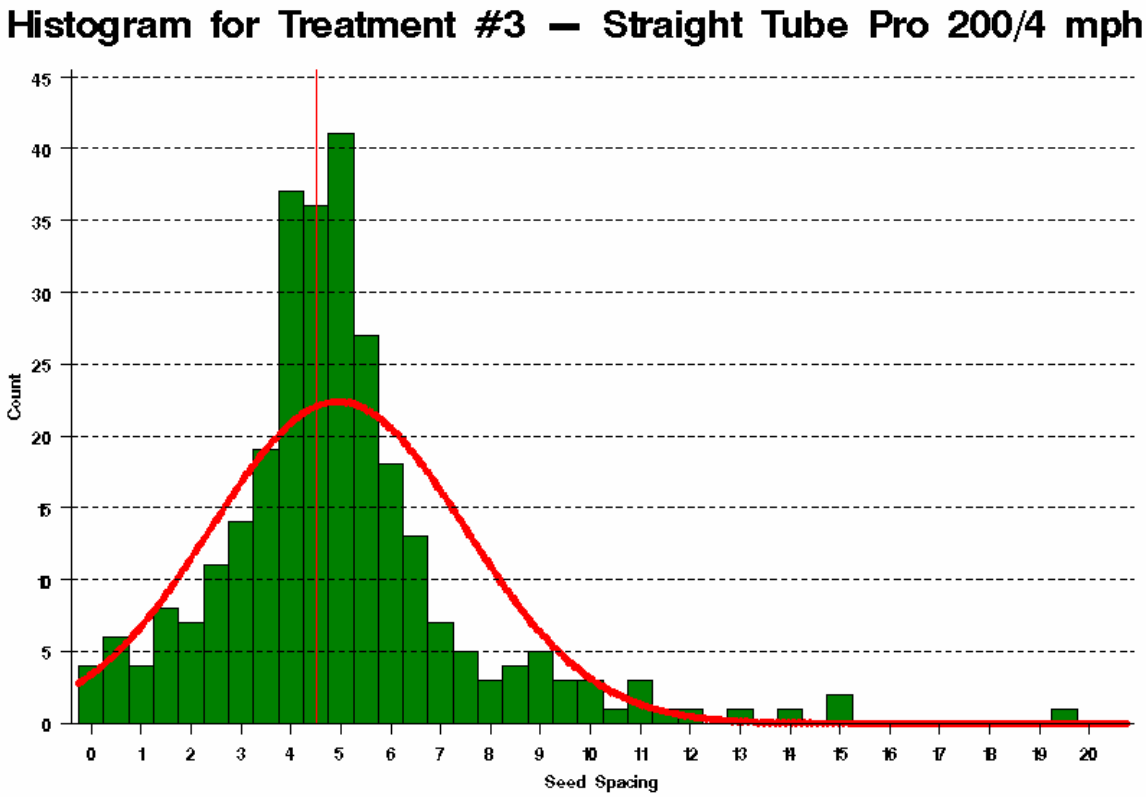

Histogram for Treatment #6 — Curved Tube Pro 50/6 mph
Count
Seed Spacing
0
5
10
15
20
25
30
35
40
45
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Table 7.


