



On-Farm Investigation of Seeding Rate for Wide-Row Wheat Production in Northwest Ohio

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WHEAT PRICES are not competitive with corn and soybean prices, so farmers are investigating ways to increase the profitability of wheat production. One way to increase profitability in northern regions (where double cropping soybean is difficult) is to interseed soybean into wheat before wheat harvest (Prochaska, 1997). In Ohio, soft red winter wheat is traditionally grown in 7.5-inch row widths. To interseed soybean, wheat needs to be planted in 15-inch row widths. Research on small-plot wheat-row width and seeding rate conducted in Kentucky indicated that 871,200 seeds/acre is optimum when planting in 15-inch row widths (Lee and Herbek, 2012). However, many farmers have been concerned that a seeding rate of 871,200 seeds/acre was too low in northwest Ohio, where the standard practice is to seed 2.0–2.5 million seeds/acre in 7.5-inch row widths. On-farm trials were conducted to evaluate wheat yield grown using the standard practice of seeding wheat in 7.5-inch row widths at 2.0 million seeds/acre compared with wheat grown in 15-inch row widths at 1.0 and 1.5 million seeds/acre.

Three on-farm trials were established during the 2013–2014 growing season, and one trial was established during the 2014–2015 growing season in Fulton County, OH. The soil series of the four fields were Nappanee (fine, illitic, mesic Aeric Epiaqualfs), Tedrow/Bount (mixed, mesic Aquic Upidsaments/fine, illitic, mesic Aeric Epiaqualfs), Blount-Pewamo (fine, illitic, mesic Aeric Epiaqualfs/fine, mixed, active, mesic Typic Argiaquolls). Soil pH ranged from 6.0 to 6.7, organic matter ranged from 1.5 to 3.2%, P was between 43 and 197 ppm, and K was between 98 and 230 ppm. All fields were in a corn-soybean-wheat rotation. Precipitation and average temperature for the 2013–2014 and 2014–2015 growing seasons are shown in Table 1.

The trials consisted of three treatments: (i) the standard practice of seeding wheat in a 7.5-inch row width at 2.0 million seeds/acre, (ii) seeding wheat in a 15-inch row width at 1.0 million seeds/acre, and (iii) seeding wheat in a 15-inch row width

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Table A. Useful conversions.

To convert Column 1 to Column 2, multiply by	Column 1 Suggested Unit	Column 2 SI Unit
2.54	inch	centimeter, cm (10 ⁻² m)
0.405	acre	hectare, ha
1.0	parts per million, ppm	extractable ions, milligram per kilogram, mg/kg
0.304	foot, ft	meter, m

Table 1. Monthly precipitation and average temperature during the 2013–2014 and 2014–2015 growing seasons in Wauseon, OH.†

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
2013–2014										
Precipitation (inches)	4.9	2.0	2.5	2.3	3.3	0.8	3.1	3.1	2.9	1.2
Average temperature (°F)	52.7	37.6	27.0	14.9	16.7	25.7	47.7	59.9	70.3	68.2
2014–2015										
Precipitation (inches)	2.9	2.1	1.2	1.8	1.0	1.1	2.2	4.3	9.1	6.0
Average temperature (°F)	50.5	34.2	33.3	20.1	11.8	31.3	47.7	62.8	67.8	69.8

† Data from the National Oceanic and Atmospheric Administration; available at www.ncdc.noaa.gov.

at 1.5 million seeds/acre. The trials consisted of randomized strips that were replicated four times per location. Wheat was planted to approximately one-inch depth with a grain drill in the 7.5-inch-row-width treatment, and an 11-row, 15-inch White air vacuum planter with wheat plates was used to plant wheat in a 15-inch row width. Varieties planted were ‘Rupp 972’ (three site-years) and ‘Pioneer 34R25’ (one site-year). Strips were 30 ft wide and at least 1000 ft long. Planting occurred as timely as possible, resulting in all four sites planted within 20 d of the Hessian fly-free safe date (22 September). Fertility was adjusted for the needs of each individual field based on soil-test P and K values and yield potential according to state guidelines (Vitosh et al., 1995). In the spring, each trial was top-dressed with 28% urea ammonium nitrate at 100 lb N/acre before Feekes growth stage 6. Heads per linear foot (two 1-ft measurements/plot), grain moisture, and grain yield were recorded. Centers of the plots were harvested with commercial combines, 30-ft wide at three sites and 25-ft wide at one site. Grain moisture and yield were measured with calibrated yield monitors. Grain yield was adjusted to 13.5% moisture content. Analysis of variance was conducted for grain yield and number of wheat heads/acre using the Proc Mixed procedures in SAS 9.3 (SAS Institute, Cary, NC). Treatment was treated as a fixed effect, while site-year and replication were treated as random effects. Means were separated using LSD at $\alpha = 0.10$.

