Use of Alternative Practices to Promote Yield Increase in Soybean

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Introduction

Achieving high yields in soybean requires frequent monitoring and intensive management of several agronomic factors. Recently, there has been interest in using alternative practices to maximize soybean yields. Practices include breaking apical dominance to induce branching, using a combination of fertilizers both in furrow and foliar applied, and the use of seed treatments to promote early stand establishment and plant health. Field studies were conducted to asses if a combination of these practices increase soybean yield in Nebraska.

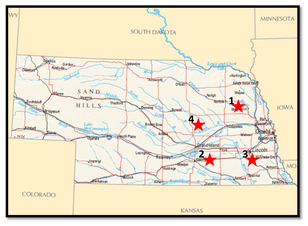
Objective

To investigate alternative soybean management practices and assess their ability in combination to increase soybean yield in Nebraska.

Materials and Methods

Field studies were conducted in 2011 at four locations in Nebraska:

1. Bancroft
2. Clay Center
3. Cortland
4. Elba



Plots were planted at:

- 556,000 seeds ha^{-1}
- 51 cm row spacing

Plot dimensions were 3.7 x 15.2 m

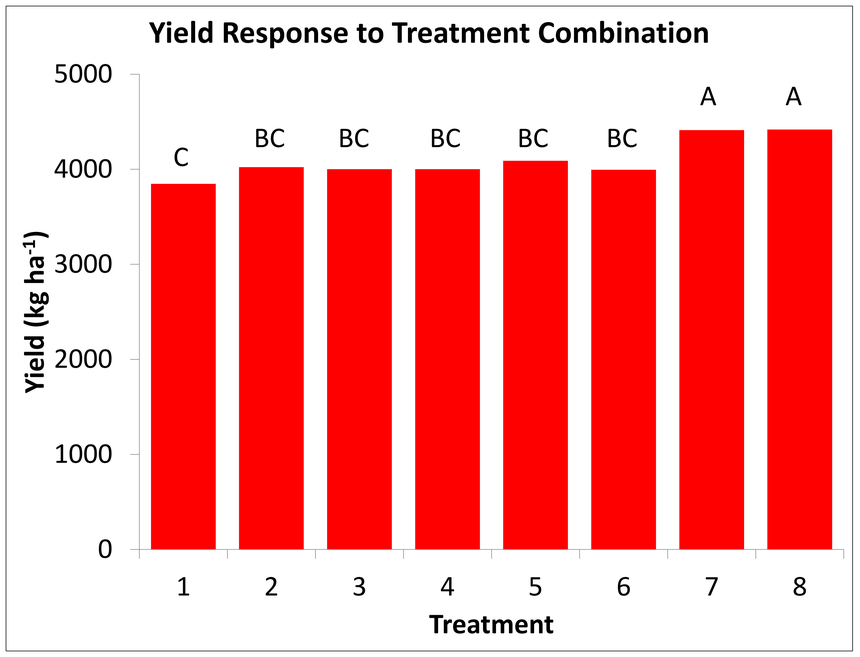
Table 1. Alternative practices used in combination to form each of eight treatments.

Treatment	5.6 kg N ha^{-1}	BioForge Foliar at R3 1169 ml ha^{-1}	BioForge Seed Treatment 1.30 ml kg^{-1} seed	Optimize 400 Seed Treatment 1.82 ml kg^{-1} seed	Clip Apical Meristem at V2
1. Full	X	X	X	X	X
2. Full With Lactofen	X	X	X	X	Lactofen at 876 g ai ha^{-1}
3. Minus Starter N		X	X	X	X
4. Minus Foliar	X		X	X	X
5. Minus BioForge	X	X		X	X
6.Minus Optimize 400	X	X	X		X
7. Minus Clipping	X	X	X	X	
8. Minus All					

At harvest, hand samples were taken from plots to evaluate and determine yield components. Measurements included:

- Branches per plant
- Pods per plant
- Seeds per pod
- Seed moisture
- Seed weight

Results



- Highest yields were observed with treatments 7 and 8 with the lowest yields at treatments 1 and 2
- Population showed significance at the 0.05 level with final populations well below the target population of 556,000 seeds ha^{-1}
- Yield components were taken from treatments 1, 2, 7, and 8 due to non-significance at all other treatments (3, 4, 5, and 6)
- Yield components including branches plant^{-1}, pods plant^{-1}, seeds plant^{-1}, seed moisture, and seed weight were not different at all treatment combinations

