Optimizing Oat Yield, Quality and Standability in Central Alberta

New PGRs for Oat Reduction in Lodging

Linda Hall, University of Alberta
Joseph Aidoo, University of Alberta
Sheri Strydhorst, Alberta Agriculture and Forestry
Bill May, Agriculture and Agri-Food Canada, Swift Current
Background

- Morgan is the variety that is grown most widely
- Growers are able to increase yield through increased N
- Alberta oat is not widely sold into the milling market
- Is there a better variety for central Alberta?
- Lodging in wet years when higher nitrogen rates are being used can be a concern
Experiment 1 (Variety response to nitrogen)

• A field experiment was conducted from 2014 to 2016 at two locations; Barrhead and St. Albert

• Oat cultivars
  • AC Morgan
  • CDC Morrison
  • Stride
  • CDC Norseman
  • CDC Sea Biscuit

• Nitrogen at 5, 50, 100, 150 N kg ha\(^{-1}\)

• The experiment was designed as a factorial, and randomized in a complete block with four replicates.

Measured

• Quality parameters
  • Test weight
  • % Thins
  • β-glucan

• Lodging and height
• Yield
Significant differences between varieties in yield potential and increase with N rate

- Optimal nitrogen rates at approximately 100 kg ha\(^{-1}\) added nitrogen
- Morgan has highest yield, followed by Norseman and Sea biscuit
- Morrison (high B-glucan has the lowest yield)
Quality parameters of five cultivars at varying nitrogen levels

- Thousand kernel weight (g)
- Test weight (kg hl\(^{-1}\))

![Graph showing thousand kernel weight and test weight against nitrogen rate (kg ha\(^{-1}\)) for five cultivars.](image)
Kernel plumpness and $B$-glucan content in 5 cultivars with variable nitrogen
Height and lodging of 5 cultivars to varying nitrogen levels
Take Home

• Optimal nitrogen rates at approximately 100 kg ha\(^{-1}\) added nitrogen
• Morgan is out performing most varieties in yield and quality, with the exception of \(\beta\)-glucan content
• Inverse relationship between yield and quality parameters
• Quality parameters – variable with buyers

Canadian Oats
• Bushel weight – 43.3 lb bu\(^{-1}\)
• Thins Max 7%
• Plumpness Min 70%

• Test weight – 48.6 Kg hl\(^{-1}\)
• Thins 2%
• \(\beta\)-glucan 4.5%
Experiment 2. Use of PGR on oats

- Determine the influence of plant growth regulator application and nitrogen fertilization on oat yield and lodging.

- A field experiment was conducted from 2014 to 2016 at three locations; Barrhead, St. Albert and Indian Head
- PGR at 0, 70, 100, 130 g ha
- cv Stride
- Nitrogen at 5, 50, 100, 150 N kg ha
- Randomized complete block with four replicates.

Measured
- Quality parameters
  - Test weight
  - % Thins
  - B-glucan
- Lodging and height
- Yield
Height of Stride oat with nitrogen and PGRs at different rates

Increased N and water makes crops taller.
Time of lodging – early lodging much more damaging to yield
Grain yield of Stride oat with nitrogen and PGRs at different rates
Lodging at maturity of Stride oat with nitrogen and PGRs at different rates
Consistent reduction in height at our single location with PGR
Trend to increases in seed yield – but only one site year of data
Lodging (1=upright, 5=flat)

Heights at Maturity (cm)

- Sprayed early:
  - 103.10
  - 95.75
  - 89.00
  - 68.30
  - 93.95
  - 79.45

- Sprayed late:
  - 79.45
  - 59.85

- Early and Late:
  - 88.10
  - 73.55
  - 71.90
  - 71.70

Early 3.1
Late 3.4
PGR’s - Preliminary conclusions

- PRGs are not currently registered for use on oats
  - Both are affective
  - But timing may differ (stay tuned)
- Not all varieties benefit from PGR’s (stay tuned)
- PGRs work to decrease height, lodging and may increase yields, under wet conditions with abundant nitrogen
- PGRs are not useful every year
Thank you for the feedback throughout the year