Single- or Twin-Row Crops?

Kelly Nelson
University of Missouri
Greenley Research Center, Novelty
Physiological benefits of twin-rows
Experiences with twin-row crops in MO

- Northeast MO – dryland
  - Corn
  - Soybean
  - Glyphosate application timings

- Southeast MO – irrigated (Henggeler)
  - Corn
  - Soybean

Summary and Recommendations
What are the benefits of twin-rows?
Twin-row benefits

• Plant with the same planter
Twin-row benefits

- No new harvest equipment required
Twin-row benefits

- Increased light (PAR) interception

East-west rows, 2004
Twin-row benefits

• Increased light (PAR) interception
Twin-row benefits

- Wider in-row plant spacing

In-row spacing at 28,000 plants/acre

- Twin-row parallel: 30 in., 7.5 in., 15 in.
- 15 in.
Twin-row benefits

- Increased seeding rates
- Improved weed control
- Lower grain moisture at harvest
- Reduced incidence of disease
- Increased grain yield
- New technology
Twin-row Peanut Production

Two, 7 in. rows on 36 in. centers

- Increased light interception
- Increased pod yield
- Improved market grade
- Reduced incidence of disease

(Jaaffar and Gardner, 1988; Jordan et al., 2002; Lanier et al., 2004)
Twin-row benefits

• Plant with the same planter
• No new harvest equipment required
• Increased light interception
• Wider in-row plant spacing
• Increased seeding rates
• Improved weed control
• Lower grain moisture at harvest
• Reduced incidence of disease
• Increased grain yield
Physiological benefits of twin-rows

Experiences with twin-row crops in MO

• Northern MO – dryland
• Southern MO – irrigated

Summary and Recommendations
Conventional and No-till Corn Row Spacing and Density

- 15 in PSS
- 22.5 in PSS
- 30 in PSS
- 30 in JD
- Twin PSS
Corn Row Spacing IPAR in 2001-2003 (Conventional tillage)

Pioneer 34B24, No interaction between RS and Plant Density. Data were averaged over 25, 30, 35, and 40K plants/acre.
Corn Grain Yield in 2001-2003 (Conventional tillage)

- LSD$_{(p<0.1)} = 5$
- LSD$_{(p<0.1)} = 8$
- LSD$_{(p<0.1)} = 24$

Pioneer 34B24, No interaction between RS and Plant Density
Data were averaged over 25, 30, 35, and 40K plants/acre.
Corn Row Spacing IPAR and Grain Yield (No-till) in 2001 and 2002

Garst 8342IT, No interaction between RS and Plant Density Data were averaged over 25 and 30K plants/acre.
No-till Corn Emergence in 2001

2-4 inches taller 4 weeks after planting
Twin-row Corn Plant Density and Arrangement
Twin-row Corn Plant Arrangement (25,000 plants/acre)

Twin-row parallel plant arrangement

Twin-row alternating plant arrangement
Burrus 671RR, No interaction between RS and plant density. Data were averaged over 25 and 35K plants/acre.
Twin- and 30 in. Wide-row Production in Large Contour Plots in 2001 and 2002
• 5 MPH @ 30,000 s/a

• Burrus BX65
• Wheat-clover

• Garst 8464IT
• Soybean

• 2.5 MPH
IPAR, Harvest Density, and Grain Yield in 2001

Garst 8464IT

- LSD = 9
- **NS**

LSD = 8

- Twin-row PSS
- 30 in. PSS
- 30 in. JD

Burrus BX65

- LSD = 11

LSD = 15

LSD = 1.6

Yield (bu/a)

IPAR (%) Plant density * 1000 (No./a)

Twin-row PSS  30 in. PSS  30 in. JD
IPAR, Harvest Density, and Grain Yield in 2002
Cooperator Research in 2001 and 2002

<table>
<thead>
<tr>
<th>Palmyra 2001</th>
<th>Yield (bu/a)</th>
<th>Knox City 2002</th>
<th>Yield (bu/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 in. Kinzie</td>
<td>170</td>
<td>30 in. JD1750</td>
<td>148</td>
</tr>
<tr>
<td>Twin-row PSS</td>
<td>159</td>
<td>Twin-row PSS</td>
<td>140</td>
</tr>
<tr>
<td>LSD (p=0.1)</td>
<td>10</td>
<td></td>
<td>NS</td>
</tr>
</tbody>
</table>

Twin  7.5 in.

22.5 in.  15 in.

