

**Project Title:**

2023 Testing Five Elite Spring Wheat Varieties with Reduced Nitrogen Application and Planting Density

Objective:

To assess the effects of reducing inputs on end-use quality and yield performance

Personnel:

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Summary:

This study was laid out in a split-split-plot design replicated three times where the main plot was nitrogen (N) treatments. The subplot was the five elite spring wheat varieties (Vida, Dagmar, Egan, MT Sidney, SY Ingmar). The sub-subplot was seeding rates (24, 18, 12 live seeds/ft²) randomly arranged within each variety. For this study, N treatments were the control (no added N), 150 lbs total N (residual + added Urea), and 200 lbs total N (residual + added Urea). This study is under rainfed conditions; see Table 1 for management information.

For this year, no significant yield differences with the N treatment levels were observed. Yields with seeding rate indicated that yields between 18 and 24 live seeds/ft² are the same, except MT Sidney (Figure 1). Thus, one can save seed technology costs by reducing seed input (Table 2), especially during drier conditions. The reduced seeding rate increased the number of productive tillers (Figure 2).

The highest N rate also had the highest grain protein (Figure 3). The lowest seeding rate had higher protein, as it also had lower yield (Figures 3, 1). As expected, Egan had the highest protein whereas Vida, the lowest (Figure 3). The other concern during a dry year is low test weight. For this study, Egan showed the lowest test weight whereas Dagmar and SY Ingmar were both superior (greater than 60 lbs/bu). Seeding rate 18 and 24 live seeds/ft² had superior test weights (Figure 4).



Table 1. Management Information, Creston, MT

Seeding date:	4/19/2023 (Julian 109)	Field Location:	R7
Seeding rate:	Various by TRT	Harvest date:	8/11/2023 (Julian 223)
Previous crop:	Alfalfa	Soil type:	Flathead fine sandy loam
Herbicide:	CleansweepM, Axial Bold	Tillage:	conventional
Insecticide:	N/A	Soil residual nutrient (NO₃-, P, K lb/A):	110.5-10-116 (Fall, 2022)
Fungicide:	Headline	Nutrient fertilizer applied (N, P₂O₅, K₂O lb/A):	Various by TRT (Spring, 2023)

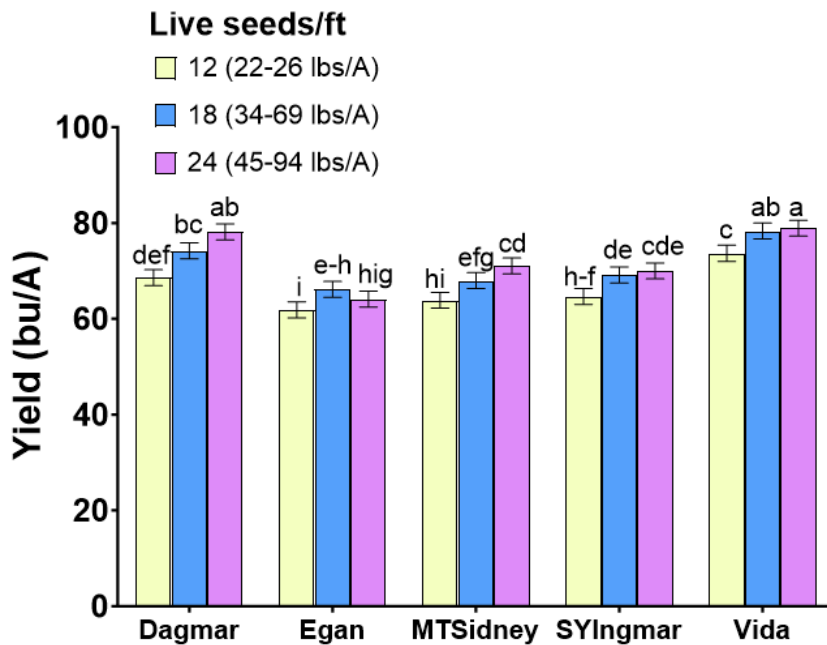


Figure 1. Significant interaction between seeding rate and varieties. The same letter assignment denotes an insignificant difference within a variety at $\alpha = 0.05$.

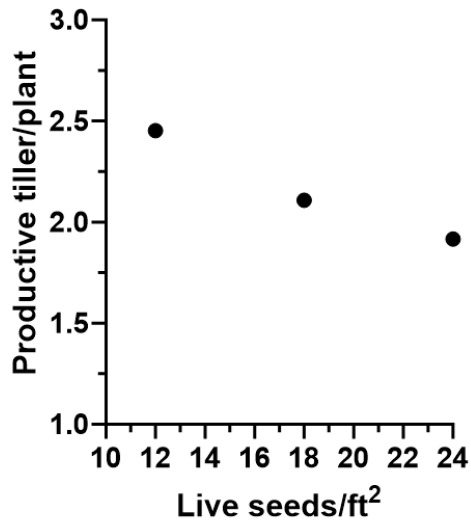


Figure 2. Reduced seeding rate increased productive tillers.

