The Impact Of Individual Planting Errors On Corn Yield

Study Guidelines

A trial was conducted at the Monsanto Learning Center at Scott, MS to demonstrate the impact of potential planting errors on corn yield in a mid-southern production system. This trial supports several other studies conducted during 2013 and will help to support the benefits of precision planting equipment.

The trial was planted on April 25, 2013 using the corn product DKC62-08 brand Genuity® VT Triple PRO® Corn. In an effort to generate highly variable populations, the least and most accurate planting equipment was used for planting in this demo. Four treatments were planted to represent a control and three different planting errors:

- 5 uniformly planted plants (the control) – x x x x x –
- 5 plants with a double and a skip – x x xx x –

  This generally occurs when two double planted seeds catch in the seed tube, which can be due to bouncing associated with planter speed.
- 4 plants with a true skip – x x x x –

  This configuration results in a reduction in plant population.

  This skip may be a seed that did not come up or it may not have been planted due to planting equipment malfunction.
- 6 plants with a true double – x x xx x x –

  This configuration results in an increase in plant population.

  In this case two seeds were not singulated by the planting equipment.

Figures 1 and 2 show examples of planting errors. The planting population was 32,000 seeds per acre. Calculations were made to estimate yield potential at populations of 35,000 and 38,000 seeds per acre. Thirty-six replicates of the four listed treatments were harvested from the trial. Ears were hand shelled, weighed by ear, and then compiled and analyzed by treatment. Data was corrected for moisture each day that shelling occurred.

Results and Conclusions

To determine potential yield differences from planting errors, corn ears were harvested from an area in each plot representative of 5 uniformly spaced corn plants. The corn ears were hand harvested, shelled, and weighed. The average weight of the corn varied by treatment, which was a function of plant spacing and/or plant population. The percent weight difference for each treatment was compared to the check.

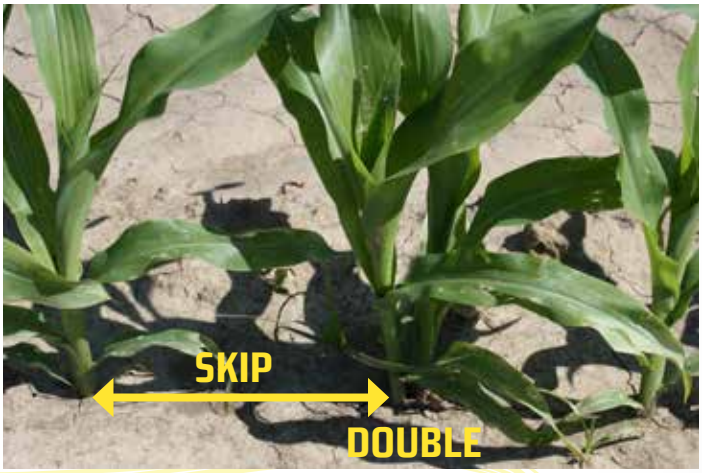

Figure 1. The planting error treatment with a double and a skip.

Figure 2. The planting error treatment with a true double.

When comparing the two treatments with 5 plants, since population is constant, the 3% weight difference is a result of plant spacing (Table 1). The weight decrease in the treatment with 4 ears and a skip is a result of the decrease in population compared to the control with 5 plants. The 4% weight increase in the treatment with 6 plants and a true double is a result of more ears per acre and a higher population.

Next, the number of 5 grouped plants found in an acre with 38-inch rows for each treatment at different populations was calculated (Table 2). The original planting population was divided by 5, to determine the number of 5 grouped plants/acre:

- Planting population ÷ 5 = groups of 5 plants/acre
- 32,000 ÷ 5 = 6,400 groups of 5 plants/acre

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Bushels of corn lost per 1/1000 of an acre due to type of planting error (treatment), incidence of planting errors (1-5), and population at a yield level of 225 bu/acre is shown in Tables 3 - 5. Two of the treatments show a yield loss due to planting error: 5 plants with a double and a skip as well as the 4 plants with a true skip. The treatment with 6 plants with a true double had a slight yield increase due to higher plant population (more ears per acre), which is common when yield conditions are good.

Yield calculated in the control treatment plots with 5 uniform plants equaled 221.5 bu/acre: (879 grams per 5 uniform plants X 6400 groups of 5 uniform plants per acre) ÷ 453.6 grams per acre ÷ 56 lbs/bu = 221.5 bu/acre.

In an associated check plot, the same DKC62-08 brand yielded an average of 226 bu/acre at 32,000 seeds/acre and an average of 237 bu/acre at 37,000 seeds/acre. If a yield calculation is made based on an average of 237 bu/acre at 37,000 to estimate the yield at a population of 32,000, the yield potential estimate is 204.97 bu/acre at a population of 32,000.

1. 237 ÷ 37,000 = yield potential estimate ÷ 32,000
2. Yield potential estimate = (237 X 32,000) ÷ 37,000
3. Yield potential estimate = 204.97 bu/acre

The difference in the two calculations of yield response accounts for the ability of the corn product to "flex". Regardless, the estimate of potential yield response to planting errors is relative and should apply reasonably well within a population that is within the normal planting range.

