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Wider row spacing may be possible in wheat

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Wider row spacing in wheat is possible – up to 16 inches – but producers need to monitor their plant density to ensure they are reaching an adequate stand establishment to achieve optimum yield, especially since all seeding equipment may not maintain separation of seed and fertilizer.

No-till row spacing is a balance between many different factors including potential issues with trash clearance, risk of seedling fertilizer burn, increased weed pressure, and yield and quality impacts.

A 4-year study was conducted from 2013 through 2016 at Agriculture and Agri-Food Canada Research Farm at Indian Head, Saskatchewan to determine the effects of row spacing and rate of nitrogen (N) fertilizer on the establishment, crop development, yield, N uptake, and quality of spring wheat. The soil type at the research site was a Rego Black Chernozem, and the soil series is Indian Head heavy clay.

The treatments were 4 row spacings of 10, 12, 14, 16 inches (25, 30, 35, and 40 cm). Five fertilizer nitrogen (N) rates were applied at 18, 36, 71, 107, and 142 pounds N per acre (20, 40, 80, 120, and 160 kg N/ha). The source of N was urea with an analysis of 46–0–0.

A fertilizer blend with an analysis of 14–20–10–10 was side-banded across all treatments, at a rate of 127 lbs. N/ac (143 kg/ha). The quantity of urea used for the five different N rates was adjusted to accommodate the N present in the 14–20–10–10 fertilizer blend.

Increasing the row spacing from 10 to 16 inches increased the amount of fertilizer product applied in the side-band by 60% per meter of row. The residual N and P prior to seeding ranged from 21 to 42 lbs. N/ac (24 to 48 kg N/ha) and 7 to 11.6 lbs. P/ac (8 to 13 kg P/ha). The target seeding density of Goodeve wheat was 25 plants/ft^2 (250 plants/m^2).

All fields had been converted to a no-till production system by 1996. Wheat was seeded into canola stubble with a no-till drill with shank openers. The fertilizer band was located 1.5 inches to the side and 0.75 inches below the seed.

Seeding depth was approximately 0.75 inches (19 mm) under the soil surface at the bottom of a 1 to 1.3 inch (25 to 33 mm) grove cut into the soil by the no-till shank opener. Good weed control was maintained in all 4 years with appropriate herbicide applications.

Increasing row spacing shows potential

In 2013 and 2015, increasing row spacing decreased plant density. In both of these years, precipitation was below normal, especially in May. There was a linear decrease in plant density from 26 to 20 plants/ft^2 as row spacing widened in 2013. In 2015, there was a curvilinear decrease in plant density from 21 to 16 plants/ft^2 as row spacing increased, with the largest greatest decrease occurring between the 10- and 12-inch row spacings.

Plant density was not affected by N rate. This indicates that as N rate increased, the separation of seed and fertilizer was maintained. Additionally, there was not an interaction between N and row spacing. This indicates that the reduced plant density observed as the row spacing increased two out of four times (213 and 2015) is due to factors other than N fertilizer rate. The researchers thought that interplant competition, especially under stressful environmental conditions in the seed row, could be the reason.

Row spacing alone did not impact the number of tillers per plant. There was a small linear increase in the number of tillers with increasing N rate rising from 1.2 tillers per plant at 18 lbs. N to 1.6 tillers per plant at 142 lbs. N. The researchers indicated that this showed that the yield potential was not maximized by just the plant density, and the crop was continuing to respond to increasing rates of N through increased tillering.

In 2015, there was a quadratic increase in tiller number as the row spacing widened with the largest value of 2.3 tillers/plant occurring with a 12-inch row spacing. This was due to the plants tillering to compensate for a lower plant density in that year.

In each test year, there was a curvilinear increase in grain yield as the N rate increased. The largest increase occurred in 2014 when grain yield climbed from 38 to 64 bu/ac (2,569.8 to 4,273.3 kg/ha), while the smaller increase occurred in 2016, when grain yield increased from 41 to 52 bu/ac (2,781.3 to 3,518.5 kg/ha). Overall, grain yield increased by the greatest proportion each year when the N rate increased from 37 to 71 lbs. N/ac (40 to 80 kg N/ha).

In 2013, grain yield decreased as row spacing increased from 10 to 16 inches with the largest decrease occurring between 12 and 14 inches, when grain yield dropped from 70 to 58 bu/ac (4,705.8 to 3,900.0 kg/ha). This indicates that as row space increased in this drier than normal year, other yield components such as increased tillering could not compensate for the lower plant densities that occurred in 2013. In the other years, row spacing did not have a significant impact on yield.

This yield decrease in 2013 demonstrates a 25% probability of a negative response to wider row spacing, though the limitations of just 4 site- years of data create uncertainty about a negative response to increasing row spacing. Due to the sizable impact on economic returns, a 25% probability of a yield decrease is cause for concern.

There was no interaction between row spacing and N rate on yield.

Nitrogen rate, year, and the interaction between N rate × year affected test weight, although the affects were small, and row spacing alone did not effect test weight.

In conclusion, wider row spacings beyond 12 inches are feasible, although there was an increased risk of loss of yield in abnormally dry years as row space increased. Producers need to weigh the risk of a potential yield decrease against the cost savings derived by increasing the row spacing.

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