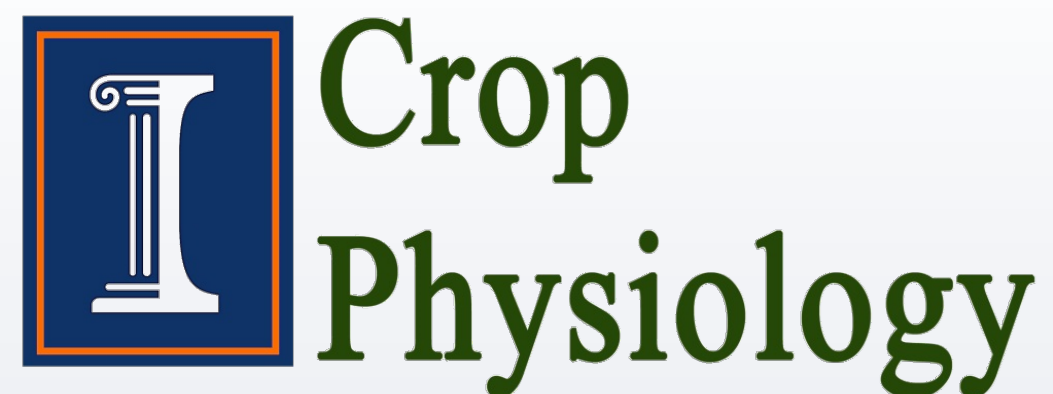


Can Strigolactone Relieve Stress and Increase Productivity of Corn?



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Question: Can strigolactone relieve population stress and increase corn grain yield?

Objective: Quantify differential responses in corn grain yield when strigolactone is used in standard and high planting densities.

Introduction:

- Increasing the planting population tends to decrease individual plant root volume, and may limit the plant's ability to absorb water and accumulate nutrients.
- Corn (*Zea mays* L.) yield is comprised of yield components including ear number area⁻¹, kernel number ear⁻¹, an individual kernel weight. Kernel number ear⁻¹ is affected by ovule potential, pollination, and the degree of kernel abortion.
- Strigolactones (SLs) and their derivatives have recently been defined as a new class of plant hormones. SLs are mediators of root responses under low nutrient conditions, and can induce lateral root formation and root hair elongation; potentially increasing early plant growth and subsequent ovule potential.
- SLs also work with abscisic acid to regulate stomatal function and mediate plant response to water stress. Corn is known to be sensitive to water stress during pollination, and as such SLs may help facilitate kernel development under stress and increase final kernel number ear⁻¹.
- The SL utilized in this study, AB-01, is a SL derivative developed by Asilomar Bio, Inc. which can be formulated as a seed treatment and/or as a foliar application.
- AB-01 applications were compared to a strobilurin fungicide, Headline AMP. Strobilurins are known to reduce oxidative stress, potentially reducing kernel abortion while increasing kernel weight.

Research Approach:

- A field evaluation was conducted during 2015 at Champaign, IL.
- Stone 6148 RIB was planted on 24 April 2015 with 202 kg N ha⁻¹ at both a standard (79,000 plants ha⁻¹) and a high planting density (108,600 plants ha⁻¹).
- AB-01 seed treatments were applied at a rate of 0.075 mg ai seed⁻¹.
- Foliar applications of AB-01 and Headline AMP were made using a backpack sprayer at application rates of 4.94 g ha⁻¹ and 1.05 L ha⁻¹, respectively at VT/R1.
- To quantify the effect of AB-01 on plant health, leaf greenness was measured at V5 and R2 growth stages with a Minolta SPAD-502 plus chlorophyll meter.
- 10 plants were measured from the ground to the tip of the tassel to quantify the effect of AB-01 on plant height.

Plant Growth Response:

- While none of the treatments significantly increased leaf greenness or plant height, there was a tendency for plants receiving the AB-01 seed treatment to be greener and taller at both plant populations (Table 1 and Figure 1).

Table 1. Effect of AB-01 treatments on leaf greenness at the V5 and R2 growth stages for plants grown at a normal (79,000 plants ha⁻¹) and a high (108,600 plants ha⁻¹) plant population.

Chemical Treatments	V5		R2	
	Plant Population (plants ha ⁻¹)			
	79,000	108,600	79,000	108,600
	SPAD Relative Units			
Untreated	40.0	40.2	50.9	51.8
AB-01 Seed Treatment (ST)	41.3	41.6	56.4	52.4
AB-01 Foliar Spray	—	—	53.1	50.7
AB-01 ST + Foliar Spray	—	—	54.3	51.3
Headline AMP	—	—	54.8	51.2
LSD ($\alpha=0.10$)	NS		NS	

