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2016

National Peanut Board / Southeast Peanut Research Initiative – Executive Summary for 2016 NPB Project # 457, entitled “Evaluation of weed control and injury to peanut cultivars with paraquat in various herbicide combinations in irrigated vs non-irrigated conditions” – Univ. of Georgia, by R. Scott Tubbs.

Approximately half of Georgia’s peanut production was non-irrigated in 2016. While the use of paraquat is common, the introduction of new peanut cultivars calls for more information on their tolerance when paraquat is applied alone and in tank-mixtures. Even with nearly half of the state growing peanut in rainfed conditions, there is little information available on the effects irrigation has on peanut injury from paraquat. This research project is designed to highlight paraquat’s efficiency in weed control and provide insight into herbicide injury in irrigated and rainfed management for high-yield potential cultivars.

Irrigated and rainfed experiments were planted near Ty Ty, GA and Plains, GA. Six herbicide treatments included 1) Prowl + Valor (PRE) followed by Gramoxone alone (POST), 2) Prowl + Valor (PRE) followed by Gramoxone + Storm (POST), 3) Prowl + Valor (PRE) followed by Gramoxone + Storm + Dual Magnum (POST), 4) Prowl + Valor (PRE) followed by Gramoxone + Storm + Warrant (POST), 5) Prowl + Valor (PRE) only, and 6) non-treated check (handweeding only). Cultivars included 1) Georgia-06G, 2) Georgia-14N, and 3) TUFRunner™ ‘511’ at the Ty Ty location, and those three plus a fourth (FloRun™ ‘157’) at the Plains location.

For the irrigated trials, herbicide treatment did not have a significant effect on yield. However, cultivars had a significant effect on yield for both locations. TUFRunner™ ‘511’ and Georgia-06G had the greatest yields at Plains. FloRun™ ‘157’ did not yield as well as the other three cultivars. Georgia-14N produced more than a 2% improvement in grade over FloRun™ ‘157’.

At Ty Ty, Georgia-06G yielded greater than TUFRunner™ ‘511’ and both of these yielded more than Georgia-14N. There were no differences in grade at this location for either herbicide treatment or cultivar. For the rainfed trials, neither herbicide nor cultivar treatment had a significant effect on yield. Yet, using pairwise comparisons FloRun™ ‘157’ again yielded the least of all the cultivars.

Overall, none of the herbicide treatments provided any benefit in yield. Water was certainly a limiting factor in the rainfed trials, as evidenced by very low grades. These trials demonstrated that FloRun™ ‘157’ is not a competitive cultivar in Georgia compared to what is already commercially available. Georgia-06G and TUFRunner™ ‘511’ were the most consistent cultivars in producing good yield and grade. The study is being repeated in both locations in 2017 for combined analyses. Detailed weed control ratings on multiple weed species and crop injury ratings will be incorporated prior to publication submission.

Data related to this project was presented at the 2017 Southern Weed Science Society meeting in February 2017 and the 2016 Sigma Xi Research Conference in November of 2016. The lead graduate student on this project (Ms. Kayla Eason) was awarded 1st place in the Agricultural, Soil, and Natural Resources Division at the Sigma Xi Student Research Conference, a national competition.

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NATIONAL PEANUT BOARD / SOUTHEAST PEANUT RESEARCH INITIATIVE

FINAL REPORT – 2016 funding cycle for work done under project agreement entitled: “Evaluation of weed control and injury to peanut cultivars with paraquat in various herbicide combinations in irrigated vs non-irrigated conditions”.

NPB Project # 457

UGA Account #25-21-RF328-118

INSTITUTION: University of Georgia

Principle Investigator: Dr. R. Scott Tubbs

EXPIRATION DATE: 31 December 2017

SPRI CONTACT: Joy Purvis, Hannah Jones

NPB CONTACT: Bob Parker

Final Report:

The state of Georgia produces nearly half of the peanuts (*Arachis hypogaea* L.) in the United States. In 2016, approximately half of the state’s production was non-irrigated. In the Southeast, weed control programs for peanut include paraquat (Gramoxone) as a postemergent (POST) herbicide. Paraquat is tank-mixed with other herbicides to broaden the weed control spectrum. While the use of paraquat is common, the introduction of new peanut cultivars calls for more information on their tolerance when paraquat is applied alone and in tank-mixtures. Even with nearly half of the state growing peanut in rainfed conditions, there is little information available on the effects irrigation has on peanut injury from paraquat. Paraquat is known to cause injury to peanut foliage, however cultivars have been able to overcome the foliar damage without loss of yield or grade. The use of safeners in tank-mixtures has been shown to reduce phytotoxicity. This research project is designed to highlight paraquat’s efficiency in weed control and provide insight into herbicidal injury in irrigated and non-irrigated situations for current high-yield potential cultivars that have not been previously tested for their tolerance to paraquat.