The number of wheat heads per acre was influenced by the seeding rate and row width treatments ($p < 0.001$). Averaged across site-years, there were 2.5 and 2.7 million wheat heads/acre when wheat was grown in a 15-inch row width at 1.0 and 1.5 million seeds/acre, respectively (Fig. 1). When wheat was grown in a 7.5-inch row width at 2.0 million seeds/acre, there was an average of 3.6 million wheat heads/acre.

Averaged across site-years, wheat grain yield was 81.7 bu/acre when grown in the standard practice of 7.5-inch

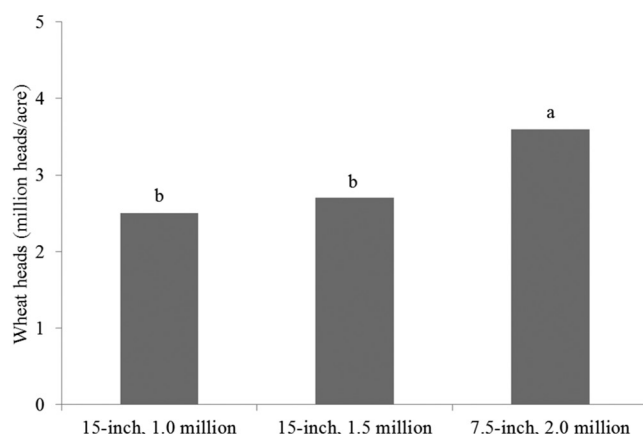


Fig. 1. Number of wheat heads per acre averaged across four site-years for wheat grown in 15-inch row widths at 1.0 million seeds/acre, 15-inch row widths at 1.5 million seeds/acre, and 7.5-inch row widths at 2.0 million seeds/acre. The same letters indicate no statistically significant difference at $\alpha = 0.10$.

row widths at 2.0 million seeds/acre (Fig. 2). Compared to the standard practice, yield was reduced by 15% when grown in 15-inch row widths across seeding rates. However, when wheat was grown in 15-inch row widths, there was no difference in yield whether wheat was seeded at 1.0 or 1.5 million seeds/acre. If wheat is grown in 15-inch row widths, more than 1.0 million seeds/acre is not necessary to maximize yield when planting within 20 d of the Hessian fly-free safe date in northwest Ohio.

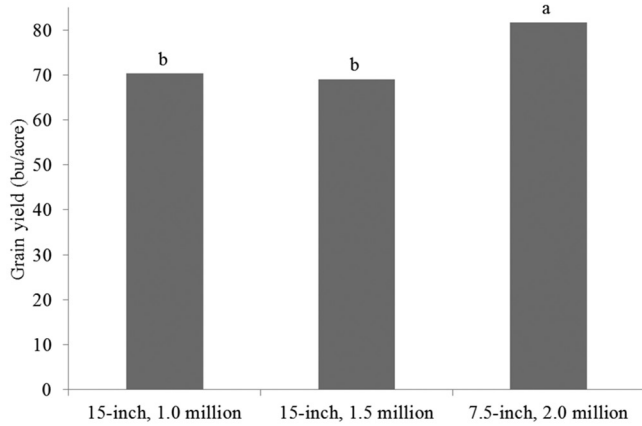


Fig. 2. Wheat grain yield averaged across four site-years for wheat grown in 15-inch row widths at 1.0 million seeds/acre, 15-inch row widths at 1.5 million seeds/acre, and 7.5-inch row widths at 2.0 million seeds/acre. The same letters indicate no statistically significant difference at $\alpha = 0.10$.

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