Influence of Nitrogen Fertilizer on Giant Ragweed Interference in Corn

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Introduction

Giant ragweed (GRW) is one of Indiana’s most problematic agronomic weeds.

Giant ragweed can reduce corn grain yield by up to 61% (Harrison et al. 2001)
Introduction

Nitrogen (N) fertilizer is a large input in corn production.

N fertilizer losses can be high in crop production systems.

Atrazine is the most used corn herbicide.

Anticipated regulations of N fertilizer and atrazine.

Herbicide resistant corn production is estimated to increase from:

2005: 17%
2008: 65% (industry estimates)
Introduction

Previous research has been conducted on grassy weeds

Grassy weeds rapidly accumulated N early in the growing season

- 12 inch tall grass weeds can accumulate up to 63 lbs N/ac (Helwig et al. 2002)

- Early in the growing season, shattercane has been reported to accumulate 17 lbs/ac N, and corn only 14 lbs/ac when in competition (Hans and Johnson 2002)

Fertilizer withheld at planting, weeds have greater impact on final grain yield and can slow corn growth and maturation (Evans et al. 2003)
Objective

- N fertilizer application timings effect GRW interference in corn
- Biomass and N accumulation in corn and GRW
Materials and Methods

Field experiment was conducted at Purdue University Agronomy Center for Research and Education in 2004 and repeated in 2005.

- Raub silt loam
- Corn-Soybean rotation
- Conventional tillage
- Moderate to high levels of GRW infestation
- Glyphosate resistant corn was planted at 30,000 seeds/ac in 30 inch rows
- N fertilizer: 28% UAN

GRW seedlings
Materials and Methods

Split-plot design, with 4 replications:

Main plots: N Fertilizer regimes
- 180 lbs/ac N at planting: PLT
- 180 lbs/ac N sidedressed: SIDE
- 90 lbs/ac N BPLT and 90 lbs/ac SIDE: SPLIT

Subplots: Weed interference periods
- Weed Free: WF
- Weed Interference until 16-in tall GRW: W16
- Season long GRW interference: W
Materials and Methods

- Experiment received a blanket treatment of 1.0 lbs ai/ac of dimethenamid and 0.39 lbs ae/ac of glyphosate

- Atrazine was applied to the WF plots at 1.5 lbs ai/ac

- GRW density set at 0.5 plants/10 ft² 10-to 14-days after GRW emergence
Materials and Methods

16 inch GRW removal timing
End of season

Data were subjected to ANOVA, LSD 0.05
# Biomass Accumulation at 16 Inch GRW Removal Timing (2004)

<table>
<thead>
<tr>
<th></th>
<th>Corn Biomass lbs/ac</th>
<th>Corn N lbs/ac</th>
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<tbody>
<tr>
<td>PLT</td>
<td>706</td>
<td>21</td>
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<tr>
<td>SIDE</td>
<td>528</td>
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<tr>
<td>SPLIT</td>
<td>700</td>
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<tr>
<td>LSD (0.05)</td>
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<tr>
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<th>GRW Biomass lbs/ac</th>
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### Leaf Area at 16 Inch GRW Removal Timing (2004)

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Corn Yield (bu/A) vs. N Fertilizer Timing

N Fertilizer Application timing

2004
LSD (0.05) = 8

2005
LSD (0.05) = 10

PLT
135
179

SIDE
144
173

SPLIT
146
188

2004
2005

N Fertilizer Application timing
Corn Yield (bu/A) vs. GRW Removal Timing

Weed Removal Timing


2004 LSD (0.05) = 8
2005 LSD (0.05) = 10
Conclusions

Biomass accumulation
Post emergent N fertilizer did enhance corn and GRW growth in the early part of the growing season

N accumulation
Early season
- Corn accumulated more N on a per acre basis, but not on a per plant basis
Season long
- GRW can accumulate 72- to 135-lbs N/ac
  - Approximately two times that which grassy weeds can accumulate with season long interference
Conclusions

Leaf area
SIDE and SPLIT N timings allow for greater GRW leaf area accumulation than PLT

Grain yield
In 2004, SIDE and SPLIT treatments had higher yields than PLT

In 2005, PLT and SPLIT treatments had higher yields than SIDE

GRW at 0.5 plants/10 sq. ft can be controlled up to 16 inches tall without yield loss