

Influence of Nitrogen Fertilizer on Giant Ragweed Interference in Corn

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PURDUE

WEED

SCIENCE

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)

	Corn Biomass lbs/ac	Corn N lbs/ac
PLT	706	21
SIDE	528	19
SPLIT	700	22
LSD (0.05)	NS	NS

Biomass Accumulation at 16 Inch GRW Removal Timing (2004)

	Corn Biomass lbs/ac	Corn N lbs/ac	GRW Biomass lbs/ac	GRW N lbs/ac
PLT	706	21	144	7
SIDE	528	19	200	11
SPLIT	700	22	275	15
LSD (0.05)	NS	NS	90	5

Season Long Biomass Accumulation (2004)

	Corn Biomass lbs/ac	Corn N lbs/ac
PLT	9391	94
SIDE	8515	87
SPLIT	9875	99
LSD (0.05)	606	6

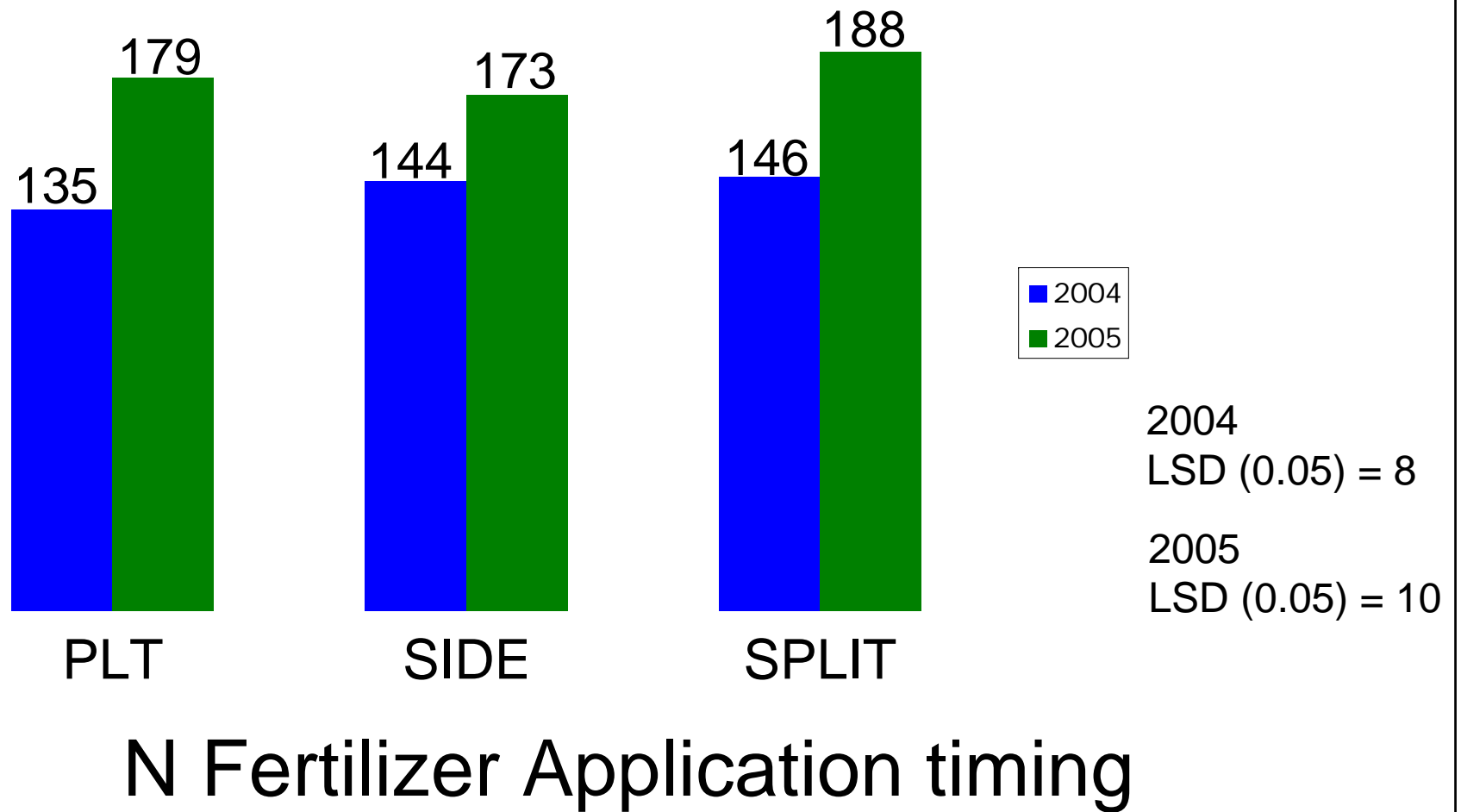
Season Long Biomass Accumulation (2004)