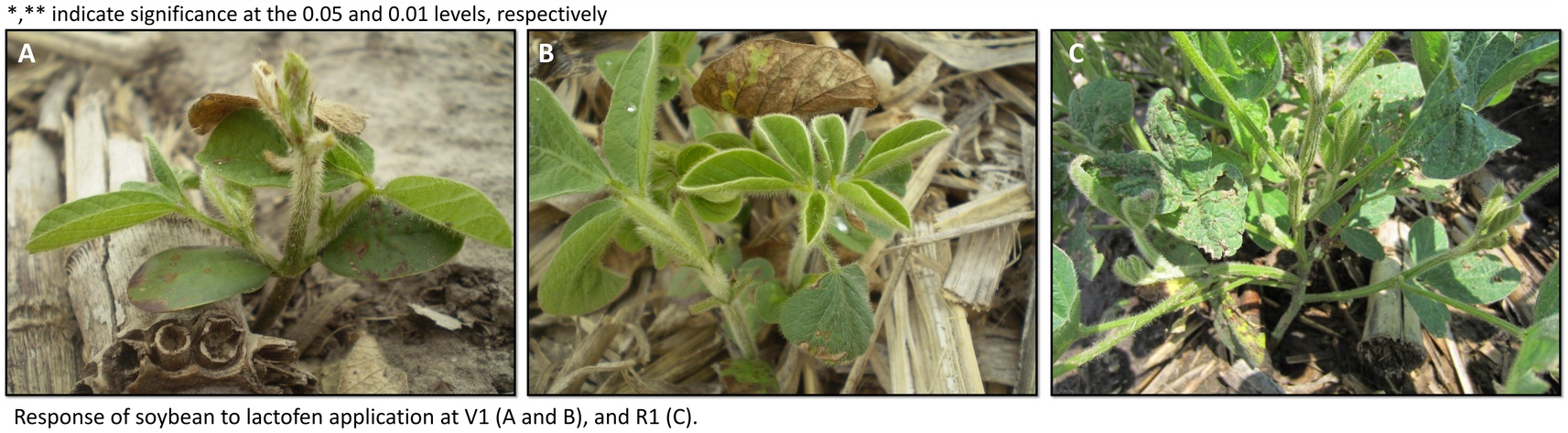
Table 2. Soil organic matter, pH, and key nutrients at all treatment locations.

	Bancroft	Cortland	Clay Center	Elba
SOM, %	5	3.4	2.9	2.5
pH	5.7	6.4	6.7	6.2
NO3-N, ppm	8.4	10.6	5.3	7.8
M3 P, ppm	87	17	9	52
K, ppm	505	340	486	483
SO4-S, ppm	24	20	18	16
Zn, ppm	3.5	1.2	0.7	3.7

Table 3. Response of individual yield components to the full, full with lactofen, minus clipping, and minus all treatments.

Treatment	Population (seeds ha^{-1})	Branches plant^{-1}	Pods plant^{-1}	Seeds plant^{-1}	Seed Moisture (%)	Seed Weight (g)	Yield (kg ha^{-1})
1	333,192*	1.4	28	78.5	8.6	0.154	3,847
2	339,104 *	1.5	29	83.5	8.3	0.155	4,022
7	336,928 *	1.5	28	72.1	8.5	0.156	4,412*
8	346,828 *	1.5	24	80.1	8.3	0.154	4,418*

*,** indicate significance at the 0.05 and 0.01 levels, respectively



Response of soybean to lactofen application at V1 (A and B), and R1 (C).

Conclusions

With highest yields at treatments seven and eight, minus clipping and the check, respectively, we see that inducing branching has a negative effect on final yield.

Applying lactofen at 876 g ai ha^{-1} also reduced yields when compared to the control.

The number of branches that were generated from clipping or lactofen application was not different from the control.

With lower than expected final populations, plants in all plots generated branches to compete for additional space, regardless of treatment.

Alternative practices used in this study did not increase yield and should not be incorporated into a production system in order to increase yield.

Acknowledgements

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