Soybean Symptomology and Yield Response to Sub-Labeled Doses of 2,4-D and Dicamba as Influenced by Varieties

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BACKGROUND

- Previous studies used old auxinic herbicide formulations[1-8]
- Lowest herbicide dose 1/10,000x[1-8]

OBJECTIVE & HYPOTHESES

- To investigate the symptomology and consequent impact on yield caused by soybean exposure to sub-labeled doses of 2,4-D and dicamba herbicides
- Varied response exists among soybean varieties
- Symptomology cannot accurately predict yield loss

MATERIALS & METHODS

- RCBD with 4 replications
- 3 Locations (Nebraska, USA)
- 7 Soybean varieties (Table 1)
- Herbicides: 2,4-D (1065 g ae ha^{-1}) and dicamba (560 g ae ha^{-1})
- 5 sub-labeled doses: 1/10x, 1/100x, 1/1,000x, 1/10,000x, and 1/100,000x
- Plot sprayer with 10 independent spray booms (TTI11003)
- 140 L ha^{-1}; 276 kPa; 1.75 m s^{-1}
- Plants were treated at R1
- Plot size: 1.5-m x 9-m
- Statistical analysis: Data were subjected to ANOVA and dose-response curves were fitted to the data using the log-logistic function of the dr4pl package in R 3.4.2

REFERENCES

[1]Al-Khatib et al. 1999, [2]Auch and Arnold 1978, [3]Behrens and Lueschen 1979; [4]Cundiff et al. 2017; [5]Egan and Mortensen 2012; [6]Griffin et al. 2013, [7]Scholtes et al. 2019, [8]Soltani et al. 2016, [9]Sholtes et al. 2019.

RESULTS

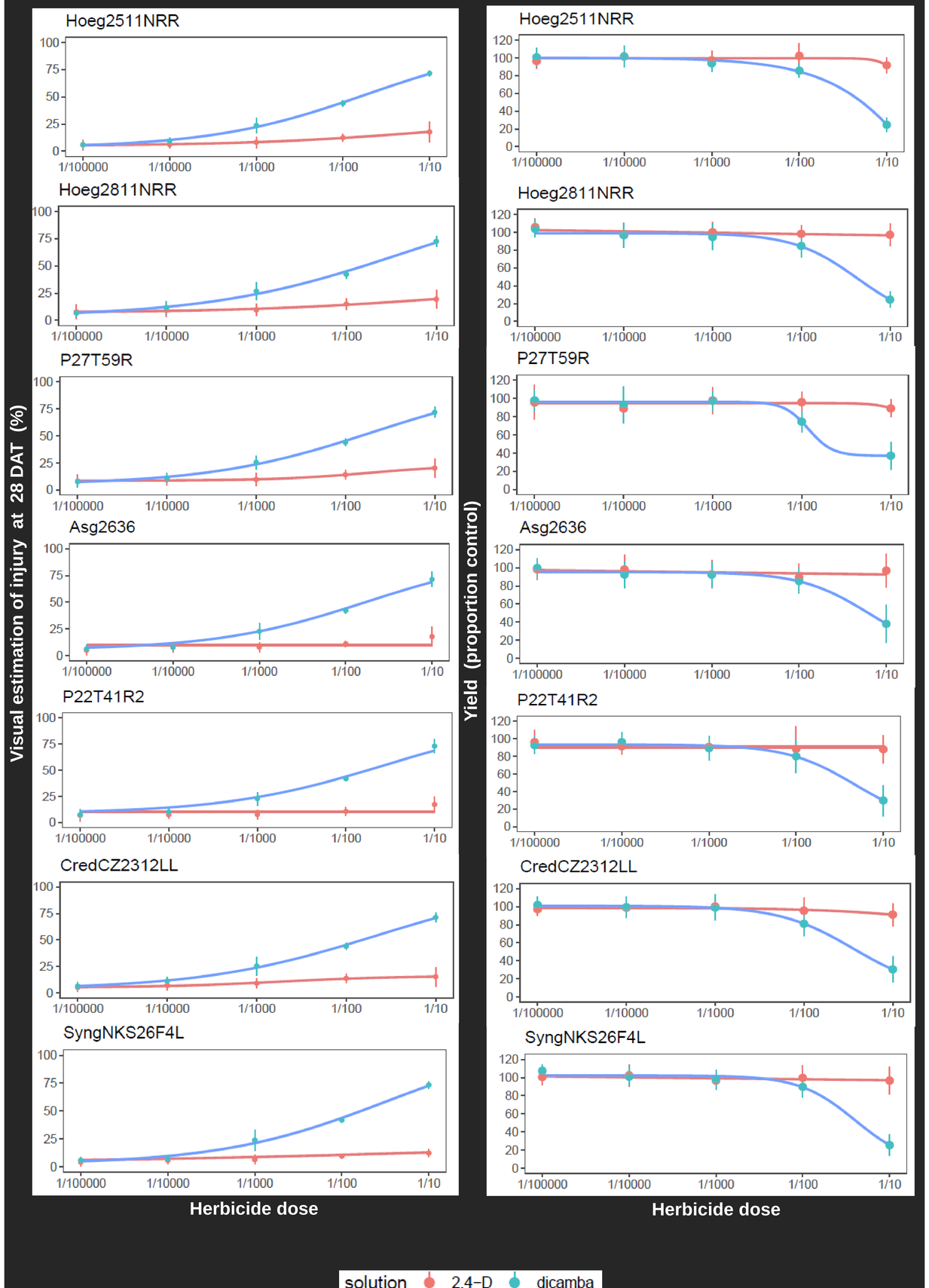

Figure 1. Soybean symptomology at 28 days after exposure to sub-labeled doses of 2,4-D and dicamba herbicides at R1 as influenced by soybeans varieties.

Figure 2. Soybean yield after exposure to sub-labeled doses of 2,4-D and dicamba herbicides at R1 as influenced by soybean varieties.

Table 1. Soybean varieties used in this research and their specifications

Code	Company	Variety
Hoegemeyer 2511NRR	DuPont Pioneer	R
Hoegemeyer 2811NR	DuPont Pioneer	R
P27T59R	DuPont Pioneer	R
Asgrow2636	DEKALB (Bayer)	RR2Y
P22T41R2	DuPont Pioneer	RR2Y
CredZ2312LL	BASF	LL
Syngenta26-F4L	Syngenta	LL

DISCUSSION & CONCLUSION

- Greater symptomology was observed when plants were exposed to dicamba than 2,4-D at higher doses (Figure 1)
- Same symptomology was observed when comparing both herbicides across doses up to 0.056 g ae ha^{-1} (1/10,000x) (Figure 1)
- Differences in symptomology were observed between herbicides when using doses greater than 0.56 g ae ha^{-1} (1/1,000x), differences in yield were observed only at the highest dose (56 g ae ha^{-1}) regardless of the soybean variety (Figure 2)
- At least half of the soybean varieties showed a slightly improvement on yield at the lowest doses, but results were herbicide-, dose- and variety-specific (Figure 2)
- Slight differences could be observed among soybean varieties but results within herbicide and dose were similar overall
- Symptomology must be carefully interpreted and may not be an accurate predictor for yield[9]

FUTURE RESEARCH

- Seeds harvested during 2019 and 2020 will be used in a greenhouse study in order to investigate potential visual estimation of injury in the next generation due to the herbicide exposure.