Experiments were planted at the University of Georgia’s Ponder Farm near Ty Ty, GA and the Southwest GA Research and Extension Center in Plains, GA. At each location two trials were conducted, one irrigated and one rainfed. A split-plot design with main plot effects in a randomized complete block with 4 replications was used. The main-plot treatment effect was herbicide treatments. Six herbicide treatments included 1) Prowl + Valor (PRE) followed by Gramoxone alone (POST), 2) Prowl + Valor (PRE) followed by Gramoxone + Storm (POST), 3) Prowl + Valor (PRE) followed by Gramoxone + Storm + Dual Magnum (POST), 4) Prowl + Valor (PRE) followed by Gramoxone + Storm + Warrant (POST), 5) Prowl + Valor (PRE) only, and 6) non-treated check (handweeding only). The sub-plot effect of cultivars included 1) Georgia-06G, 2) Georgia-14N, and 3) TUFRunner™ ‘511’ at the Ty Ty location, and those three plus a fourth (FloRun™ ‘157’) at the Plains location. Planting, digging, and harvest date information is presented in Table 1.

For the irrigated trials, herbicide treatment did not have a significant effect on yield (Table 2). However, cultivars had a significant effect on yield (kg/ha) for both locations. There were no interaction effects between cultivar and herbicide treatment in either location. The Gramoxone + Storm + Warrant treatment did have a greater numerical yield than all other herbicide treatments in both locations, so when combined over locations and adding another year of data, this will be worth monitoring. Although, this herbicide treatment also reduced grade compared to most other herbicide treatments at Plains. TUFRunner™ ‘511’ and Georgia-06G had the greatest yields at this location. FloRun™ ‘157’ did not yield as well as the other three cultivars. Georgia-14N produced more than a 2% improvement in grade over FloRun™ ‘157’.

At Ty Ty, each of the three cultivars were significantly different from each other, with Georgia-06G yielding greater than TUFRunner™ ‘511’ and both yielding more than Georgia-14N. There were no differences in grade at this location for either herbicide treatment or cultivar.

Table 1. Planting, digging, and harvest dates for paraquat tank-mixture trials at Ty Ty and Plains, GA, 2016

	Ty Ty – Irrig.	Ty Ty – Rainfed	Plains – Irrig.	Plains - Rainfed
Planting	May 12, 2016	May 11, 2016	May 16, 2016	May 16, 2016
Digging	Oct. 7, 2016	Oct. 18, 2016	Oct. 12, 2016	Oct. 18, 2016
Harvest	Oct. 11, 2016	Oct. 21, 2016	Oct. 17, 2016	Oct. 24, 2016

Table 2. Peanut yield and grade (Total Sound Mature Kernel [TSMK] for irrigated herbicide treatments and cultivars at Plains, GA and Ty Ty, GA in 2016. Means within a column not followed by the same letter are significantly different at the P=0.05 level.

Herbicide Treatment	Yield (kg/ha)		Grade (% TSMK)	
	<i>Plains</i>	<i>Ty Ty</i>	<i>Plains</i>	<i>Ty Ty</i>
Gramoxone	4048	6286	71.1 a	75.6
Gramoxone + Storm	3881	6462	71.0 a	75.8
Gramoxone + Storm + Warrant	4530	6754	69.0 b	75.9
Gramoxone + Storm + Dual Magnum	4159	6646	71.3 a	76.1
PRE	4144	6161	69.7 ab	75.9
NTC	4152	5717	71.4 a	75.6
Cultivars				
Georgia-06G	4249 ab	6779 a	70.3 ab	76.2
Georgia-14N	4073 bc	5812 c	71.8 a	75.9
TUF-Runner ‘511’	4498 a	6422 b	70.7 ab	75.4
FloRun™ ‘157’	3789 c	X	69.6 b	X

For the rainfed trial, herbicide treatment and cultivar treatment did not have a significant effect on yield (Table 3). Yet, using pairwise comparisons FloRun™ ‘157’ again yielded the least of all the cultivars. Conversely from the irrigated trial, the Gramoxone + Storm + Warrant treatment had the highest grade, and was the only herbicide treatment that was an improvement

over the NTC. Because of the discrepancy between the irrigated and rainfed trials at the same location, more data will be needed to come to an informed conclusion about this phenomenon.

Table 3. Peanut yield and grade (Total Sound Mature Kernel [TSMK]) for rainfed herbicide treatments and cultivars at Plains, GA and Ty Ty, GA in 2016. Means within a column not followed by the same letter are significantly different at the P=0.05 level.

Herbicide Treatment	Yield (kg/ha)		Grade (% TSMK)	
	<i>Plains</i>	<i>Ty Ty</i>	<i>Plains</i>	<i>Ty Ty</i>
Gramoxone	3245	3312	67.0 cd	60.7
Gramoxone + Storm	4171	3205	68.8 ab	58.8
Gramoxone + Storm + Warrant	4092	3077	69.5 a	58.4
Gramoxone + Storm + Dual Magnum	3785	3205	68.5 abc	62.2
PRE	3442	3341	66.3 d	59.4
NTC	3283	3071	67.4 bcd	60.3
Cultivars				
Georgia-06G	3727	3112	68.7 a	58.7
Georgia-14N	3793	3227	67.2 b	61.4
TUF-Runner '511'	4053	3143	69.1 a	59.8
FloRun™ '157'	3107	X	66.7 b	X

Overall, none of the herbicide treatments provided any benefit in yield. Water was certainly a limiting factor in the rainfed trials, as evidenced by such low grades. These trials did demonstrate that FloRun™ '157' does not appear to be a competitive cultivar in Georgia compared to what is already commercially available. Georgia-06G and TUFRunner™ '511' were the most consistent cultivars in producing good yield and grade. The study is being repeated in both locations in 2017 for combined analyses. Detailed weed control ratings on multiple weed species and crop injury ratings will be incorporated prior to publication submission.

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