Histogram for Treatment #3 — Straight Tube Pro 200/4 mph
Count
Seed Spacing

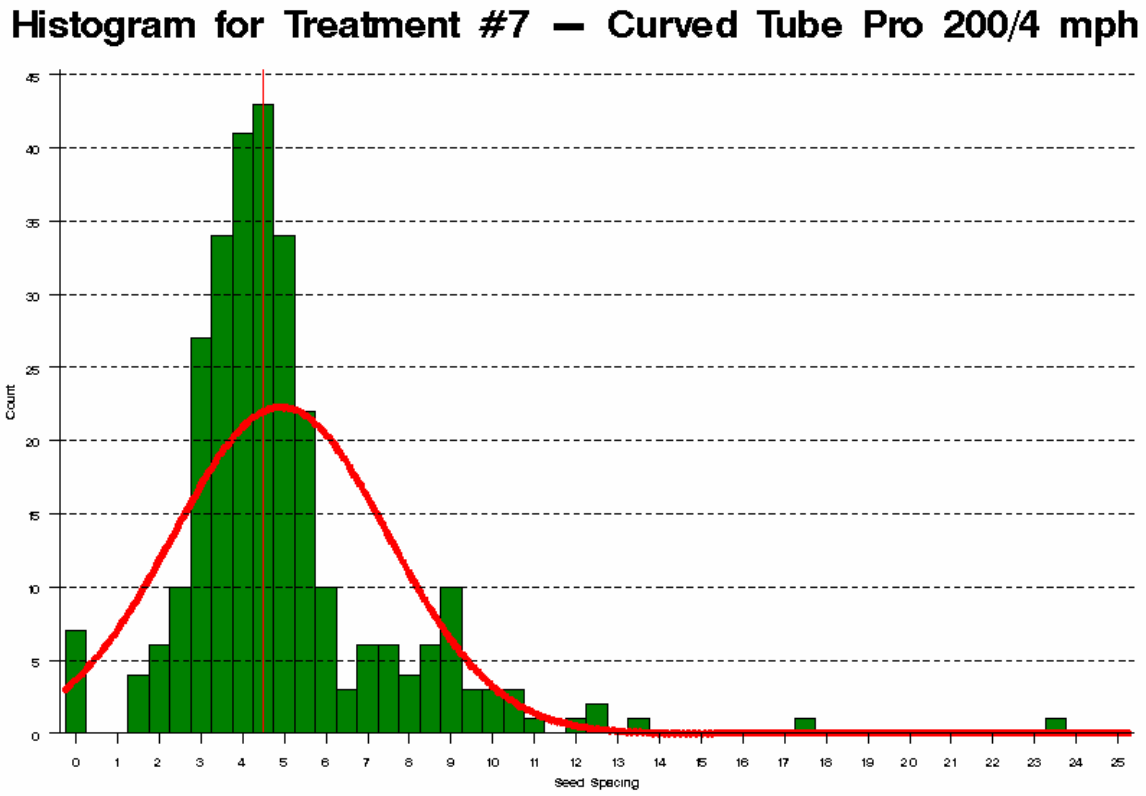
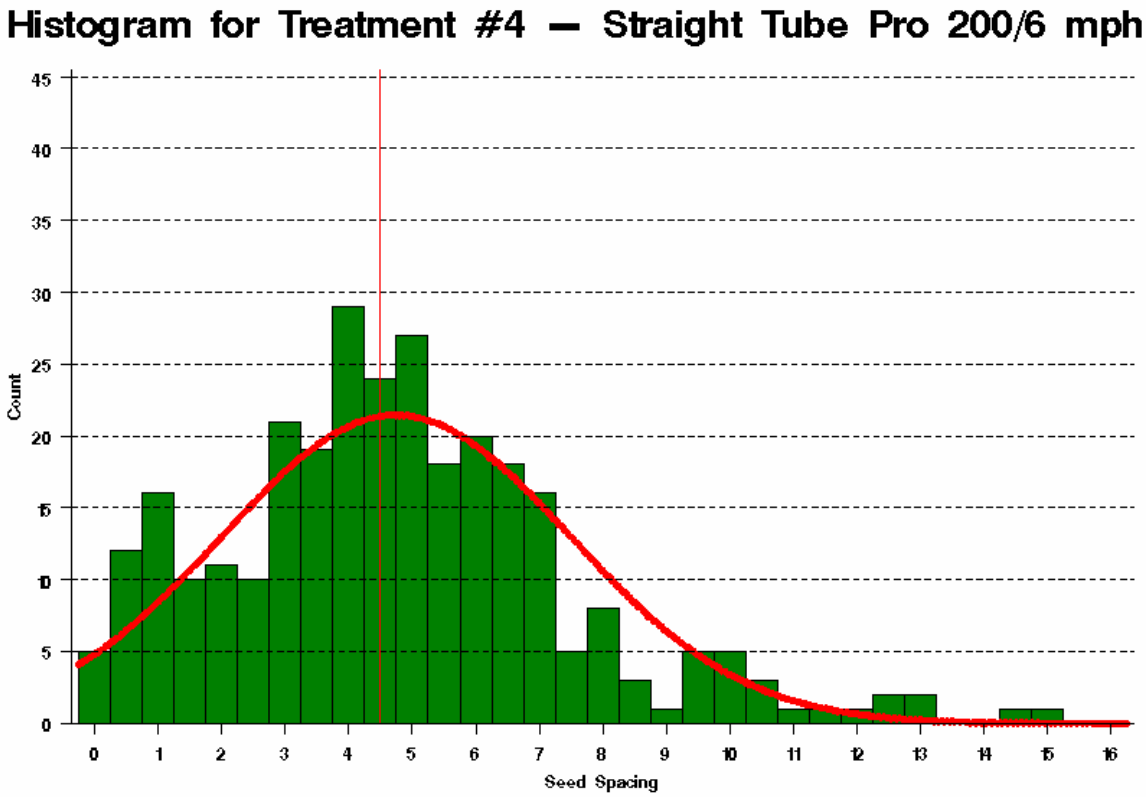
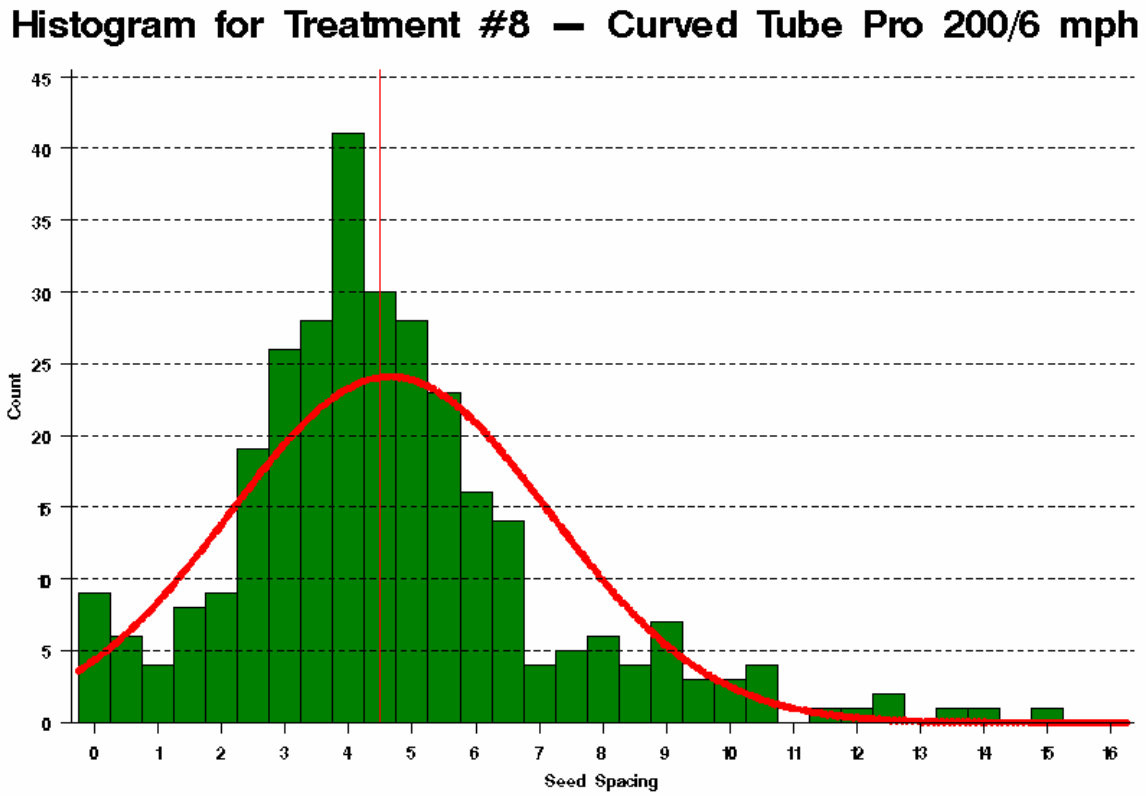

Histogram for Treatment #7 — Curved Tube Pro 200/4 mph
Count
Seed Spacing

Table 8.


Histogram for Treatment #4 — Straight Tube Pro 200/6 mph
Count
Seed Spacing
0
5
10
15
20
25
30
35
40
45
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16


Histogram for Treatment #8 — Curved Tube Pro 200/6 mph
Count
Seed Spacing
0
5
10
15
20
25
30
35
40
45
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16