	Corn Biomass lbs/ac	Corn N lbs/ac	GRW Biomass lbs/ac	GRW N lbs/ac
PLT	9391	94	3622	72
SIDE	8515	87	6034	135
SPLIT	9875	99	4206	79
LSD (0.05)	606	6	NS	NS

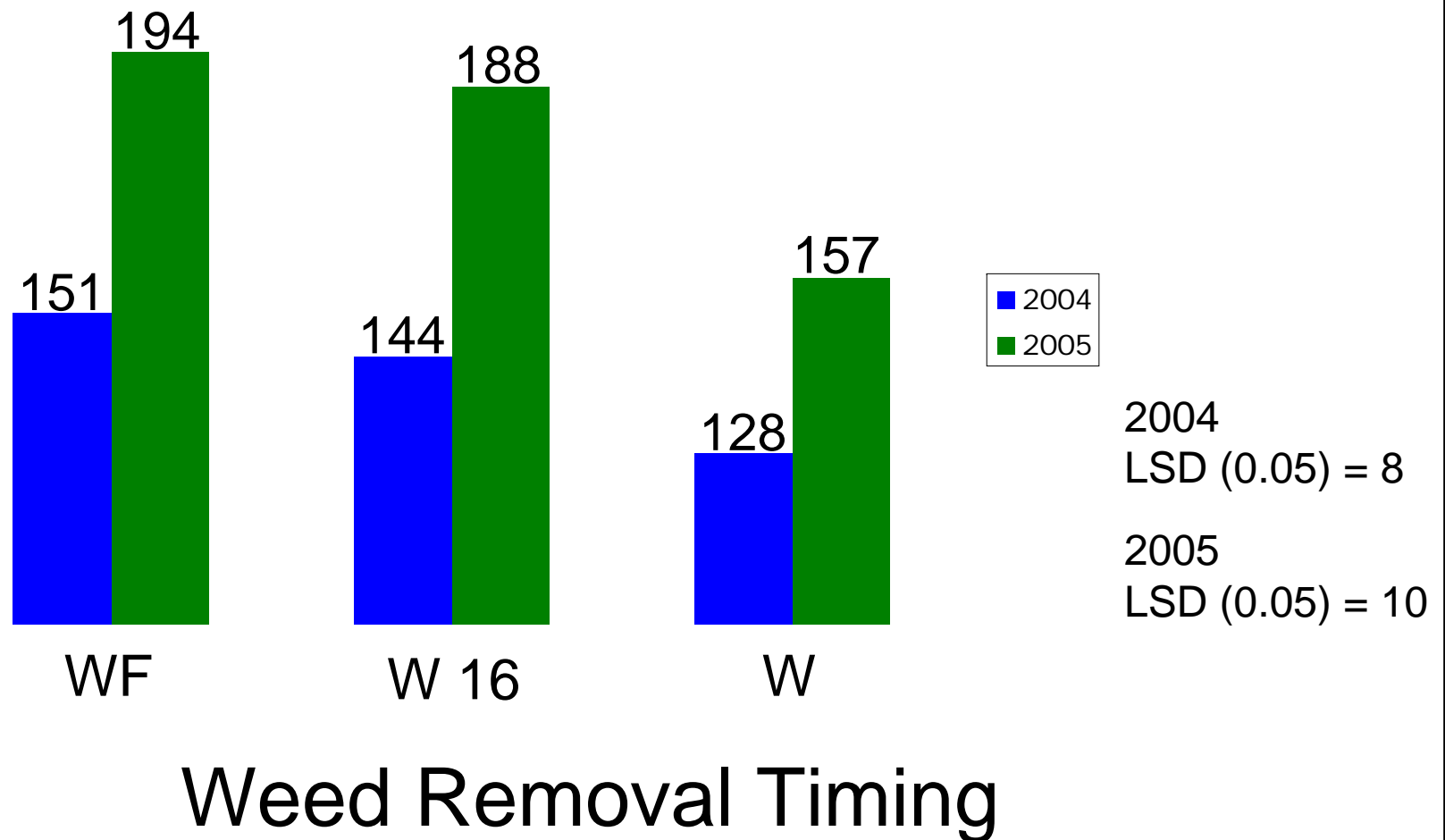
Leaf Area at 16 Inch GRW Removal Timing (2004)

	Corn LA square inches/plant	GRW LA square inches/plant
PLT	55	17
SIDE	40	25
SPLIT	52	27
LSD (0.05)	6	7

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



Corn Yield (bu/A) vs. GRW Removal Timing



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