# OATS, PGRS, SEEDING RATES AND THEIR INTERACTIONS ON LODGING AND SHATTERING

Oats are an important crop whose acreage in the prairies has increased in recent years as a result of breeding efforts resulting in high-yielding varieties. Several agronomic projects in the past have determined the relationship between seeding rates, dates, and wild oat suppression, the relationship between caryopsis sizes, seedling vigor, and competition with wild oats. A recent report from a one-year trial in Saskatchewan indicated that plant growth regulators (PGRs) had a significant effect on agronomic parameters in tall and short oat varieties. Increased seeding rates are associated with better weed competition and increased yields. However, there is an optimum seeding rate for oats after which there are no benefits. For new oat varieties, the jury is still out on whether the current standard seeding rate is optimum. Oat yields and quality are affected by lodging and shattering, both of which pose a challenge for producers. PGRs used to address lodging were proven effective. However, how PGRs interact with seeding rates and their effects on shattering is unknown. While there is a genetic component to shattering, a study in China has attributed shattering to palea and lemma morphological polymorphism in naked oat varieties. Management and environmental conditions are also huge contributing factors to shattering in addition to genetics.

This project aims to explore the interaction between plant growth regulators (PGRs), specifically Moddus® and Manipulator®, and increased oat seeding rates, as well as their impact on shattering across different prairie locations, both under normal field conditions and drought conditions in a greenhouse setting.

The 2024 season marked the first year of the project, and this report presents the findings from the GRO site. **It is important to note that data from a single site and year is generally not sufficient to draw scientific conclusions.**

**Agronomics:**

Seeding Date: May 15, 2024
Seeding Depth: 1 inch
Seeding Rate: 300 plants/$m^2$ ; 400 plants/$m^2$
Fertilizer:
- Fall applied by producer: 46-0-0 (coated with Neon Air) @ 163.04 lbs/ac = 75 lbs/ac actual N
- Spring applied:
  - side banded: 15.6-3.3-27.4-6.9 @ 218.81 lbs/ac = 34.1 lbs.ac actual N; 7.2 lbs/ac actual P; 60.0 lbs/ac actual K; 15.0 lbs/ac actual S
  - seed placed: 11-52-0 @ 53.5 lbs/ac = 5.9 lbs/ac actual N; 27,8 lbs/ac actual P

Pesticide:
- MCPA Ester 600 + Pardner @ 320 mL/ac on June 10
- Prestige A+B @ 710 mL/ac + 600 mL/ac on June 24

PGR Application @ GS 31-32
- Manipulator @ 930 mL/ac on July 11
- Moddus @ 340 mL/ac on July 11

Rainfall: recorded from May 1 - September 15: 221.2 mm
Harvest Date: September 20, 2024

**Results and Discussion:**

A linear mixed-effects model formula has been used for analyzing data, specifically for predicting yield based on various factors (PGR, Seeding Rate, Variety) and their interactions (PGR*Seeding Rate, PGR*Variety, Seeding Rate*Variety).

Regarding Yield, both PGR and Variety exhibited significant effects, whereas Seeding Rate did not. Plots treated with PGR showed higher yields compared to the control, with no significant differences observed among different types of PGR. Among the varieties, Morgan and Camden yielded higher, while Summit showed lower yields.

# OATS & PGRS CONT'D

For Days to Maturity (DTM), all factors—PGR, Variety, and Seeding Rate—had individual significant effects, though their interactions did not show significance. In contrast, for Days to Flowering (DTF), only Variety showed significance, indicating that PGR and Seeding Rate did not affect flowering significantly.

The number of tillers was significantly influenced by the Seeding Rate, with plots having fewer plants showing more tillers. Lodging was significantly affected by both PGR and Variety, while the Seeding Rate did not show a significant effect. Plots treated with Manipulator exhibited less lodging compared to the control and Moddus. Among varieties, AAC Morgan had the least lodging, whereas AC Summit had the highest.

Similarly, both PGR and Variety significantly affected Plant Height, with Manipulator-treated plots being shorter than controls. Among varieties, AC Summit was the shortest, while Arborg was the tallest. Thousand Kernel Weight (TKW) showed significance only among Varieties, while other factors did not. Plant count measurements were highly significant with the Seeding Rate.

This analysis underscores the differential impacts of PGR, Seeding Rate, and Variety on various agronomic traits, highlighting their potential for optimizing crop yield and plant characteristics in agricultural practices.

| Source of variation | Yield (kg/ha) | TKW | DTM | DTF | Tillers | Plant counts | Lodging | Plant height (cm) |
|---|---|---|---|---|---|---|---|---|
| | Pr(>F) | Pr(>F) | Pr(>F) | Pr(>F) | Pr(>F) | Pr(>F) | Pr(>F) | Pr(>F) |
| **PGR** | 0.001** | ns | 0.0001*** | ns | ns | na | 0.001** | 0.0001*** |
| **Seeding Rate** | ns | ns | 0.001** | ns | 0.001** | 0.0001** | ns | ns |
| **Variety** | 0.0001*** | 0.0001*** | 0.001** | 0.001* | ns | ns | 0.0001*** | 0.0001*** |
| **PGR & Seeding Rate** | ns | ns | ns | ns | ns | ns | ns | ns |
| **PGR & Variety** | ns | ns | ns | ns | ns | na | 0.0001*** | ns |
| **Seeding Rate &Variety** | ns | ns | ns | ns | ns | ns | ns | ns |

*Table1 : Analysis of variance of treatments imposed during the experiment*

| **PGR** | **Yield (kg/ha)** | **Plant Height (cm)** | **DTM** | **DTF** | **Tillers** | **Plant counts** | **Lodging** | **TKW** |
|---|---|---|---|---|---|---|---|---|
| Manipulator | 6753 a | 79.3 a | 102 b | 64.1 a | 1.08 a | 227 b | 1.81 a | 43.9 a |
| Control | 6564 b | | 101 a | 63.8 a | 1.08 a | 220 b | 2.59 b | 43.4 a |
| Moddus | 6775 a | 80.8 b | 101 a | 63.9 a | 1.07 a | 240 a | 2.25 b | 44.0 a |
| **Seeding Rate** | **Yield (kg/ha)** | **Plant Height (cm)** | **DTM** | **DTF** | **Tillers** | **Plant counts** | **Lodging** | **TKW** |
| 400 | 6663 a | 81.9 a | 101 a | 64.0 a | 1.03 a | 249 a | 2.42 b | 43.6 a |
| 300 | 6732 a | 82.6 a | 102 b | 63.9 a | 1.12 b | 209 b | 2.02 a | 43.8 a |
| **Variety** | **Yield (kg/ha)** | **Plant Height (cm)** | **DTM** | **DTF** | **Tillers** | **Plant counts** | **Lodging** | **TKW** |
| AC Summit | 5847 c | 79.0 a | 102 bc | 63.5 a | 1.08 a | 232 a | 5.33 b | 41.2 c |
| CS Camden | 7057 a | 80.0 a | 101 ab | 64.3 b | 1.07 a | 234 a | 1.08 a | 43.5 bc |
| CDC Arborg | 6791 b | 87.7 c | 100 a | 63.9 ab | 1.08 a | 227 a | 1.42 a | 44.6 b |
| AAC Morgan | 7094 a | 82.2 b | 102 c | 64 ab | 1.08 a | 222 a | 1.04 a | 45.6 a |

*Values with the same letter do not differ significantly*

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