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2011 Southeastern Peanut Research Initiative
Final Report

Title: Determining optimum plant stand for making an economically viable replant decision, and other stand implications on pest incidence, agronomic, and economic factors

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There are a number of reasons that a grower can end up with a poor plant stand in a year, varying from traveling too fast with the planter, having vacuum pressure set too low on a planter, poor quality seed with low germination, and many others. Thus, peanut scientists are faced every year with questions on whether a grower should replant his field when faced with a poor plant stand. This becomes a highly significant economic decision for a grower, especially when large seeded cultivars are used and/or seed prices are high. If a grower does not re-plant a poorly established field, it can lead to additional pest pressures from *Tomato spotted wilt tospovirus* (TSWV), weed pressure in skipped drill row, and ultimately lead to low yields, grades, and profit. However, spraying a burndown herbicide and starting over will essentially double seed costs and require an extra trip through the field for herbicide application.

Therefore, it is essential to understand how low seed emergence rates will impact various parts of the production cycle. Before we recommend an expense replant option, knowing exactly what to expect from a poor stand is essential. Therefore, the objectives of this research were to investigate how poor seedling emergence impacts weed management recommendations and overall crop yield potential.

Materials and Methods

Experiments were conducted at the Plant Science Research and Education Center in Citra, FL. The cultivar Ga06G was planted at a rate of 6 seeds per foot on April 25. Aldicarb was applied in furrow at planting. The experiment was irrigated as needed and fungicides were applied regularly to suppress both foliar and soil-borne diseases.

One week after seedling emergence, plots were thinned by hand to desired density. The densities were non-thinned (control), one twelve inch gap every five feet of row, or one twenty four inch gap every five feet of row. The two middle rows of the four-row plot were thinned. In each of these three densities, six herbicide programs were applied (Table 1).

Weed control was then monitored throughout the season. At peanut maturity, as determined by the hull scrape method, plots were harvested and pods were weighed for yield determination.

The experiment was conducted as a 3 (seeding density) by 6 (herbicide) factorial with treatments arranged in a randomized complete block fashion. Each treatment possessed four replications. Data were analyzed using ANOVA to determine the presence or absence of main effects and interactions. Were no main effects were observed, data were pooled accordingly.

Results

Seeding density did not impact weed control or final peanut yield. However, the main effect of herbicide was significant. Therefore, data were pooled across seeding density and only the effect of herbicide treatment will be discussed (Table 2).

Crabgrass control was greater than 90% for all treatments, except non-treated and Cadre + 2,4-DB alone, through 45 days after planting (DAP) (Table 2). Though some would question why Valor + Cadre was better than Cadre alone, we have consistently observed crabgrass suppression from Valor. Though this level of activity is not sufficient to omit other grass control herbicides (i.e. Prowl), it does assist to some degree. Crabgrass control was further observed when comparing Valor followed by (fb) sequential applications of Gramoxone as compared to sequential applications of Gramoxone alone. It is likely that the Valor application delayed crabgrass growth and allowed the crabgrass to be smaller at the time of the Gramoxone application. A few cm in crabgrass height can greatly affect the efficacy of Gramoxone on many grass species. The presence of a residual herbicide also greatly affected Palmer amaranth control (Table 3). The Palmer amaranth population at the site was ALS-sensitive, thus Valor and Cadre were highly effective with control greater than 88% at 60 DAP. However, the two applications of Gramoxone only provided greater than 90% control through the first 45 days. After this, newly germinated plants became established and reduced control to 63% by 60 DAP. Conversely, hemp sesbania control was greater than 93% for all herbicide treatments except for Cadre and 2,4-DB which provided only 25% control by 60 DAP (Table 4).

Canopy width was consistently reduced by the sequential applications of Gramoxone (Table 5). This was anticipated since we have generally observed a reduction in canopy growth from a single Gramoxone application. Previous research by Boyer (2009)[1] found that single applications of Gramoxone can reduce peanut canopy closure by up to 7 days. However, this effect was somewhat inconsistent with respect to application timing and the presence of Basagran. Regardless, two applications of Gramoxone occurring 14 days apart consistently decreased canopy width in the present experiment. Peanut yield was decreased for all treatments that did not contain a preemergence application of Valor. For treatments containing Cadre + 2,4-DB alone, yield was 1350 lb/A. This was most likely influenced by the presence of hemp sesbania. Both of these herbicides have limited activity on this weed, while being fairly effective on the other weed species present. Therefore, hemp sesbania was released by the applications and reached heights of over 6'. When Gramoxone + Basagran was applied sequentially, Palmer amaranth was the dominate weed. In this treatment, peanut yield was 2500 lb/A and was significantly less than those treatments containing Valor.

The objectives of this research were to determine how poor stand establishment affects overall yield potential and weed management. However, the density of the peanut skips (none, 12" every 5' of row, 24" every 5' of row) was not sufficient to show a yield decrease if weeds were properly managed. It is not known what level of peanut stand loss is sufficient to result in yield reduction, but that level was not reached in the current experiment.

