

# **Do Plant Growth Regulators (PGRs) Promote Better Winter** Survival in Canola?

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### Introduction:

Winter canola (*Brassica napus* L.) has shown good potential for production in the Pacific Northwest region of the United States. Typically sown on summer fallow, it offers higher yields than spring canola. However, winter survival is a major concern, especially when the crop is sown during midsummer to take advantage of seed zone soil moisture that is available then. Such early seeding appears to reduce winter survival due to excessive vegetative growth and moisture stress entering winter. The adoption of management practices that contribute to improving winter survival provides farmers a way to minimize yield loss. In this study, we explored the possibility of improving winter survival with the application of plant growth regulators (PGRs).

#### **Results:**

Good plant stands were achieved throughout the trial, but the winter of 2020-2021 was relatively mild, and no winter damage was observed that year. In the 2019-2020 trial, prohexadione and metconazole visibly reduced summer growth (Table 2). Both of those PGRs resulted in more compact plants (Figure 2) that appeared to be less moisture stressed and also showed better winter survival (Table 2).

**Table 2.** Performance of winter canola with 4 PGR treatments averaged over 3 rates of each PGR during

 the 2019-2020 and the 2020-2021 cropping seasons.

PGR	Growth Reduction	Drought Tolerance	Winter Survival	Growth Reduction	Mean Growth			
	2020	2020	2020	2021	Reduction			
	1-9 score	1-9 score	1-9 score	1-9 score	1-9 score			
Prohexadione	4.1 <sup>a*</sup>	7.1 <sup>a*</sup>	8.1 <sup>a*</sup>	1.80 <sup>a*</sup>	2.9 <sup>a*</sup>			
Metconazole	1.7 <sup>b</sup>	5.2 b	7.8 b	1.75 a	1.7 <sup>b</sup>			
Paclobutrazol	1.4 <sup>bc</sup>	<b>4.8</b> <sup>c</sup>	7.5 bc	1.40 ab	1.4 <sup>c</sup>			
No PGR	1.2 <sup>c</sup>	<b>4.8</b> <sup>c</sup>	<b>7.1</b> <sup>c</sup>	1.25 <sup>b</sup>	1.2 <sup>c</sup>			
LSD (p=0.05)	0.3	0.3	0.3	0.41	0.3			
* Means within columns with different superscript letters are significantly different (P<0.05)								



**Figure 1.** A) Severe winter damage in canola. B) Winter damage in early-seeded winter canola.

#### **Objectives:**

The objectives of this study were:

- To assess if PGRs can increase winter survival in early-seeded winter canola.
- To assess if different PGRs are equally effective in promoting winter survival.

#### **Materials and Methods:**

- Field studies were done in 2019-2020 and 2020-2021 at the University of Idaho Research Farm at Moscow, Idaho, in conventional summer fallow.
- Winter canola cultivars: 'Amanda', 'Mercedes', and 'CP320W RR'.
- PGRs: prohexadione (Apogee<sup>®</sup>), paclobutrazol (Bonzi<sup>®</sup>), and metconazole (Quash<sup>®</sup> fungicide), at 4 rates including a no-treatment control for each PGR.
- Planting Dates: July 8, 2019, and July 14, 2020, into good soil moisture.
- Each PGR was applied 32 days after seeding with a non-ionic surfactant (0.25% v/v in the final solution) and 1 pint/acre of urea ammonium nitrate. Growth reduction, drought tolerance and winter survival were scored, and flowering date, plant canopy height, seed yield, and seed oil content were recorded.

- Seed yield of winter canola was affected by PGR treatment in the 2019-2020 trial (Figure 3).
- Prohexadione and metconazole application contributed to increased seed yield.
- Seed yield followed a trend similar to the growth reduction scores.



#### 2020 2021

**Figure 3.** Performance of winter canola with 4 PGR treatments averaged over 3 rates of each PGR in 2020 and 2021.

**Table 1.** Rates of PGR active ingredients (a.i.) and products used to investigate growth suppression in winter canola during the 2020 and 2021 cropping seasons.

	PGR Rates					
	Metconazole		Paclobutrazol		Prohexadione	
Trial Treatments	a.i.	product*	a.i.	product <sup>+</sup>	a.i.	product <sup>‡</sup>
	OZ	./acre	oz./acre	fl.oz./acre	OZ.	/acre
No PGR (Control)	0	0	0	0	0	0
Rate 1	1.0	2.0	0.3	1.2	1.93	7
Rate 2	2.0	4.0	0.6	2.3	3.85	14
Rate 3	3.0	6.0	0.9	3.5	5.78	21

\* Quash, 50% active ingredient (a.i) by weight. +Bonzi, 2 lbs. a.i. per gallon. +Apogee, 27.5% a.i. by weight



Increased growth suppression with increasing application rate was observed for prohexadione (Table 3).

 

 Table 3.
 Performance of winter canola averaged over 2 years at 4 rates of prohexadione during the 2020

 and 2021 cropping seasons.

Prohexadione Rate	Growth Suppression	Drought Stress Tolerance	Winter Survival	Yield			
	1-9 score	1-9 score	1-9 score	lbs./acre			
Control	1.0 <sup>a*</sup>	<b>4.8</b> a*	6.7 <sup>a*</sup>	2,857 <sup>a*</sup>			
Rate 1	3.2 <sup>b</sup>	6.8 <sup>b</sup>	7.9 <sup>b</sup>	3,172 <sup>b</sup>			
Rate 2	4.3 <sup>c</sup>	7.0 bc	8.1 <sup>b</sup>	3,476 <sup>c</sup>			
Rate 3	<b>4.8</b> <sup>c</sup>	<b>7.5</b> <sup>c</sup>	8.3 b	3,387 <sup>bc</sup>			
LSD (p=0.05)	0.6	0.7	0.7	237			
* Means within columns with different superscript letters are significantly different (P<0.05)							

## **Conclusions:**

- The first year of this study showed positive results from PGR applications.
- The PGRs reduced the summer vegetative growth of early-seeded winter canola suggesting that this might have application in commercial canola production.
- Some PGRs may be more effective than others in suppressing growth and promoting drought tolerance and winter survival.

The results indicate that some PGRs are can be effective in suppressing summer growth in early-sown winter canola, which may have a positive impact on seed



Figure 2. A) Growth suppression was seen with prohexadione in September 2019 in the 2019-2020 trial. B) Little growth suppression was visible in September 2020 in the 2020-2021 trial.

yield especially when the crop faces harsh winters by improving winter survival.

Further studies are needed before any recommendations can be made.