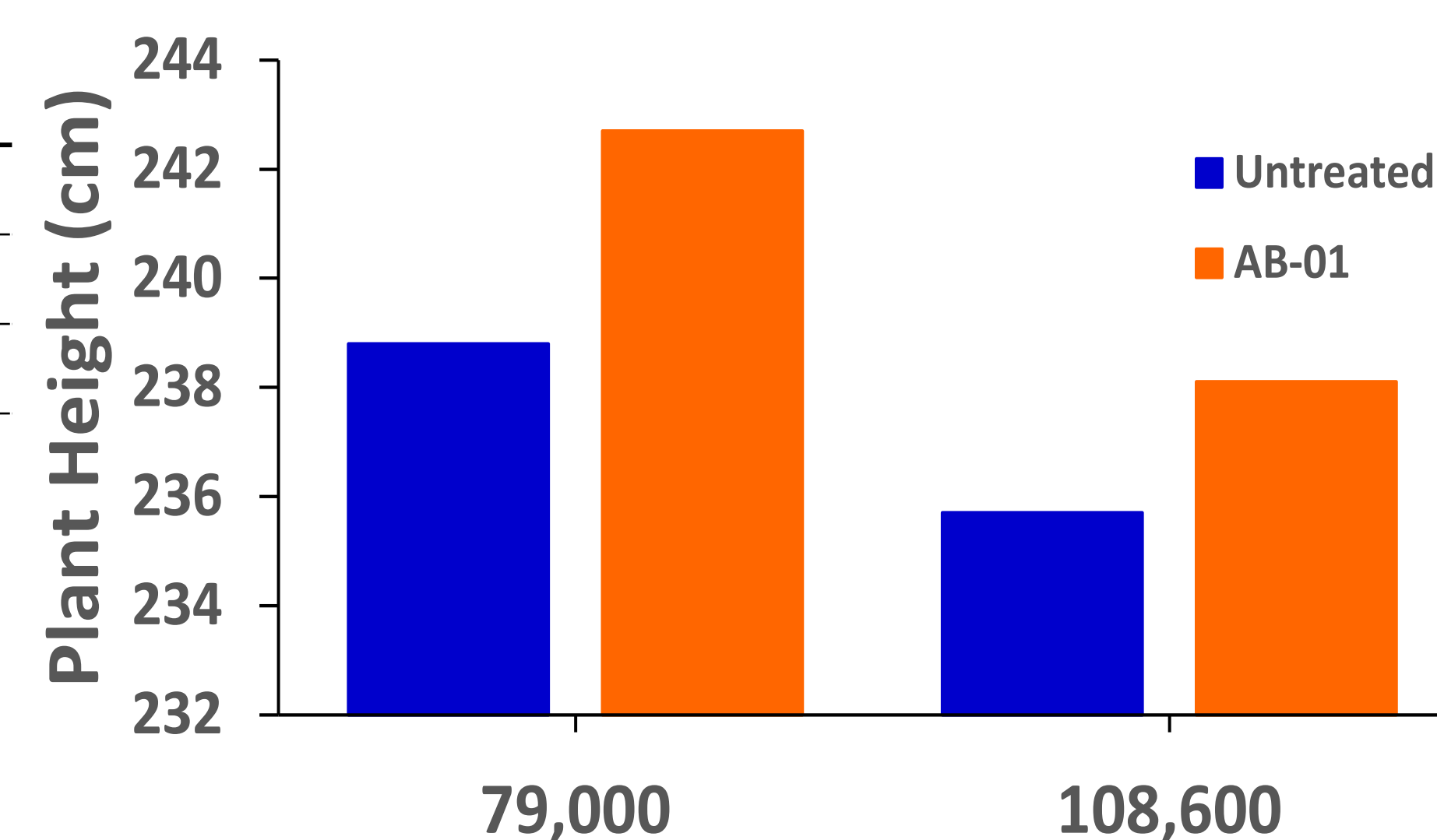


Figure 1. The effect of AB-01 seed treatment and plant population on the height of VT/R1 plants.

Yield Response:

- Although not statistically significant, there was a tendency for the AB-01 treatments to increase grain yield at the normal plant population, especially for plants that received the seed treatment (Table 2).
- Increasing the plant population from 79,000 to 108,600 plants ha⁻¹ did not negatively impact grain yield, which was probably due to the limited degree of environmental stress experienced during the 2015 growing season (Table 2).
- Although not significant at the individual plant populations, when averaged over plant population, Headline AMP increased yield by 7% over untreated plants (Table 2).

Table 2. Effect of plant population, AB-01, and Headline AMP applications on grain yield. Grain yield is presented at 0% moisture concentration.

Chemical Treatment	Plant Population (plants ha ⁻¹)		
	79,000	108,600	Average
	Mg ha ⁻¹		
Untreated	10.8	11.6	11.2
AB-01 Seed Treatment (ST)	11.8	11.6	11.7
AB-01 Foliar Spray	11.2	11.2	11.2
AB-01 ST + Foliar Spray	11.2	11.1	11.4
Headline AMP	11.7	12.3	12.0
LSD ($\alpha=0.10$)	NS	NS	0.56

Yield Component Response:

- None of the treatments affected emergence or final plant populations, or the individual kernel weights (data not shown).
- The yield increase from Headline AMP was the result of a greater number of kernels per unit land area (Figure 2).

