

EVALUATION OF COTTON FOR PREEMERGENCE INTERACTION BETWEEN HERBICIDES AND INSECTICIDES

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Introduction

Approximately 50% of southeastern cotton production is grown using conservation tillage practices. In order to control glyphosate tolerant and resistant weeds, tankmixtures of contact and residual herbicides are often applied. Specifically, saflufenacil (Sharpen) and flumioxazin (Valor) are PPO herbicides registered for this use. Saflufenacil can be PRE applied up to 42 day before cotton is planted providing contact and residual weed control. Fomesafen can be PRE applied from 14 to 30 days before planting, with planting restriction dependent on the planting technique. These plant back restrictions to cotton are on both herbicides labels due to potential PPO injury.

Aldicarb (Temik), a thiocarbamate, and phorate (Thimet), an organic phosphate (OP), are insecticides applied at cotton planting for control of thrips, aphids, and other insects. Aldicarb and phorate are most commonly applied in-furrow at planting. The water solubility of aldicarb and phorate are 4.9 and 0.05 g L⁻¹, respectively. Both are absorbed by developing seedlings providing systemic insect control. Aldicarb moves via passive transport with water while phorate is taken up rapidly in developing root systems via contact and high lipid solubility. Pesticide interactions can be variable with respect to measures of plant growth and yield. For example, aldicarb and trifluralin plus diruron, had no interactive effect on stand, plant weight, or cotton yield while injury from trifluralin resulted in decreased uptake of phorate and terbufos by seedling cotton.

There is very little information about PPO herbicide and insecticide interaction with respect to cotton injury. Therefore, field studies were carried out in 2010 to evaluate cotton response to herbicide /insecticide interactions for cotton emergence, stand establishment, height, and yield in two different soil types in Georgia.

Materials and Methods

Experiments were conducted during 2010 at Plains and Tifton GA on a Faceville sandy loam and Tift loamy sand, respectively. Experimental design was 7 herbicide treatments by 3 insecticides arranged as a factorial in a RCB with 4 replications. Herbicides were saflufenacil at 20 g ha⁻¹ (1X rate) and flumioxazin at 142 g ha⁻¹ (2X rate to simulate injury) applied at 42, 28, and 14 days prior to planting (DBP) and included a nontreated control. Insecticides were aldicarb (1X rate) and phorate (1X rate) applied in furrow at planting and a nontreated control. The experimental area was irrigated after all herbicide treatments and planting. Data included stand counts, height measures, and yield (Tifton). Data were subjected to analysis of variance appropriate for the 3

(insecticide) by 7 (herbicide) factorial treatment arrangement. Analysis of variance procedures were conducted with means for significant main effects and interactions separated using Fisher's protected LSD method test at $P \leq 0.05$.

Results and Discussion

The 2-way interactions between insecticide and herbicide were not significant for stand at Tifton or Plains, and height and yield at Tifton. Therefore, data for the main effects of insecticide were combined and analyzed across herbicide treatments, and data for the main effects for herbicide were combined and analyzed across insecticide treatments. There was a height difference at Plains for the 2-way interaction. Cotton injury was evident for the 14 DBP flumioxazin and saflufenacil treatments as cotton emerged from soil in the form of stunting, leaf chlorosis, and stand loss. Flumioxazin injury was observable up to 30 days after planting and with final stand differences (Figure 1).

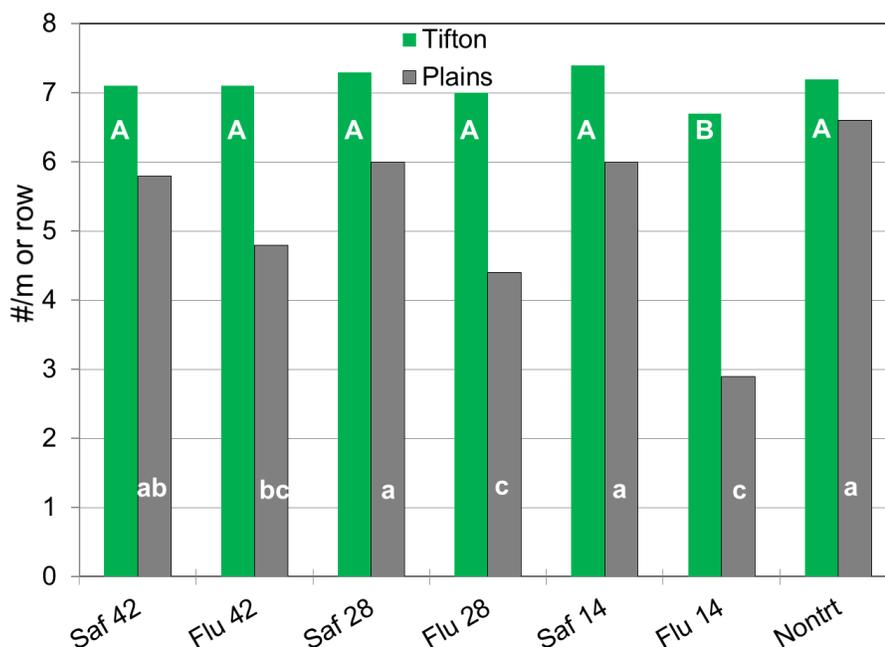


Figure 1. Final cotton stands as affected by herbicide treatment. Letters within location indicates significant differences at $P < 0.05$. Abbreviations: saflufenacil, Saf; Flu, flumioxazin; 42, 28, 14 are days before planting.

