

I. Abstract

a. Project Title: Evaluation of weed control and injury to peanut cultivars with paraquat in various herbicide combinations in irrigated vs non-irrigated conditions.

b. Principal Investigator(s):

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c. Cooperating Personnel: Research Associate, Graduate Students, and staff assisted with this project.

d. Summary:

Paraquat (Gramoxone) is an effective and popular herbicide used in peanut production. Tank-mixes with other herbicides are commonly used to reduce injury to peanut and to broaden the spectrum of weeds controlled. There has been little research conducted on the effect of paraquat herbicide combinations on different peanut varieties. The objective of this project was to determine the effect of various paraquat tank-mix combinations of common herbicides on peanut injury and tolerance for multiple cultivars with different growth characteristics. There were four peanut varieties evaluated, Georgia-06G, Georgia-14N, TUFRunner-511, and Georgia-12Y. The following 8 Gramoxone tank mixes treatments were evaluated: Gramoxone 12 oz/a, Gramoxone 24 oz/a, Gramoxone 12 oz/a + Storm 24 oz/a, Gramoxone 12 oz/a + Storm 24 oz/a + Zidua 0.213 lb/a, Gramoxone 12 oz/a + Storm 24 oz/a + Dual Magnum 22 oz/a, Gramoxone 12 oz/a + Storm 24 oz/a + Anthem Flex 3.75 oz/a, Gramoxone 12 oz/a + Storm 24 oz/a + Warrant 48 oz/a, and a non-treated check. The experiment was replicated at three locations in Alabama (Shorter, Headland and Fairhope AL). For all three locations Gramoxone 24 oz/a treatment reduced plant heights at 50 days after planting (DAP) and 70 DAP. Only two treatments did not show any height reduction and stunting at all of the locations, which are Gramoxone 12 oz/a + Storm 24 oz/a and Gramoxone 12 oz/a + Storm 24 oz/a + Zidua 0.213 lb/a when compared to the non-treated check (NTC). However, no treatment negatively affected peanut yield relative to NTC. As a conclusion, grower should not be surprised to see growth stunting with any of these tank mixes. However, the peanuts will likely outgrow this stunting and it will not affect the yield of the crop.

II. Report

a. Project Title:

Evaluation of weed control and injury to peanut cultivars with paraquat in various herbicide combinations in irrigated vs non-irrigated conditions.

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d. Objectives:

The objective of this project was to determine the effect of various paraquat tank-mix combinations of common herbicides on peanut injury and tolerance for multiple cultivars with different growth characteristics.

e. Procedure:

This was a multi-location experiment which took place at Wiregrass Research and Extension Center (REC) in Headland, AL, E.V. Smith REC in Shorter, AL and Gulf Coast REC in Fairhope, AL. It was a completely randomized split plot design with 4 replications where the herbicide treatments were applied to the whole plot and the 4 varieties are the sub plots. Four peanut varieties were evaluated Georgia-06G, Georgia-14N, TUFRunner-511, and Georgia-12Y. Plots were 8 rows wide, 2 rows for each variety, and 25 – 30 ft long depending upon location. Valor and Prowl H2O were applied as PRE on all peanut plots. The trials at Wiregrass and E.V. Smith were non-irrigated while the trial at Gulf Coast was under irrigation. Throughout the season hand weeding occurred when necessary. The plots were sprayed with a backpack sprayer, 6-nozzle boom with Teejet TT110025 tips, at a rate of 20 gallons per acre. The following 8 Gramoxone tank mixes treatments were evaluated: Gramoxone 12 oz/a, Gramoxone 24 oz/a, Gramoxone 12 oz/a + Storm 24 oz/a, Gramoxone 12 oz/a + Storm 24 oz/a + Zidua 0.213 lb/a, Gramoxone 12 oz/a + Storm 24 oz/a + Dual Magnum 22 oz/a, Gramoxone 12 oz/a + Storm 24 oz/a + Anthem Flex 3.75 oz/a, Gramoxone 12 oz/a + Storm 24 oz/a + Warrant 48 oz/a, and a non-treated check. NIS@0.25% was used on all treatments except for NTC. Data collected consisted of plant heights and stand counts, at ~50 and ~70 days after application, as well as yields at the end of the growing season.

