



MAXIMIZED SPACE

Rotational effects and optimized plant spatial arrangement
for wheat production in Manitoba



With seed an ever-costlier input for farmers, maximizing value for ideal density is an important variable that has not received much study or recognition in the past. Provincial recommendations for density are at least 25 years old and suggest 246 to 300 plants per metre square (plants/m²). Row spacing guidelines do not exist. Existing research speaks about density, but there is nothing about row spacing. Select scientific literature from the U.S. and Europe generally reference that not all wheat varieties respond the same to density and spacing recommendations. It's for this reason that Rob Gulden decided to look at both factors as influences on wheat production in the province.

Gulden's project lasted four years (2016–2020) and focused on two well-known CWRS varieties, AAC Brandon and Cardale, which yield 70 and 68 bu/ac, respectively. Both varieties are 101 days to maturity with comparable disease packages, including MR ratings to Fusarium head blight.

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Lead Researcher:

**Robert
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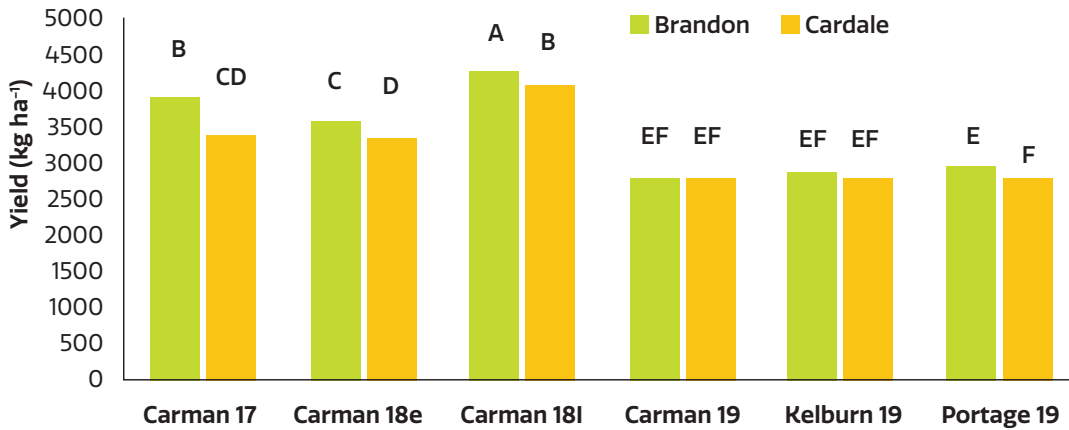
Researcher bio: Rob

Gulden joined the University of Manitoba in 2007. His lab investigates weed and crop ecology and management. He grew up on family farms in Europe and Manitoba and received his post-graduate education at the universities of Manitoba, Saskatchewan and Guelph. Gulden's areas of expertise include agronomy, applied crop and weed ecology and biostatistics.

Collaborators: Manitoba Crop Diversification Centre at Portage la Prairie and Richardson International's Kelburn Farm



GRAPH A | SITE PERFORMANCE



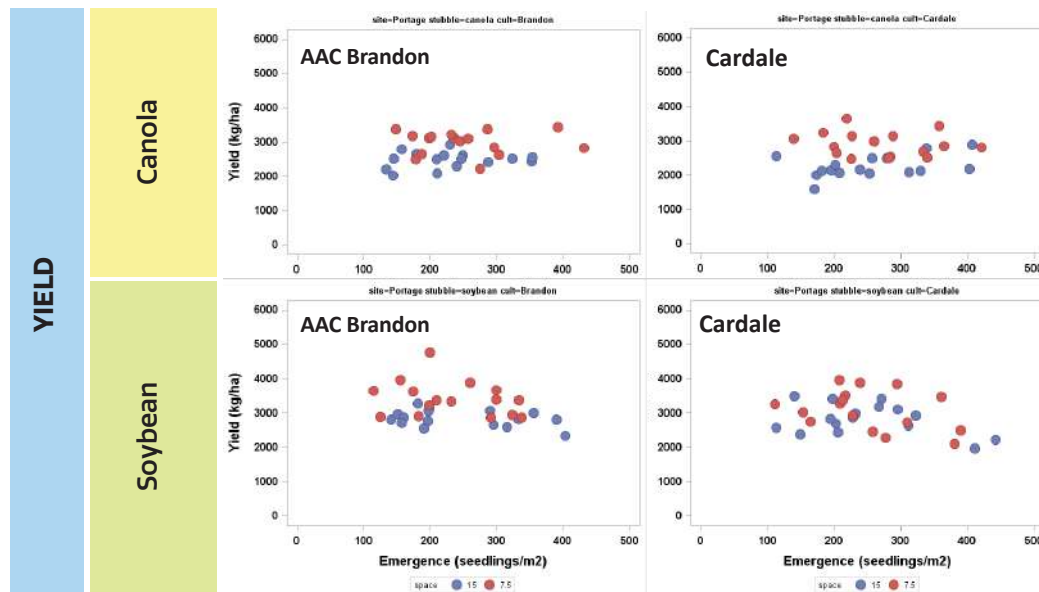
The research below details findings for the first three years, which occurred at Carman (2017-19), Kelburn (2019) and Portage la Prairie (2018-19). All six site years experienced drought conditions.

