

**2012 Southeastern Peanut Research Initiative
Final Report**

Title: Influence of Palmer amaranth density and time of removal on peanut yield

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Palmer amaranth continues to spread across the southeast. Although this weed has the potential to devastate peanut yield, numerous research trials have shown that timely application of preemergence herbicides (namely flumioxazin and S-metolachlor) can effectively manage this weed. The limitation of this program is that rainfall or irrigation is necessary to activate these herbicides. With approximately 30% of peanuts irrigated in FL, a dry spring can result in preemergence herbicide failures.

There are postemergence options such as paraquat and the diphenylether herbicides. However, neither of these herbicides possess soil activity, paraquat has 28 days after emergence limitation, and the diphenylether herbicides will not control weeds >3-4" in height. If there is a situation where preemergence herbicides fail, these two postemergence options will only provide a modicum of control. Fortunately, we now have the option for mid to late-season control using paraquat in a wiper. Research has shown 90 to 100% control when a 50% paraquat solution is applied to the top 50% of Palmer amaranth. Controlling these large plants will surely reduce Palmer amaranth seed production and improve harvest efficiency. However, we have no data to document when these weeds should be removed to limit further yield reduction.

Most weed competition models suggest that late season weeds do little to impact yield. But Palmer amaranth is likely more competitive than many of our commonly occurring weeds. Recent experiments in cotton have shown that a 6' Palmer amaranth creates a progressive water deficit as much as 6' away from the base of the weed (Ferrell, unpublished data). Considering this, it is possible that mid to late-season competition could be more severe than we have anticipated. If this is the case, recommendations need to be put in place to remove these as soon as 50% of the plant can be treated with a wiper. If this isn't the case, then delaying the wiper application until a few weeks prior to harvest would be sufficient. Therefore, the objectives of this research are to determine how Palmer amaranth density and time of removal impact peanut yield.

Materials and Methods

Peanuts were planted on April 24th 2012, and April 30 2013 at the PSREU in Citra, FL. The plots were kept weed free for the first 30 days after planting. At 30 days, Palmer amaranth seeds were spread down the middle two rows of each experimental plot. After the weeds emerge, they were to be thinned to a density of 4, 8, and 12 plants per 25' of row. Each experimental plot consisted of 6 rows to minimize the weed interference from one plot to the next. After the populations were established, the weeds were to be removed at 60, 75, 90, and 130 days after planting; plots were to remain weed free after each Palmer harvest. The 130 day treatment was to have plants removed immediately prior to harvest to minimize digging loss. At time of removal, Palmer amaranth height, width, and biomass were to be measured. At the conclusion of the trial, peanut yield data would be collected.

Results

2012. The idea behind this trial was to monitor the impact of mid-season weed competition on peanut yield. Since we generally understand the impact of early season competition, we chose to keep the plots clean for the first 30 days after planting. We chose to use Valor (flumioxazin) herbicide at 1 oz/A to accomplish this. Flumioxazin has a short field half-life and also doesn't tolerate soil disturbance (incorporation). Since we were seeding the weeds at 30 days, and disturbing the soil, it was assumed that the flumioxazin would not interfere with seedling establishment.

The seeding process was conducted by dragging a hoe down the center two rows of each plot. A small furrow, approximately 2 inches deep, was opened and herbicide treated soil was pushed to the side. Palmer amaranth seed were then mixed with bagged builders sand and hand sprinkled into the newly opened furrow. After the sand/seed mixture was placed, someone would walk down the furrow and press the seed into the soil to ensure good seed/soil contact.

After 10 days it was observed that no seedlings, across the entire trial, had emerged and the seeding process was repeated. Again, no seedlings emerged. The entire trial was seeded a third time at 49 days after planting – but establishment still did not occur. Since we were nearing our first Palmer amaranth harvest time and few plants were present, the trial was abandoned.

It should be noted that the viability of that Palmer amaranth seed lot we used was high. We used that same seed lot for a greenhouse trial and high levels of seedling emergence was observed.

2013. We surmised that the failure in 2012 was due to the fact that flumioxazin was used in the trial. Though we used a very low rate and expected it to have dissipated by the time of seeding, it may have still caused the failure of Palmer amaranth establishment. Therefore, in 2013, peanuts were planted and no preemergence herbicides were used across the entire trial. We intended to manage all weeds with postemergence herbicides such as clethodim, bentazon, 2,4-DB, etc.

At 30 days after planting, the same seeding method described above was employed. As we monitored the plots, it was observed within 5 days after seeding that many Palmer amaranth seedlings had emerged. We were then to simply wait until the scheduled time of weed removal to begin data collection. However, as the weeks passed, very little seedling growth was observed. The seedlings that emerged didn't die, but they simply failed to grow. Image 1 shows Palmer amaranth seedlings that were 30 days old. It was expected that a 30 day old Palmer amaranth should be 2 feet in height, if not more. Since it was time for the first Palmer amaranth harvest and only seedlings were present, the study was abandoned for a second year.

The reason for the failure of seedling vigor in 2013 is unknown. Other weeds in the plots, such as purple nutsedge, Florida beggarweed, and crabgrass grew as expected. There were also Palmer amaranth seedlings that emerged in boarder rows (that we didn't plant) that grew as expected. Likewise, the peanuts demonstrated proper vegetative and reproductive growth characteristics.

It is regrettable that this trial, though twice conducted, failed to produce usable data. Even more troubling is that we do not know why the failures occurred, particularly in the second year. Since two failures have occurred and future success is uncertain, it is likely that we will surrender this project with no plans of moving it forward.

Image 1. Thirty day old Palmer amaranth seedlings in 60 day old peanuts.

