

Impact on plant development and yield of various application timings of fomesafen and lactofen



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Introduction

As glyphosate resistance in multiple weed species continues to increase in prevalence, tank mix partners are being used to kill emerged glyphosate-resistant weeds in soybeans. The most common of these tank mix partners are protoporphyrinogen oxidase (PPO)-inhibiting herbicides.

- Applications are often made as rescue treatments during the reproductive phases
- Applying PPO-inhibiting herbicides during reproductive phases could have negative impacts on yield due to loss of flowers and early developing pods
- This study was conducted in a high yield environment with new genetics to provide representation of central Illinois soybean production

The objective of this experiment was to evaluate whole crop injury as a result of two PPO-inhibiting herbicides applied at five different timings in a high yielding environment.



Example of a weedy field near Champaign, IL

Methods

Field trials were conducted in a randomized complete block design with six replications at the BASF Midwest Research Farm in Seymour, Illinois. Plots were 3 by 12.2 meters seeded with Asgrow¹ 36X6 soybeans at 316,000 seeds/ha. Herbicides were applied using a backpack sprayer equipped with TeeJet AIXR02 nozzles² at 40 psi and a carrier volume of 140.3 L/ha.

- Treatments: lactofen and fomesafen applied at 210 and 329 g ai/ha, respectively
- All treatments included 1% v/v crop oil concentrate (COC)
- Application timings for all treatments were V3, V5, R1, R2, and R3
- Evaluations of crop injury and stunting were conducted 7, 14, and 28 days after treatment (DAT)
- At harvest, node and pod counts, seed weight, and yield data were collected

References

Hager, A. & Sprague, C. Postemergence Soybean Herbicide Injury: Is There a Yield Penalty? (2000). University of Illinois IPM Bulletin. Nayayanan KS. Macro- and microemulsion technology and trends. In: *Pesticide Formulation and Adjuvant Technology*. Foy CL, Pritchard DW, eds., Boca Raton, FL: CRC Press 1996:115–174.

¹Asgrow is a registered trademark of Monsanto Technology, LLC

²Spraying Systems, Co., Wheaton, IL

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Results



Figure 1. Visual stunting observed 21 DAT with lactofen (left) and fomesafen (right) at V3 application timing

Table 1. Phytotoxicity and crop stunting response of soybeans to lactofen and fomesafen applied at growth stages V3-R3^{1,2,3}

	Visual Injury (0-100%) 14 DAT			
	Crop injury		Crop stunting	
	Lactofen	Fomesafen	Lactofen	Fomesafen
V3	50.8b	24.2c	13.3a	7.5b
V5	55ab	45b	5.8bc	5.8bc
R1	28.3c	24.2c	1.7c	0c
R2	65a	32.5c	3.3bc	0c
R3	33.3c	18.3c	0.8c	0c

¹Plants were assessed 14 days after being sprayed with either lactofen or fomesafen at 210 and 329 g ai/ha, respectively. Data are an average of six replications

²Values with the same letters are not significantly different at P≤0.05

³Injury rating scale 0-100%, 0%=normal growth, 100%=plant death

- Although initial crop injury and stunting were severe, symptoms were reduced over time as plants continued to grow and develop
- Yield, seed weight, and pod count data were not significantly different for any treatment or application timing