Table 1. Percent difference of treatments compared to control.

Treatment	Weight of corn represented in an area that 5 ears would be planted uniformly in a field (grams)	% Weight Difference Compared to Control
5 uniformly planted plants (control)	879	100%
5 plants with a double and a skip	868	97%
4 plants with a true skip	711	79%
6 plants with a true double	930	104%

Table 2. The number of plants found in an area of 5 uniform plants at different populations.

Treatment	Example 1: The number of plants found in an area of 5 uniform plants within an acre having 38" rows and a population of 32,000	Example 2: The number of plants found in an area of 5 uniform plants within an acre having 38" rows and a population of 35,000	Example 3: The number of plants found in an area of 5 uniform plants within an acre having 38" rows and a population of 38,000
5 uniformly planted plants (control)	6400	7000	7600

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Table 3. Bushels of corn lost per 1/1000 of an acre due to type of planting error (treatment), incidence of planting errors (1-5) at a population of 32,000 at a yield level of 225 bu/acre.

Treatment	Bushels lost per acre from 1 planting error on 1/1000 of an acre at population of 32,000 and a yield level of 225 bu/acre	Bushels lost per acre from 2 planting errors on 1/1000 of an acre at population of 32,000 and a yield level of 225 bu/acre	Bushels lost per acre from 3 planting errors on 1/1000 of an acre at population of 32,000 and a yield level of 225 bu/acre	Bushels lost per acre from 4 planting errors on 1/1000 of an acre at population of 32,000 and a yield level of 225 bu/acre	Bushels lost per acre from 5 planting errors on 1/1000 of an acre at population of 32,000 and a yield level of 225 bu/acre
5 uniformly planted plants (control)	-	-	-	-	-
5 plants with a double and a skip	0.11	0.21	0.32	0.42	0.53
4 plants with a true skip	0.74	1.48	2.21	2.95	3.69
6 plants with a true double	-0.14*	-0.28*	-0.42*	-0.56*	-0.70*

* The negative value indicates the yield increase that occurred when 6 plants were planted instead of the 5 uniformly spaced plants.

Table 4. Bushels of corn lost per 1/1000 of an acre due to type of planting error (treatment), incidence of planting errors (1-5) at a population of 35,000 at a yield level of 225 bu/acre.

Treatment	Bushels lost per acre from 1 planting error on 1/1000 of an acre at population of 35,000 and a yield level of 225 bu/acre	Bushels lost per acre from 2 planting errors on 1/1000 of an acre at population of 35,000 and a yield level of 225 bu/acre	Bushels lost per acre from 3 planting errors on 1/1000 of an acre at population of 35,000 and a yield level of 225 bu/acre	Bushels lost per acre from 4 planting errors on 1/1000 of an acre at population of 35,000 and a yield level of 225 bu/acre	Bushels lost per acre from 5 planting errors on 1/1000 of an acre at population of 35,000 and a yield level of 225 bu/acre
5 uniformly planted plants (control)	-	-	-	-	-
5 plants with a double and a skip	0.10	0.19	0.29	0.39	0.48
4 plants with a true skip	0.68	1.35	2.03	2.70	3.38
6 plants with a true double	-0.13*	-0.26*	-0.39*	-0.51*	-0.64*

* The negative value indicates the yield increase that occurred when 6 plants were planted instead of the 5 uniformly spaced plants.

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Table 5. Bushels of corn lost per 1/1000 of an acre due to type of planting error (treatment), incidence of planting errors (1-5) at a population of 38,000 at a yield level of 225 bu/acre.

Treatment	Bushels lost per acre from 1 planting error on 1/1000 of an acre at population of 38,000 and a yield level of 225 bu/acre	Bushels lost per acre from 2 planting errors on 1/1000 of an acre at population of 38,000 and a yield level of 225 bu/acre	Bushels lost per acre from 3 planting errors on 1/1000 of an acre at population of 38,000 and a yield level of 225 bu/acre	Bushels lost per acre from 4 planting errors on 1/1000 of an acre at population of 38,000 and a yield level of 225 bu/acre	Bushels lost per acre from 5 planting errors on 1/1000 of an acre at population of 38,000 and a yield level of 225 bu/acre
5 uniformly planted plants (control)	-	-	-	-	-
5 plants with a double and a skip	0.09	0.18	0.27	0.36	0.44
4 plants with a true skip	0.62	1.24	1.87	2.49	3.11
6 plants with a true double	-0.12*	-0.24*	-0.36*	-0.47*	-0.59*

* The negative value indicates the yield increase that occurred when 6 plants were planted instead of the 5 uniformly spaced plants.

Summary

- The most significant planting error was the true skip with a 79% reduction in yield compared to the uniformally spaced control.
- The skip resulted in a lower planting population than was intended.
- The evenly spaced true double and the double with a skip were statistically similar in yield.
- The data from this trial can help to determine yield loss associated with planting errors.
- This trial should help growers realize that uniformity and seed placement are very important in determining yield potential.

Legals

The information discussed in this report is from a single site, 36 replicate demonstration. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

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