Gulden tested three different spacings: 3.75-inch, 7.5-inch and 15-inch. In addition, each variety was seeded at 200, 300, 400 or 500 seeds per metre square (seeds/m²) into either canola or soybean stubble. He was interested to know if the plant density would affect the crop's overall canopy, weed competitiveness and general yield based on spacing.

At every site year, AAC Brandon equalled or outperformed Cardale (Graph A).

It was clear, overall, both varieties produced the best at 7.5-inch row spacing every time. Cardale had optimum results between 200 and 400 seeds/m² (Graph B) while AAC Brandon performed best on 400-500 seeds/m² (Graph B). Stubble type did not always affect the results, but when it did both cultivars yielded better on soybean stubble. Gulden says the difference, at most, has been no more than a few hundred kilograms per hectare, about 10 per cent. At 3.75-inch spacing, row closure occurred, on average.

GRAPH B | VARIETY PERFORMANCE AND YIELD





ON YOUR FARM

Multiple benefits from density, spacing results for farmers

Manitoba farmers have plenty of reasons to be pleased with ongoing research aimed to drive the most efficient returns on investment for both row spacing and seeding densities.

Research by Rob Gulden shows 7.5-inch row spacing is optimal as compared to 15-inch, encouraging news for farmers. For one, it demonstrates that the 7.5-inch row spacing means less room for weeds to emerge due to how fast the canopy closes post-emergence. Row closure is delayed or may not achieve 100 per cent on wider spacing. From a competition standpoint, more rapid row closure is a positive for the wheat plants.

In addition, the density curve of Gulden's research is fairly flat, meaning there is no detriment for farmers to increase seed rates as a possible option to alleviate weed issues, such as wild oat. Certain wild oat populations now have no Group 1 or 2 herbicide options, so the increased rates are a natural convention to fight against weeds and delay herbicide application for as long as possible to maintain efficacy of limited available chemistries.

On 15-inch row spacing, farmers may face common weed issues such as green fox tail, which won't be able to compete well with a large second flush during the growing season. And while a late flush of green foxtail may have little impact on yield, it could spell issues in subsequent years if the weed seed bank has time to replenish itself. Similarly, increased plant densities offer some yield protection against grasshoppers, cutworms or other abiotic and biological stressors.

Research also demonstrates that in the 7.5-inch spacing there appears to be virtually no issues with lodging, either. So, while plant stands are becoming more robust, current varieties continue to perform well enough when it comes to fighting lodging at 7.5-inch and even 15-inch intervals.

Such research will be able to make more informed choices regarding seed drills, as well. With provincial research on this subject only emerging, farmers have to make educated guesses and what ideal seeding equipment may look like for them, specifically with row spacing.

"'Narrower is better' certainly seems to be the truth in terms of maximizing yield per unit acre," says Gulden.

By giving plants a more balanced, informed start in the month of May, it has the possibility to give farmers greater crop uniformity for improved harvestability and decreases general anxiety farmers may face throughout the growing season.

"A well-established crop can do a lot for itself. Taking some of that risk and worry away right from the get-go and minimizing that, it is good from a whole suite of perspectives, including producers' mental health and their stress loads." ●

