Twin Row Corn Evaluation in a Dry Year

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Objective

This trial evaluated a twin row system as a method to narrow corn rows and increase yield with higher seeding rates as compared to a standard 30-inch row. The objectives of this trial are as follows:

- To determine corn yield response to twin row planting system.
- To determine optimum seeding rate for twin row corn.
- To determine hybrid differences across row spacing systems and seeding rates.

Background

Crop Year: 2012
Location: Farm Science Review MCAC
County/Town: Madison/ London
Soil Type: Kokomo, Crosby, Miami, Lewisburg
Drainage: Pattern tiled 70 ft spacing
Previous Crop: Soybean
Tillage: Field cultivated April 18

Soil Test: OM 3.2%, CEC 15, pH 6.5, BpH 6.9
Bray P1 P 50ppm, K 165ppm
Planting Date: April 20, 2012
Fertilizer: 10 gal. 10-34-0 banded
Nitrogen: 190 lbs N/A pre-plant NH_3
Seeding Rate: Varies with treatment
Harvest Date: October 17 & 18, 2012

Methods

Corn grain yield is used to measure the effects of row spacing, seeding rate and hybrid in 30-inch and twin-row corn. This study was designed as a randomized complete block with four replications of each treatment. The trial was conducted in strips of 1440 feet length by 40 feet wide (1.3 A) for each treatment at the OSU Farm Science Review Molly Caren Agricultural Center near London, Ohio.

Variables evaluated:

1. Row spacing –
    - Twin row planted with a Great Plains Yield Pro planter (YP-1625A-32TR), and 30-inch rows planted with a John Deere 1770 NT planter.
2. Seeding rate –
    - Three rates: 33, 40 or 47 thousand seeds per acre.
3. Hybrids –
    - Pioneer P1184AM1 and USA 1108RR. The USA hybrid is a tall, flex ear hybrid as compared to the Pioneer hybrid, which is shorter with a medium-flex ear.

The twin row planter was capable of planting 32 rows in a 40-foot width. Rows were twinned at 7.5 inches, with an inter-row spacing of 22.5 inches. Twinned rows allow easy harvest of the twin row system strips with a common 30-inch row head.

The seeding rates were set from the cab with a planter mounted variable rate seeding mechanism for each of the seeding rates. A pounding rain event occurred approximately 10 days after

planting, reducing plant stands from expected counts. Stands were sampled in 17.4 feet length of row or twin row pair (1/1000 acre) for each strip at 30 days after planting.

A John Deere S550 combine with GreenStar yield monitor was used to harvest eight rows (16 twin) of each pass in a 40-foot strip. Grain was weighed and moisture was determined and recorded. Yield was corrected for moisture content to 15%.

Monthly rainfall amounts at the Farm Science Review headquarters site for spring and summer 2012.

- April - 1.66"
- May - 5.28"
- June - 2.08"
- July - 1.79"
- August - 0.6"

Nearly all of the 5.28 inches of rain in May were concentrated in one event the first week of the month. Normal rainfall (US Climate Data) across the period is 19.56 inches vs. the 11.41 in 2012.

Results

Data was analyzed using PROC MIXED in SAS 9.3 (Raleigh, NC). Results for corn yield are presented in the first three tables. Table 1 presents row spacing effects, Table 2 seeding rate effects and Table 3 the hybrid effects.

Table 1. Row spacing effects on corn yield across seeding rate and hybrid, London Ohio 2012.

Row spacing	Yield (bu/A)
30 inch rows	146.03
Twin row	128.11
LSD (0.05)	**3.4**

Table 2. Seeding rate effects on corn yield across row spacing and hybrid, London Ohio 2012.

Seeding rate (s/A)	Yield (bu/A)
33,000	144.7
40,000	137.7
47,000	128.8
LSD (0.05)	**4.1**

Table 3. Hybrid choice effects on corn yield across row spacing and seeding rate, London Ohio 2012.

Hybrid	Yield (bu/A)
Pioneer P1184AM1	135.7
USA 1108RR	138.4
LSD (0.05)	**NSD**

Results for crop stand (population count) are presented in the following three tables. Table 4 presents row spacing or planter effects, Table 5 seeding rate effects and Table 6 the hybrid effects.

Table 4. Row spacing effects on crop stand across seeding rate and hybrid, London Ohio 2012.

Row spacing	Stand (thou. pl/A)
30 inch rows with the John Deere planter	30.3
Twin row with the Great Plains planter	33.2
LSD (0.05)	**0.5**

Table 5. Seeding rate effects on crop stand across row spacing and hybrid, London Ohio 2012.

Seeding rate (s/A)	Stand (thou. pl/A)
33,000	26.1
40,000	32.2
47,000	36.9
LSD (0.05)	**0.7**

Table 6. Hybrid effect on crop stand across row spacing and seeding rate, London Ohio 2012.

Hybrid	Stand (thou. pl/A)
Pioneer P1184AM1	33.6
USA 1108RR	29.9
LSD (0.05)	**0.5**

Summary

Yield

Our greatest interest was to increase yield with narrow row planting. As noted in Table 1, there were significant yield differences by row spacing ($p = 0.001$). However, the 30-inch system (John Deere) produced significantly higher yield than the twin row (Great Plains) system.

Our second concern was the required seeding rate to maximize yield. As shown in Table 2, increasing seeding rates did not increase yield, quite the opposite ($p = 0.042$). There was no row spacing by seeding rate interaction ($p = 0.750$).

Shown in Table 3 is our third interest, hybrid difference. In this trial Pioneer P1184AM1 did not significantly out yield its competitor USA 1108RR ($p = 0.586$). We anticipated a hybrid by row spacing interaction, but that did not occur ($p = 0.411$)

Stand
Shown in Table 4, there were significant differences for crop stand by row spacing (p= 0.001). The twin row (Great Plains) system maintained significantly higher plant stands than the conventional 30-inch (John Deere) system.

Shown in Table 5, increasing seeding rates did increase plant stand ($p < 0.0001$).

Shown in Table 6 are our hybrid differences. In this trial Pioneer P1184AM1 was able to maintain significantly higher populations than USA 1108RR ($p < 0.0001$).

Water limitation impact
Previous work with narrow row corn indicated we would not see a yield reduction with either narrow rows or higher seeding rates. For crop year 2012, narrow row spacing and in-row crowding may have led to excessive water use early in the growing season leaving less available moisture in the twin row system (Table 1) and high seeding rate (Table 2) treatments for proper grain fill. This high population reaction to reduced rainfall level was seen previously in another dry year, 2005 in Darke County, Ohio (Foster, Watters; Watters, Foster).

References

Foster, S., Watters, H. Twin Row Corn Silage Trial, a method to increase silage production. http://agcrops.osu.edu/on-farm-research/archive%20pages/2005/Twin%20Row%20Silage%2005_final.pdf.

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