LSD = 7

LSD = 3

Pioneer 93B01
Wilcross 3149 @ 29,000 s/a

Asgrow 3701 @ 180,000 s/a
Weed-free Corn Intercepted PAR in 2002 & 2003

Twin-row corn vs. 30" corn

- Light interception (%)
- NS indicates non-significant difference

9 WAP: 65% (Twin-row) vs. 65% (30")
10 WAP: 70% (Twin-row) vs. 70% (30"
11 WAP: 75% (Twin-row) vs. 75% (30"
12 WAP: 80% (Twin-row) vs. 80% (30"

Twin-row corn graph is light blue, 30" corn is yellow
Weed-free Soybean Intercepted PAR in 2002 & 2003

Light interception (%)

100
95
90
85
80
75
70

10 WAP 11 WAP 12 WAP

Twin-row soybean 15" soybean 7.5" soybean

LSD\(_{(p<0.1)}\) = 2

NS
Total Weed Biomass in 2002 and 2003

Row spacing main effect. Data were averaged over glyphosate application timing.
Summary:

1. Intercepted PAR was similar in twin- and 30 in. wide-row corn 9 to 12 weeks after planting (WAP).

2. 7.5 in. soybean intercepted 3% more PAR than 15 in. soybean 12 WAP.

3. Total weed biomass was similar in twin- and 30 in. wide-row corn, and similar in twin-, 15 in., and 7.5 in. soybean.
Row spacing main effect. Data were averaged over glyphosate application timing.

LSD \(_{(p \leq 0.05)} = 14\)

NS
Soybean Grain Yield in 2002 and 2003

Row spacing main effect. Data were averaged over glyphosate application timing.

LSD \( (p<0.1) = 4 \) for Soybean 2002,
LSD \( (p<0.1) = 3 \) for Soybean 2003.

Legend:
- Yellow: Twin-row
- Cyan: 15 in.
- Black: 7.5 in.
Summary:

1. Corn grain yield was 15 bu/a greater in 30 in. wide-rows than twin-rows in 2002 while grain yields were similar in 2003.

2. Soybean grain yield was 3 to 7 bu/a greater in 7.5 and 15 in. rows than twin-rows.
- 2 in. glyphosate application timing

- 7.5 and 15 in. soybean were more tolerant of late emerging weeds
Twin- and Single-Row Irrigated Corn in 2003

Joe Henggeler, David Reinbott, John Engram
Irrigation Specialist, Farm Management Specialist, and Scott Co. Farmer
Monosem and 900 Case IH

- 30.5 in.
- 7.5 in.
- 30.5 in.
- 38 in.

Flood irrigated
Twin- and Single-Row Irrigated Corn in 2003

\[ y = -1E-07x^2 + 0.0094x + 42.597 \]
\[ R^2 = 0.9568 \]

11 bu/a
1 rep.

Plant Population

Yield (bushels/acre)
Twin- and Single-Row Irrigated Corn on Sandy Soils in 2003 (Hand Planted)

LSD\(_{p<0.1}\) = NS

DK 64-11RR
Twin- and Single-Row Soybean on Overhead Irrigated Sandy Soils in 2003

Joe Henggeler

104,500 plants/a

30 in. rows

Twin-row alternating

30 in.

2 in.

7.8 in.

4 in.

30 in.

7.5 in.

22.5 in.
Twin- and Single-Row Irrigated Soybean on Sandy Soils in 2003 (Hand Planted)

LSD_{p<0.1} = NS

Yield (bu/acre)

- Twin-row alternating
- 30 in. single-row

Morsoy RT4480N
### Summary: Twin-Row Corn IPAR and Grain Yield

<table>
<thead>
<tr>
<th>IPAR (%)</th>
<th>Site/years (average)</th>
<th>Yield (bu/a)</th>
<th>Irrigated Yield (bu/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 in. PSS</td>
<td>3 of 11 (9)</td>
<td>3 of 15 (21)</td>
<td>1 of 1 (-2)</td>
</tr>
<tr>
<td>30 in. planter</td>
<td>4 of 9 (12)</td>
<td>5 of 9 (0)</td>
<td>0</td>
</tr>
</tbody>
</table>

Plant density was greater at 2 sites
ECB harvest loss 2 contour sites
Weed interference was greater 1 site
ECB harvest loss 2 contour sites
Plant density was greater at 1 site
## Summary: Twin-Row Soybean IPAR and Grain Yield

<table>
<thead>
<tr>
<th>IPAR (%)</th>
<th>Site/years (average)</th>
<th>Yield (bu/a)</th>
<th>Weed interference</th>
<th>Irrigated Yield (bu/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.5 in.</td>
<td>4 of 4 (-2)</td>
<td>4 of 4 (4)</td>
<td></td>
<td>1 of 1 (5)</td>
</tr>
<tr>
<td>15 in.</td>
<td>4 of 4 (1)</td>
<td>2 of 4 (4)</td>
<td>2 of 2 (8)</td>
<td></td>
</tr>
<tr>
<td>22.5 in.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 in.</td>
<td>1 of 1 (5)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Risks Associated with Twin-row Crops

• Banded insecticide cost – coated seed and rootworm resistant hybrids
• Increased risk of lodging in corn
• Increased insect management (ECB)
• Ability to compete with weeds
• Incidence of disease in corn
• Side-dress fertilizer applications
• Cultivation
• Reduced soybean grain yield
Twin-row Corn
Depth control gauge wheels
7.5 in. and 11.25 in. soybean
“Well, lemme think. ... You've stumped me, son. Most folks only wanna know how to go the other way.”