f. Results and Discussion:

All data was converted to percentage of non-treated check before analysis to focus on peanut herbicide tolerance. All data was analyzed in SAS 9.4 using PROC Glimmix. Locations were significantly different ($P < 0.001$) therefore, the data was analyzed separately for each location. There were no significant interactions at $P < 0.05$ for any of the peanut varieties and tank mixes for any location. There were no significant differences for stand counts or yields for each varieties and treatments compared to the non-treated check. However, when only looking at the main effect of treatments on all peanut varieties plant heights, overall there were some significant treatment differences seen. At the Gulf Coast Center, only Gramoxone at 24 oz/a significantly reduced plant

height by 9.75% at 50 DAP and by 5.25% at 70 DAP compared to the non-treated check. At E.V. Smith, Gramoxone at 12 oz/a, Gramoxone at 24 oz/a, Gramoxone 12 oz/a + Storm 24 oz/a +Anthem Flex 3.75 oz/a and Gramoxone 12 oz/a + Storm 24 oz/a + Dual Magnum 22 oz/a significantly reduced plant heights from 6.75% to 14% as compared to the non-treated check. At 70 DAP Gramoxone 12 oz/a + Storm 24 oz/a +Anthem Flex 3.75 oz/a and Gramoxone at 24 oz/A treatments showed height reduction by 7.25% and 7.5% respectively. At the Wiregrass Center, all treatments, except for Gramoxone 12 oz/a + Storm 24 oz/a + Warrant 48 oz/a, reduced plant height from 5.5% to 20% when compared to the non-treated check at 50 DAP. At 70 DAP only Gramoxone at 24 oz/a was significantly reduced height by 16.75%. However, each of the peanut varieties were able to tolerate initial stunting and produce yields that were not significantly different by any herbicide tank mixes (Table 1).

Table 1: Average Yield for Peanut Varieties (lbs/A)

Treatments	Georgia 06G	Georgia 14N	TUFRunner 511	Georgia 12Y
Gramoxone 12 oz/a	4362.45	4136.59	5138.47	4204.35
Gramoxone 24 oz/a	4023.65	4041.40	4252.75	4028.49
Gramoxone 12 oz/a + Storm 24 oz/a	4514.10	4094.64	5240.11	4272.11
Gramoxone 12 oz/a + Storm 24 oz/a + Dual Magnum	4396.33	4002.68	5409.51	4694.80
Gramoxone 12 oz/a + Storm 24 oz/a + Warrant 48 oz/a	3946.21	3834.89	4654.47	4099.48
Gramoxone 12 oz/a + Storm 24 oz/a + Zidua 0.213lb/a	3883.29	3517.07	4488.29	4357.61
Gramoxone 12 oz/a + Storm 24 oz/a +Anthem Flex 3.75 oz/a	3994.61	3513.84	5756.37	4060.76
Non-Treated Check of each variety	4598.00	3872.00	4990.04	4320.51

g. Discoveries:

Only two treatments did not show any significant height reduction and stunting at all three locations: Gramoxone 12 oz/a + Storm 24 oz/a and Gramoxone 12 oz/a + Storm 24 oz/a + Zidua 0.213 lb/a, when compared to the non-treated check (NTC). No herbicide treatments caused significant yield loss as compared to NTC. A grower should not be surprised to see some growth stunting after using any of these tank mixes. However, the peanuts will likely outgrow this stunting and it will not affect the yield of the crop. We are continuing this research study in 2017 with different tank mixes with Gramoxone on same peanut varieties. Results of 2017 trials will be available to peanut farmers at the end of 2017 or early 2018.

