

Optimizing Barley Fertility

Increasing applied fertilizer rates can increase barley yield and quality. Prairie soils are often deficient in nitrogen (N) and phosphorus (P), and may also be deficient in potassium (K), sulphur (S), or micronutrients. Depending on the environment, genetics, and other management practices within the production system, increasing fertilizer rates may result in differing economic returns for each farm.

Objective:

Fine-tuning barley fertility rates with specific management to optimize economic yields.

Project Overview:

Cooperators will implement a replicated field-scale trial in a barley field of their choice, using their own equipment and otherwise normal practices. An agronomist/trial manager will provide support throughout the season, including setting up the trial and collecting data. A report with your results, including statistical and economic analysis will be provided. Data from all on-farm trials will also be pooled to examine the results across different management, soil, and weather conditions. Results from all trials will be publicly available, however individual farm data will be kept anonymous, apart from the location of the trial (nearest town or R.M.). Collaborators will be invited to join a network of producers who are conducting on-farm research through field tours and a year-end result meeting and banquet. This program is only available to registered barley producers in Saskatchewan.

Treatments (with example targets included):

- 1) Reduced Rate (25% lower than normal available nitrogen)
- 2) Normal Rate (Soil-test recommended nitrogen rate based on yield goal)
- 3) Enhanced Rate: (25% higher than normal available nitrogen)
- 4) *Optional*: Variable Rate (Soil-test recommended rates based on separate management zones)

Three required fertility treatments and an optional treatment will be compared. The producer and agronomist will calculate their rates based on soil tests. They will then seed a reduced, normal and enhanced Nitrogen rate. The rates must be adjusted to be a minimum of 10% higher or lower than available fertility. For example, if soil test nitrogen is 40 lbs/ac, and applied N is 60 lbs, the minimum rate adjustment would be 10 lbs/ac). All fertilizer must be applied by the same methods for each treatment (i.e. same equipment, source, timing, and placement). Treatments will be replicated four times, for a total of 12 strips. Apart from fertilizer rates, all strips must be managed the same agronomically including seeding rate, seeding date, variety, seeding depth and pesticide application. Variable seeding rates may be used, as long the trial area is done in a representative area of the field. Treatments will be randomly arranged within blocks in the field. The location of the treatment strips will be marked with GPS and by placing tall flags in the field at time of seeding. An example randomized field plan is shown below. Individual plot layouts will be provided.

Rep	1				2				3				4			
Plot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TRT	1	3	2	4	1	4	3	2	1	2	4	3	1	2	3	4
Treatment Description	Reduced	Enhanced	Normal	Variable	Reduced	Variable	Enhanced	Normal	Reduced	Normal	Variable	Enhanced	Reduced	Normal	Enhanced	Variable

Data Collection:

Agronomists or trial managers will ensure that the cooperator seeds the trial according to the protocol and will complete the following in-season data collection. A data collection spreadsheet will be provided and must be used to submit all data.

1. Spring soil samples will be collected at each trial site prior to seeding and fertilizer application to assess residual soil nutrient levels (regardless of whether soil sampling was previously completed). Trial site managers will collect a minimum of 12 soil cores throughout the trial area, separated by 0-6" and 6-24" depths. A single composite sample for each depth will be submitted directly to AgVise Laboratories for Test F2. Shipping and Purolator information will be provided.
2. Plant density will be assessed at the 2-4 leaf stage. A minimum of 8 counts will be conducted in each treatment strip. Optionally, plant counts can be done separately by field position within treatments (hilltop, midslope, depression).
3. Height will be assessed on each treatment strip separately at the soft dough to late dough stage. A minimum of 20 plants will be measured in 4 different locations in each treatment strip.
4. Lodging will be assessed on each treatment strip separately at the soft dough to late dough stage. A visual rating should be representative of the plot. Where differences occur throughout the plot, take separate ratings.
5. The trial should be visited regularly to collect notes, observations, and/or photos describing visual treatment differences in flowering, maturity, disease pressure and plant health. NDVI imagery at key growth stage(s) would also be an asset. Photos and updates should be provided to the protocol lead throughout the season.
6. Yield will be determined separately for each treatment strip using a weigh wagon or calibrated grain cart scale. Cooperators will communicate with trial managers regarding the harvest date.
7. Grain samples (approximately 1 kg, bags will be provided) will be collected separately for each treatment strip for quality analysis (12 samples). Shipping information will be provided.
8. The following management and agronomic data will be recorded precisely:
 - a. Applied fertilizer rates for each treatment
 - b. Fertilizer products/blends, placement, timing
 - c. Variety and seeding rate
 - d. Crop protection: seed treatment, pesticide applications
 - e. Equipment type, openers, row spacing, seeding depth, seeding speed
 - f. Previous crop and residue accumulation
 - g. Soil moisture conditions at seeding time
 - h. General notes on weed, insect, disease infestations, and notable weather events
9. Daily precipitation will be recorded using a weather station positioned at or within 0.5 miles of the trial site. If a weather station is not available, a rain gauge can be provided. Daily average temperature will be recorded from a weather station within 25 km of the trial site or the nearest Environment Canada station. Precipitation and temperature should be recorded from May 1 to August 31, regardless of the seeding and harvest dates.

For more information or to participate in the program contact:

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