Agronomic Decisions for Narrow Row Corn Production in the Eastern US Corn Belt

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INTRODUCTION

- Renewed interest in narrow row corn production (<51 cm)
- Perception that grain yield may improve
  - Documented improvement in silage yield
  - Varied responses in grain yield
- Population response to narrow rows
  - Greater interception of light may equate to greater yield
  - More even distribution of plants per unit area
- Higher yielding hybrids
  - Altered plant characteristics
  - May respond differently to narrow row production

RESEARCH QUESTIONS

1. Does narrow row production alter optimum seeding rate?
2. Do modern hybrids differ in their response to narrow row spacing?
3. Is there a yield advantage for corn in narrow rows compared to conventional row spacing?

METHODS

- Two field experiments conducted
  - South Charleston and Hoytville, OH (2016)
    - Split-plot randomized complete block design
  - Gatesburg (2015 and 2016) and Rock Springs (2016), PA
    - Randomized complete block design
- First factor (whole plot): Row spacing
  - 38-cm (narrow)
  - 76-cm (conventional)
- Second factor (sub-plots):
  - Field trial 1: Plant population (86,500, 98,800, or 111,200 plants ha^{-1}, 105-d hybrid); or
  - Field trial 2: Hybrid/brand (Table 1, 86,500 plants ha^{-1})

Table 1. Hybrids (Pioneer brands) and comparative relative maturity of each utilized in 2015 and 2016.

Year	Hybrid/Brand	Comparative Relative Maturities (d)
2015	P0506AM, P0604AM, P0970AMXT, P1197AMXT	105, 106, 109, 111
2016	P0506AM, P0604AM, P1197AM, P1443AM	105, 106, 111, 114

- Stover yield measured at R6
- Grain yield collected after R6 (adjusted to 155 g kg^{-1} moisture)

RESULTS AND DISCUSSION

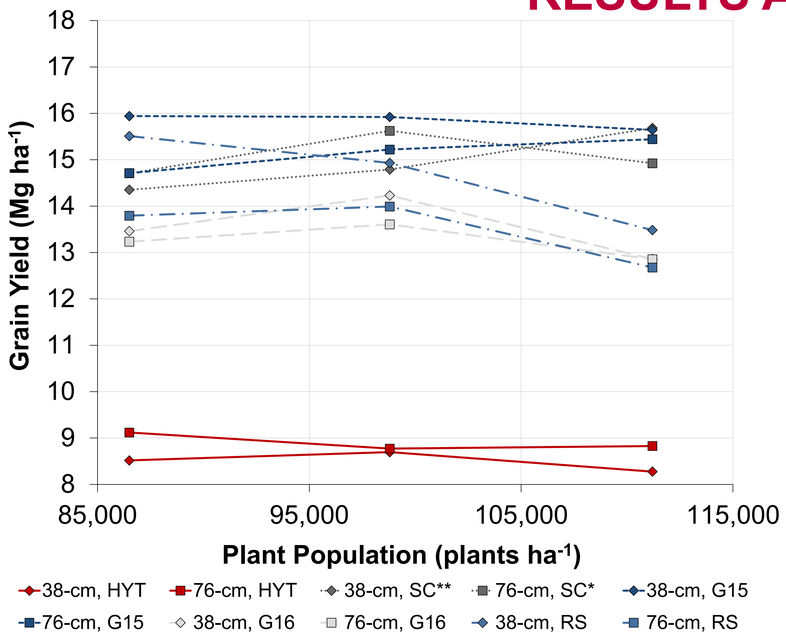

Figure 1. Grain yield response of corn in 38-cm and 76-cm rows to population at the Ohio (Hoytville = HYT, South Charleston = SC) and Pennsylvania (Gatesburg 2015 = G15, Gatesburg 2016 = G16, and Rock Springs = RS) locations.

Grain and Stover Yield Response to Plant Population in Narrow Rows

- 86,500 plants ha^{-1} produced grain yield similar to the greatest yielding population in all environments and row spacings except at South Charleston (Figure 1)
  - Row spacing by population interaction (P<0.001)
  - Narrow rows - 111,200 plants ha^{-1} (double-asterisk)
  - Conventional rows - 98,800 plants ha^{-1} (single asterisk)
- Narrow row effect on grain yield across populations
  - Decreased by 0.4 Mg ha^{-1} at Hoytville
  - Increased by 0.8 Mg ha^{-1} at Rock Springs
- Stover yield was similar to the greatest yield at 86,500 plants ha^{-1} regardless of row spacing in all environments (data not shown).
  - Stover yield only greater in narrow rows at Rock Springs (1.7 Mg ha^{-1} greater, P=0.013).