Saflufenacil did not reduce stand at either location compared to the nontreated control. Cotton growth trends remained consistent up to 50 DAP among treatments when compared to timing of application (Figures 2 & 3).

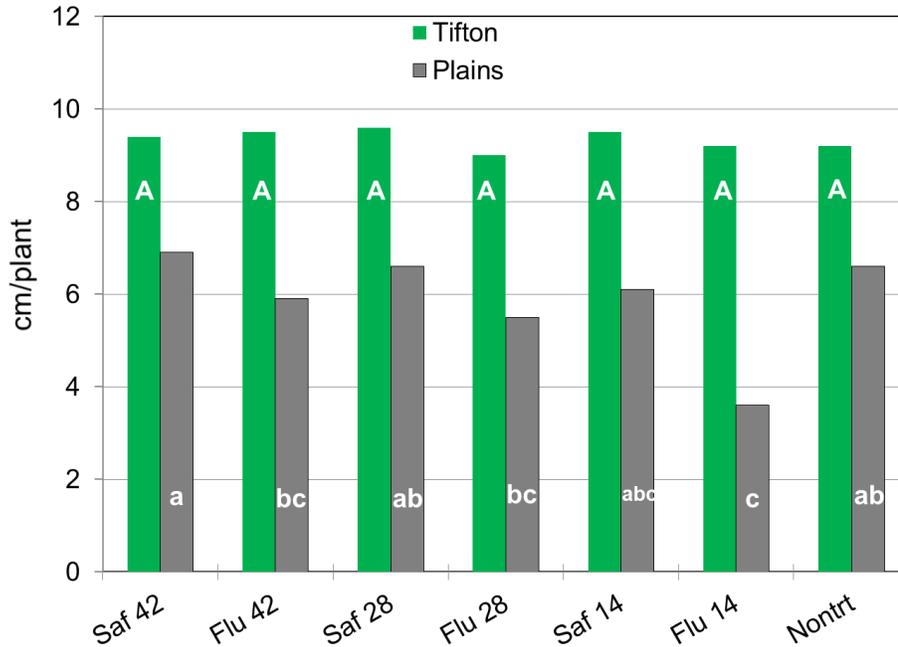


Figure 2. Cotton height as affected by herbicide treatment 14 days after planting. Letters within location indicates significant differences at $P < 0.05$. Abbreviations: saflufenacil, Saf; Flu, flumioxazin; 42, 28, 14 are days before planting.

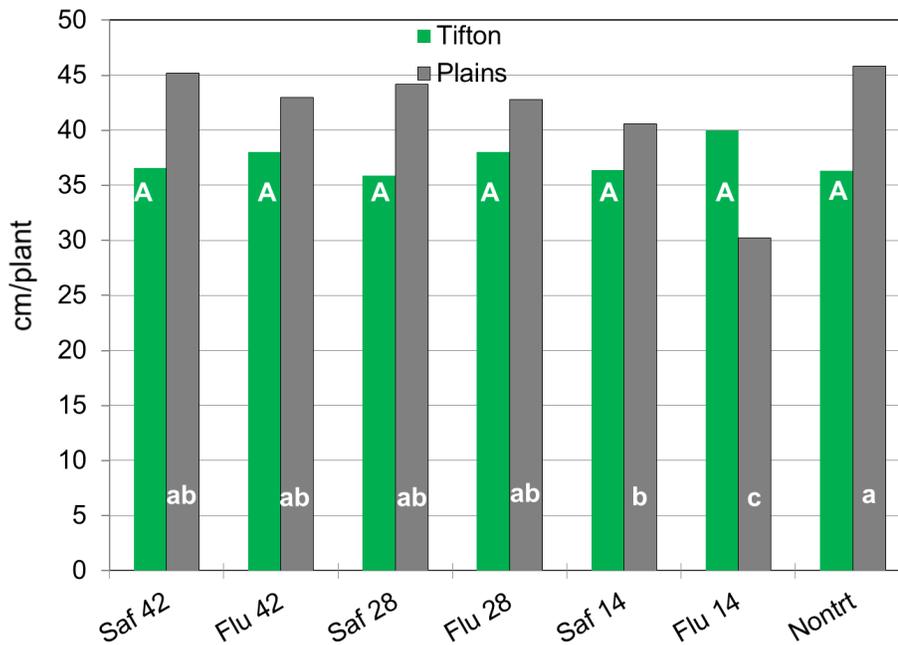


Figure 3. Cotton height as affected by herbicide treatment 50 and 30 days after planting at Plains and Tifton, GA respectively. Letters within location indicates significant differences at $P < 0.05$. Abbreviations: saflufenacil, Saf; Flu, flumioxazin; 42, 28, 14 are days before planting.