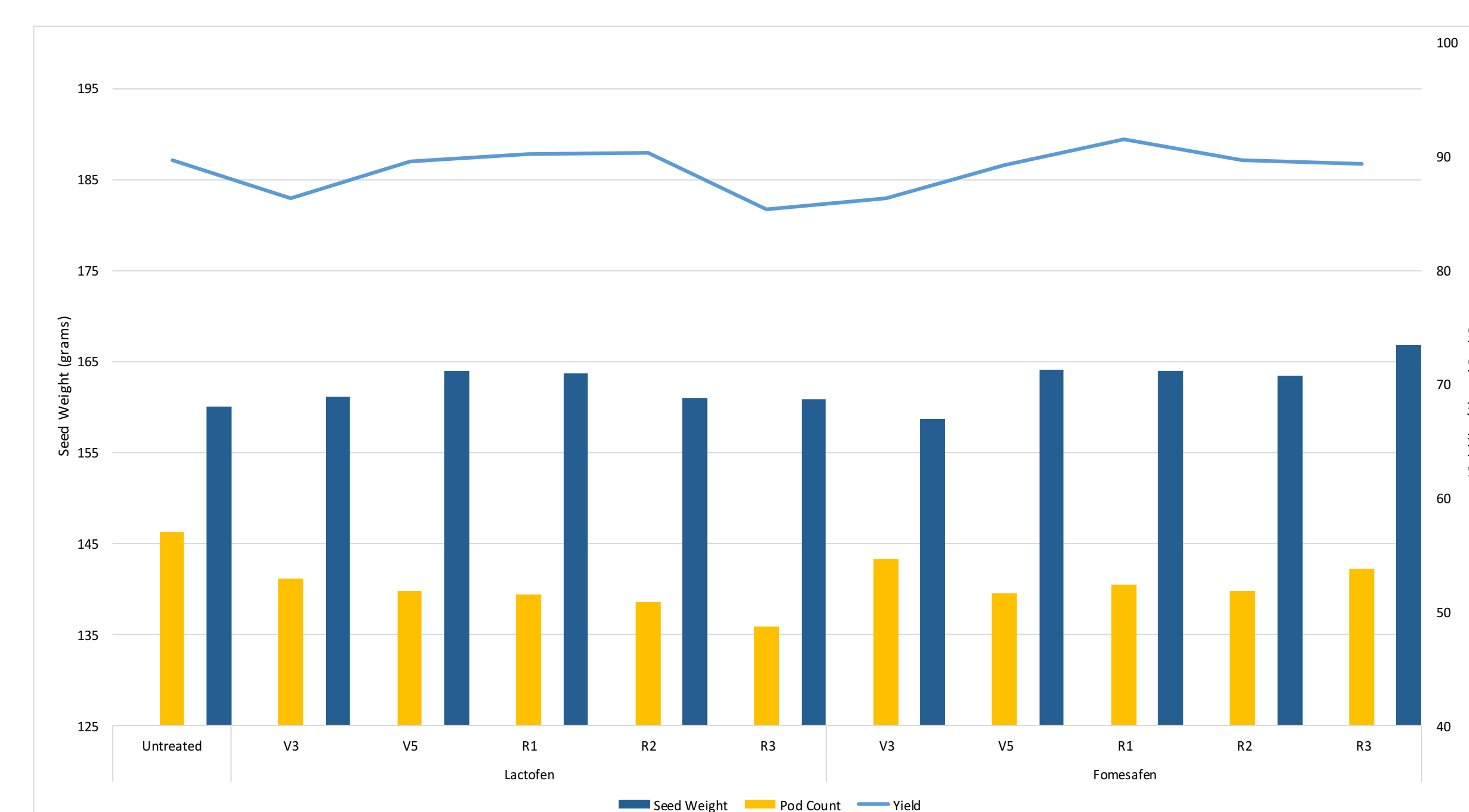


Figure 2. Yield, seed weight, and pod count responses to single rates of lactofen and fomesafen at five application timings

Discussion

There were no differences in yield across all treatments. Lack of yield difference is likely attributable to the high-yielding environment and optimal growing conditions which facilitated rapid plant recovery. This aligns with work conducted by Aaron Hager and Christy Sprague (2000) in which they found visual injury did not correlate with yield. Rather, soybean recovery environment had a greater impact on herbicide-induced yield penalty.

Lactofen caused higher percentages of both crop injury and crop stunting than fomesafen at each application timing (Table 1 and Figures 1 and 3). Lactofen is formulated as an emulsifiable concentrate (EC) and fomesafen is formulated as a soluble liquid (SL). It is widely accepted that solvent-based formulations have increased potential to penetrate the cuticle (Nayayanan, 1996). Thus, it is likely that increased injury observed in lactofen applications was due to a greater amount of active ingredient within the leaf.

At constant yield, a potential inverse relationship between seed weight and pod count was observed. When pod count declined, seed weight increased (Figure 2). Additional studies would need to be conducted to validate this hypothesis.



Figure 3. Lactofen symptomology (left) vs. fomesafen symptomology (right)

Conclusions

- PPO-inhibiting herbicides did not affect yield at any application timing
- Compared to fomesafen, lactofen resulted in greater plant injury
- Correlation of seed weight and pod number requires additional research

Acknowledgements

Thank you to Katie Demers for technical assistance and for taking the time to help edit and format this poster, and Connor Sible for helping with spraying, rating, and taking pictures of the plots.

UID: 102555