Hybrid Grain and Stover Yield Response in Narrow Rows

- Hoytville (Figure 2a): Row spacing by hybrid interaction (P=0.019)
  - 105-d hybrid produced less grain yield in narrow rows
  - 111-d hybrid produced greater grain yield in narrow rows
  - Stover yield similar regardless of treatment (data not shown).
- South Charleston (Figure 2a): Grain yield was increased in narrow rows across hybrids (P=0.09)
  - 106-d hybrid produced less grain yield (asterisk)
  - 105-d hybrid produced less stover yield (data not shown)
- Gatesburg (Figure 2b): Narrow row production (P≤0.04)
  - Increased grain yield by 0.7-0.9 Mg ha^{-1} (asterisk)
  - Increased stover yield by 1.0-1.6 Mg ha^{-1} (data not shown)
  - Similar hybrid grain and stover yield response to narrow rows
- Rock Springs (Figure 2b): Similar responses for all treatments

STATISTICS

Data were analyzed within each site due to differences in experimental design. Data were analyzed using PROC GLIMMIX in SAS 9.4, with means separated using paired t-tests when Global F-test was significant (α=0.05).

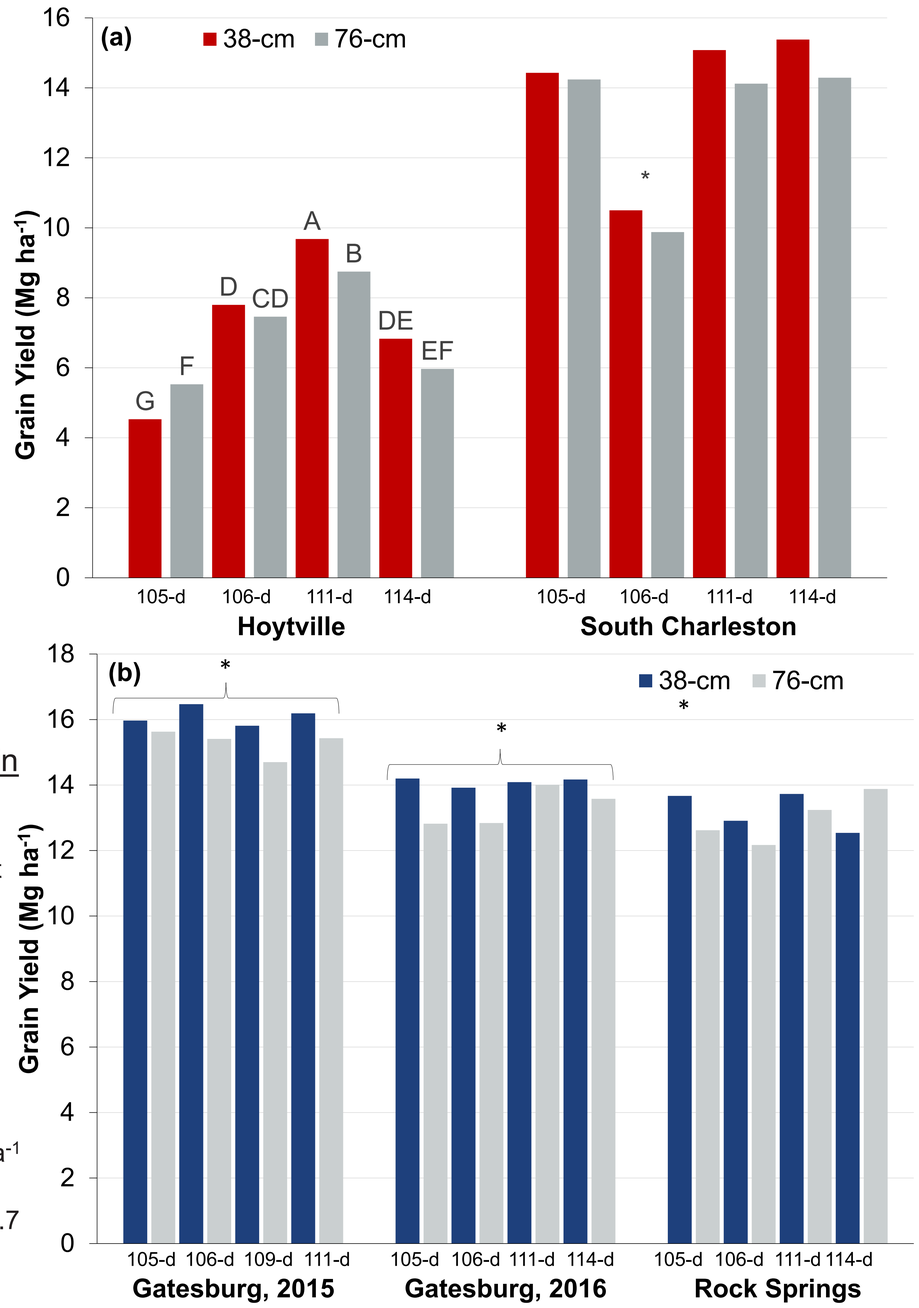

Figure 2. Grain yield response of four corn hybrids in 38-cm and 76-cm rows to population at the Ohio (a) and Pennsylvania (b) locations. Letters denote a row spacing by hybrid interaction (a), asterisks denotes a significant hybrid (a) or row spacing (b) effect.

CONCLUSIONS

- Grain and stover yield was greatest at the 86,500 plants ha^{-1} population in most environments.
- Narrow row production:
  - Increased grain yield in three PA environments and one OH environment
  - Decreased grain yield in one OH environment
  - Increased stover yield in three of the 10 environments
- Results suggest current agronomic management practices can be applied for narrow row production
- These studies will be repeated to further validate these results.

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