By mid-season, there were no differences in height and no observable injury for saflufenacil applied at 42 and 28 DBP. Saflufenacil applied 42 and 28 DBP exhibited little to no injury at either location. Insecticides did not cause any cotton stand or height concerns (Figure 4).

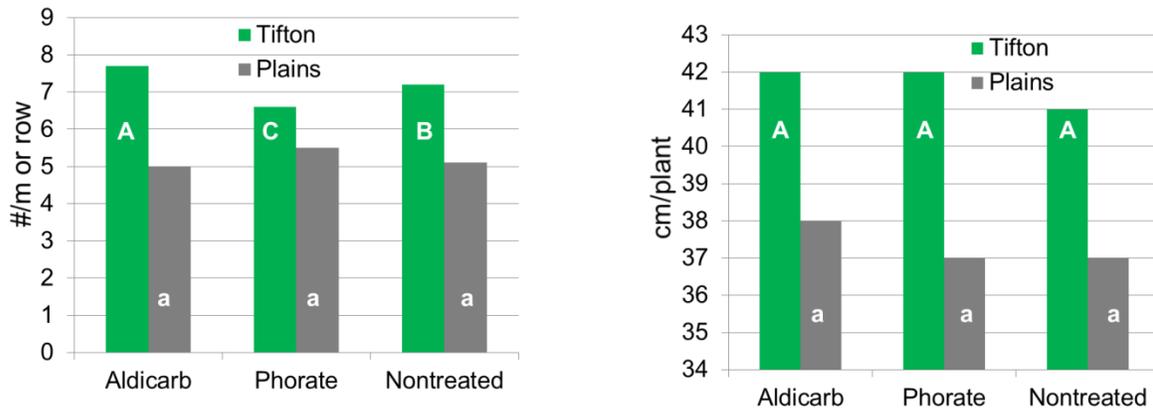


Figure 4. Cotton final stands and heights as affected by insecticide treatment. Letters within location indicates significant differences at $P < 0.05$. Abbreviations: saflufenacil, Saf; Flu, flumioxazin; 42, 28, 14 are days before planting.

These data indicate that there were no insecticide by saflufenacil 42 DBP issues with stand, growth (height measures), or yield of cotton (Figure 5).

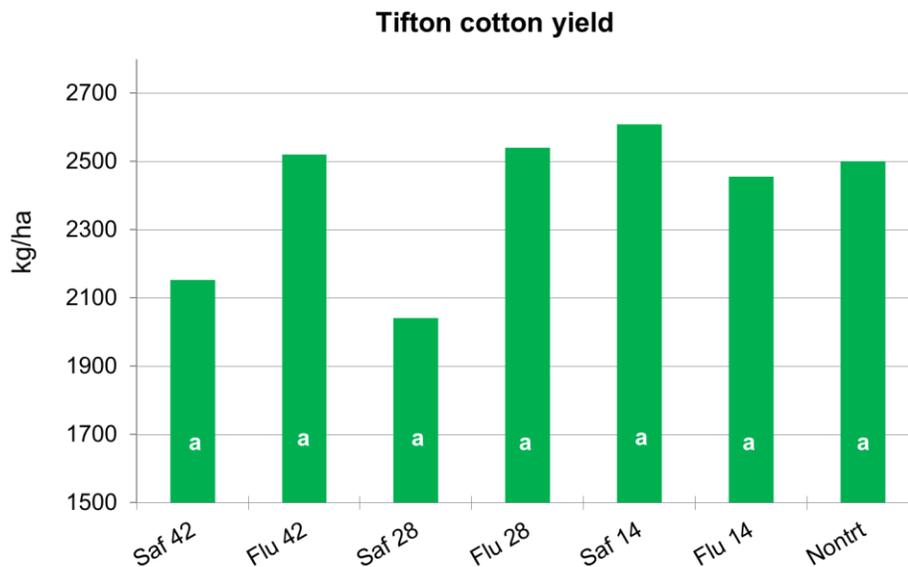


Figure 5. Cotton yield as affected by herbicide treatment. Letters within location indicates significant differences at $P < 0.05$. Abbreviations: saflufenacil, Saf; Flu, flumioxazin; 42, 28, 14 are days before planting.

Saflufenacil applied 42 and 28 days before planting exhibited little to no cotton injury. Insecticides did not cause any cotton stand or height concerns. These data indicated that there were no insecticide by saflufenacil issues with stand, growth (height measures), or yield of cotton.

Acknowledgements

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