Table 2. Seed size (g per 1000 seeds) and resulting seeds to plant at varied seeding rate/ft².

Varieties	1000 Seeds (g)	-----lbs/acre-----		
		24 seeds/ft ²	18 seeds/ft ²	12 seeds/ft ²
Dagmar	38.9	92	69	46
MT Sidney	19.1	45	34	22
Egan	40.3	94	70	47
Vida	33.6	80	60	40
SY Ingmar	32.5	80	60	40

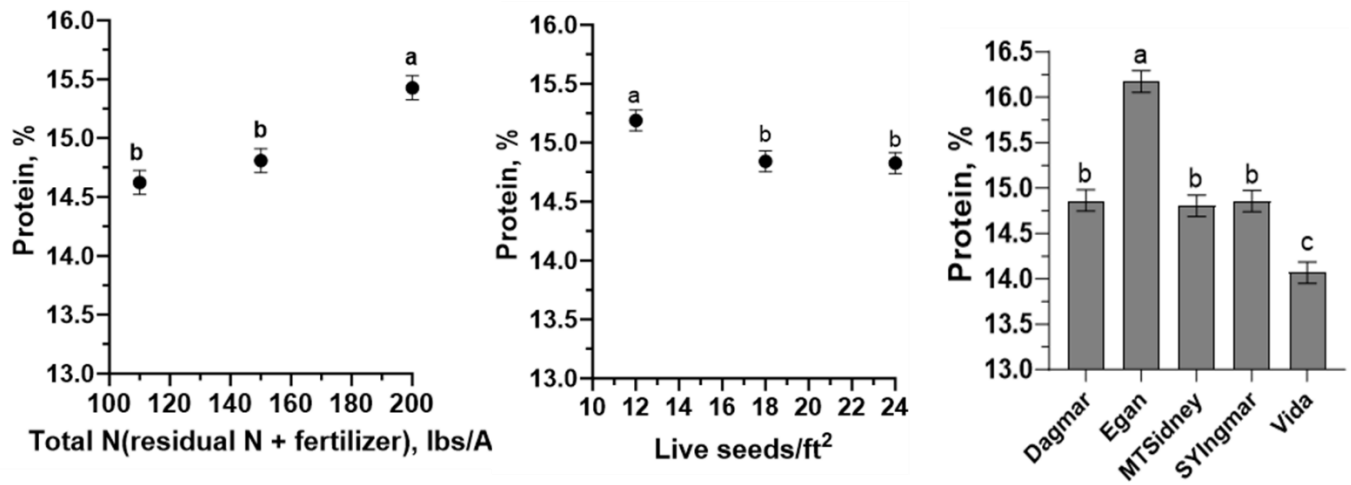


Figure 3. Grain protein responses with nitrogen (left), seeding rate (middle), and variety (right). The same letter assignment denotes an insignificant difference at $\alpha = 0.05$.

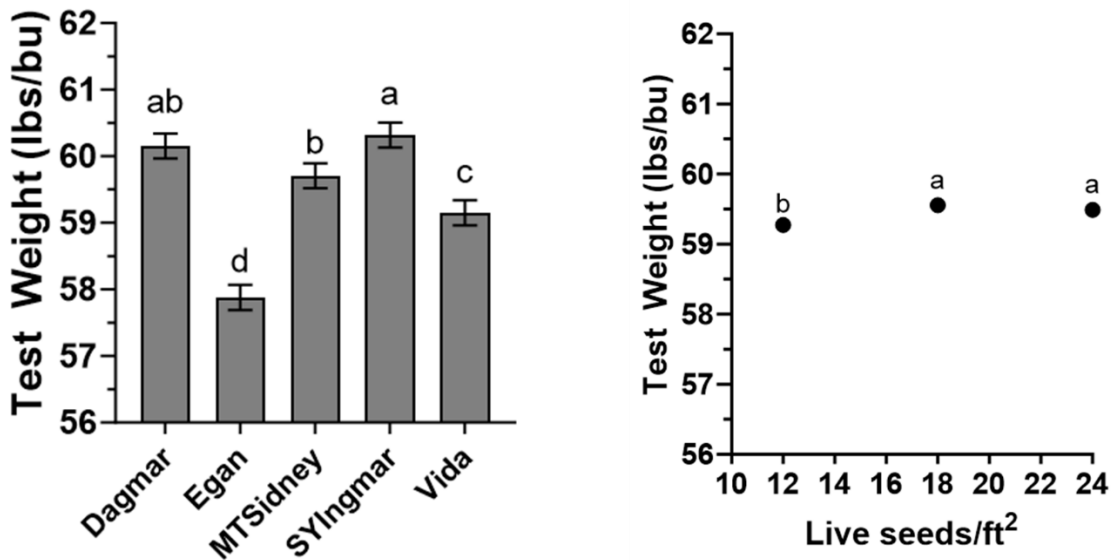


Figure 4. Test weight per variety (left) and seeding rate (right). The same letter assignment denotes an insignificant difference at $\alpha = 0.05$.