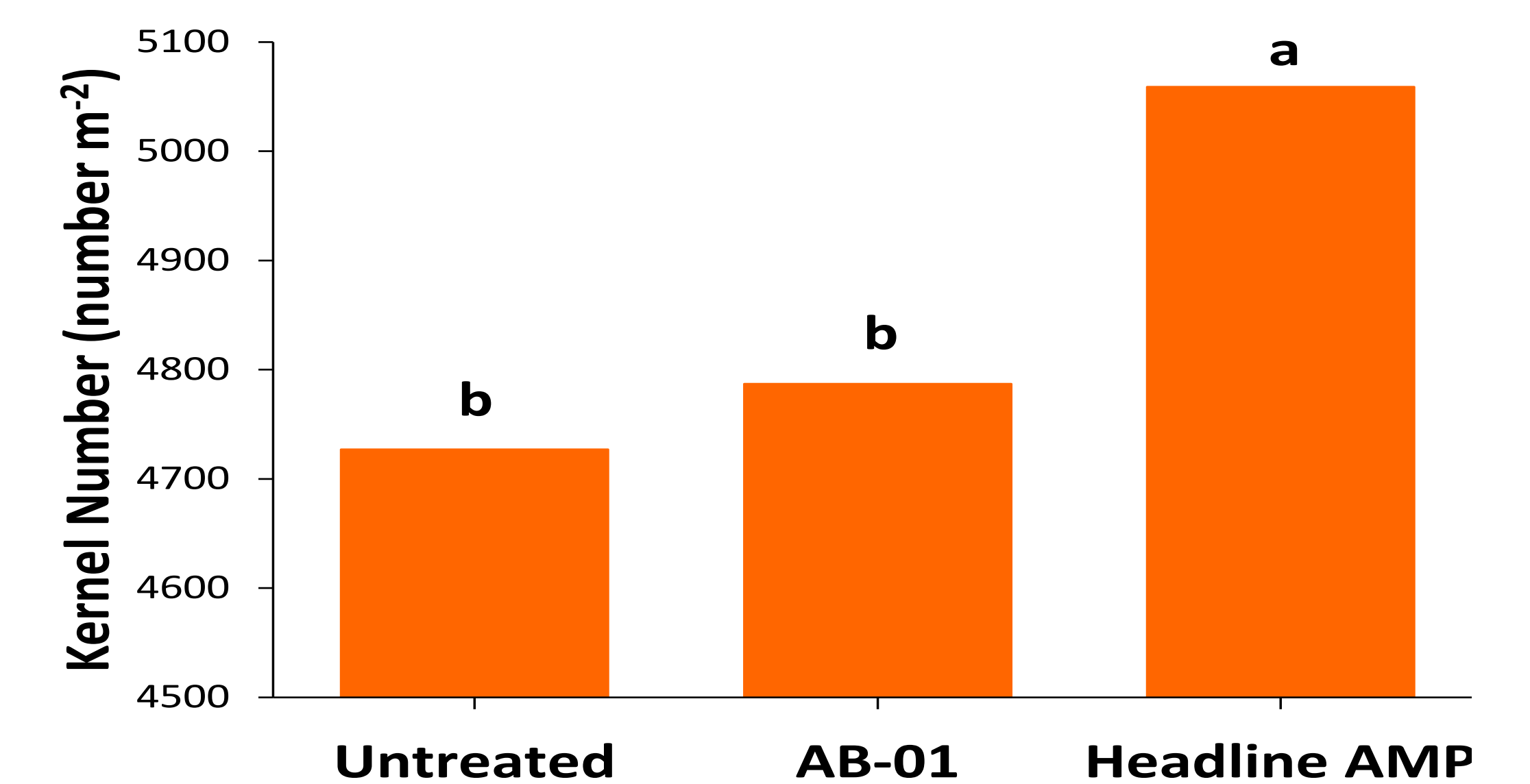


Figure 2. The effect of AB-01 and Headline AMP applications on kernel number. Values are averaged over the two planting populations. Different letters indicate significant differences between groups ($P \leq 0.1$).

Conclusions:

- AB-01 seed treatments had a tendency to produce greener and taller plants at both the standard and high planting densities, although it wasn't statically significant.
- AB-01 treatments did not impact grain yield at either the standard or the high planting densities, although there was tendency for the AB-01 treatments to increase yield at the standard planting density.
- Increasing the population to 108,600 plants ha⁻¹ did not negatively impact grain yield, possibly due to the record yield environment of the 2015 growing season.
- While there was no significant interaction with Headline AMP and individual planting densities; when averaged over densities, Headline AMP applications increased yield by 0.8 Mg ha⁻¹, which was directly related to an increase in kernels per unit land area.

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