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[1] Boyer, J.A. 2009. Influence of herbicides and time of application on peanut (Arachis hypogaea L.) injury and yield. Thesis. University of Florida.

Additionally, when replanting decisions are being made about due to poor stand establishment, the impact of weed competition should not be part of the decision. A proper herbicide program that combines prememrgence herbicides with timely applications of the proper postemergence herbicides will likely control the weeds without being heavily influenced by peanut density.

Table 1. Herbicide rate and treatment timings used in this experiment.

Herbicide[a]	Rate	Timing[b]
Weedy Check		
Weed Free Check		
Valor Cadre 2,4-DB	3 oz/A 4 oz/A 16 oz/A	At Plant 21 DAP 45 DAP
Valor Gramoxone + Basagran Gramoxone + Basagran 2,4-DB	3 oz/A 12 + 16 oz/A 12 + 16 oz/A 16 oz/A	At Plant 14 DAP 28 DAP 45 DAP
Cadre 2,4-DB	4 oz/A 16 oz/A	21 DAP 45 DAP
Gramoxone + Basagran Gramoxone + Basagran 2,4-DB	12 + 16 oz/A 12 + 16 oz/A 16 oz/A	14 DAP 28 DAP 45 DAP

[a]Weedy check had no weed control while weed free were maintained using both herbicides and hand weeding.
[b]DAP – days after planting.

Table 2. Influence of herbicide program on control of large crabgrass.

Herbicide	Rate (oz/A)	Timing[b]	Large Crabgrass		
			% control		
			30 DAP	45 DAP	60 DAP
Weedy Check			0 c	0 c	0 d
Weed Free Check			92 ab	90 a	93 a
Valor Cadre 2,4-DB	3 4 16	At Plant 21 DAP 45 DAP	97 a	94 a	91 ab
Valor Gramoxone + Basagran Gramoxone + Basagran 2,4-DB	3 12 + 16 12 + 16 16	At Plant 14 DAP 28 DAP 45 DAP	98 a	95 a	96 a
Cadre 2,4-DB	4 16	21 DAP 45 DAP	87 b	85 b	87 bc
Gramoxone + Basagran Gramoxone + Basagran 2,4-DB	12 + 16 12 + 16 16	14 DAP 28 DAP 45 DAP	94 a	90 ab	84 c

Table 3. Influence of herbicide program on control of Palmer amaranth.

Herbicide	Rate (oz/A)	Timing[b]	Palmer amaranth		
			% control		
			30 DAP	45 DAP	60 DAP
Weedy Check			0 d	0 c	0 d
Weed Free Check			92 b	99 a	92 b
Valor Cadre 2,4-DB	3 4 16	At Plant 21 DAP 45 DAP	98 a	99 a	99 a
Valor Gramoxone + Basagran Gramoxone + Basagran 2,4-DB	3 12 + 16 12 + 16 16	At Plant 14 DAP 28 DAP 45 DAP	99 a	99 a	98 a
Cadre 2,4-DB	4 16	21 DAP 45 DAP	85 c	90 b	88 b
Gramoxone + Basagran Gramoxone + Basagran 2,4-DB	12 + 16 12 + 16 16	14 DAP 28 DAP 45 DAP	90 b	93 b	63 c

Table 4. Influence of herbicide program on control of hemp sesbania.

Herbicide	Rate (oz/A)	Timing[b]	Hemp Sesbania		
			% control		
			30 DAP[a]	45 DAP	60 DAP
Weedy Check			-	0 c	0 c
Weed Free Check			-	94 a	97 a
Valor Cadre 2,4-DB	3 4 16	At Plant 21 DAP 45 DAP	-	94 a	93 a
Valor Gramoxone + Basagran Gramoxone + Basagran 2,4-DB	3 12 + 16 12 + 16 16	At Plant 14 DAP 28 DAP 45 DAP	-	97 a	99 a
Cadre 2,4-DB	4 16	21 DAP 45 DAP	-	40 b	25 b
Gramoxone + Basagran Gramoxone + Basagran 2,4-DB	12 + 16 12 + 16 16	14 DAP 28 DAP 45 DAP	-	97 a	95 a

[a]Hemp sesbania was not dense enough to rate until 45 DAP.

Table 5. Influence of herbicide program on peanut canopy width and yield.

Herbicide	Rate (oz/A)	Timing[b]	Canopy Width		Yield
			Cm		Lb/A
			45 DAP	60 DAP	135 DAP
Weedy Check			32 ab	56 b	500 d
Weed Free Check			37 a	63 ab	3800 a
Valor Cadre 2,4-DB	3 4 16	At Plant 21 DAP 45 DAP	35 a	68 a	4100 a
Valor Gramoxone + Basagran Gramoxone + Basagran 2,4-DB	3 12 + 16 12 + 16 16	At Plant 14 DAP 28 DAP 45 DAP	28 bc	48 c	3750 a
Cadre 2,4-DB	4 16	21 DAP 45 DAP	35 a	64 a	1350 c
Gramoxone + Basagran Gramoxone + Basagran 2,4-DB	12 + 16 12 + 16 16	14 DAP 28 DAP 45 DAP	23 c	53 bc	2500 b