

Evaluating the Impact of Canopy Defoliation at Two Critical Timings in Peanut

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Introduction

Peanut (*Arachis hypogaea* L.) can be defoliated by a number of pests; including insects, diseases, and mammals. Pod yield can be adversely affected by canopy defoliation (Boote et al., 1980; Bourgeois and Boote, 1992); however information is lacking regarding critical levels of defoliation at multiple points in the growing season. Preliminary defoliation research indicated peanuts were sensitive to defoliation at two timings; 40 and 80 days after emergence (DAE). Knowing how current cultivars respond to multiple defoliation levels at these critical timings will help extension personnel make informed pest management decisions and will allow growers to become better stewards of pesticides and economic resources.

This primary objective of this research is to determine the critical level of canopy defoliation at two plant development stages; late vegetative/early reproductive growth, and mid-late reproductive growth.

Materials and Methods

Locations: 2015 & 2016- R. R. Foil Research Farm, Starkville, MS, Delta Research and Extension Center, Stoneville, MS

Plots: **Starkville:** Two rows on raised beds, measuring 0.97 m wide x 4.57 m long. **Stoneville:** Two rows on raised beds, measuring 1.02 m wide x 6.10 m long. Managed using a medium disease risk program.

Planting: Cultivar Georgia-06G seeded at 20 seed m⁻¹ at a depth of 5.1 cm using a two-row Monosem precision air planter.

Treatments: Leaves removed by hand at 40 or 80 DAE at 10 (2016), 20, 40, 60, 80 and 100 %, with a non-defoliated control.

Experimental Design: Randomized Complete Block with four replications.

Sampling: **Starkville-** Crop biomass measurements were taken at 0, 2, and 4 weeks after defoliation (WAD). Pictures were taken of the full plot at 0, 2 and 4 WAD. Row height and width measurements were taken at 2 and 4 WAD.

Stoneville- Pictures were taken at 0, 2 and 4 WAD. Row height and width measurements were taken at 2 and 4 WAD.



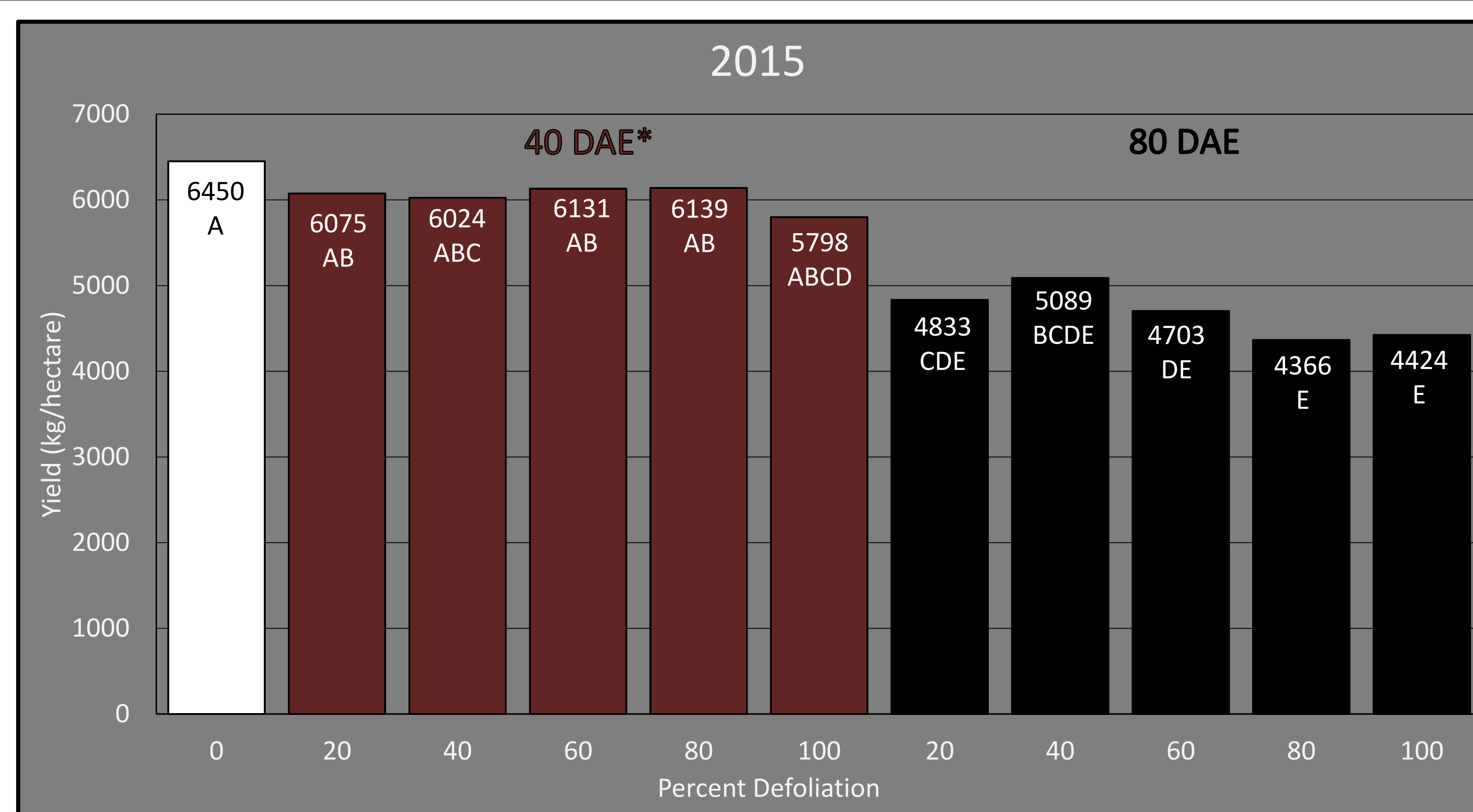
Results

- Graphs for each year represent both Starkville and Stoneville locations, with yields combined across sites due to lack of treatment x site interactions.
- No yield loss occurred for any defoliation level at 40 days after emergence in either year.
- In 2015, significant yield loss occurred for all defoliated treatments at 80 days after emergence when compared to the non-defoliated control.
- In 2016, significant yield loss was observed at all defoliation levels 40% and above at the 80 days after emergence defoliation timing.
- Mean yield loss for 40% defoliation at 80 DAE is 16.6%, equal to a loss of \$480 per hectare using \$440/MT peanuts and mean observed non-defoliated yield of 6,569 kg/ha.

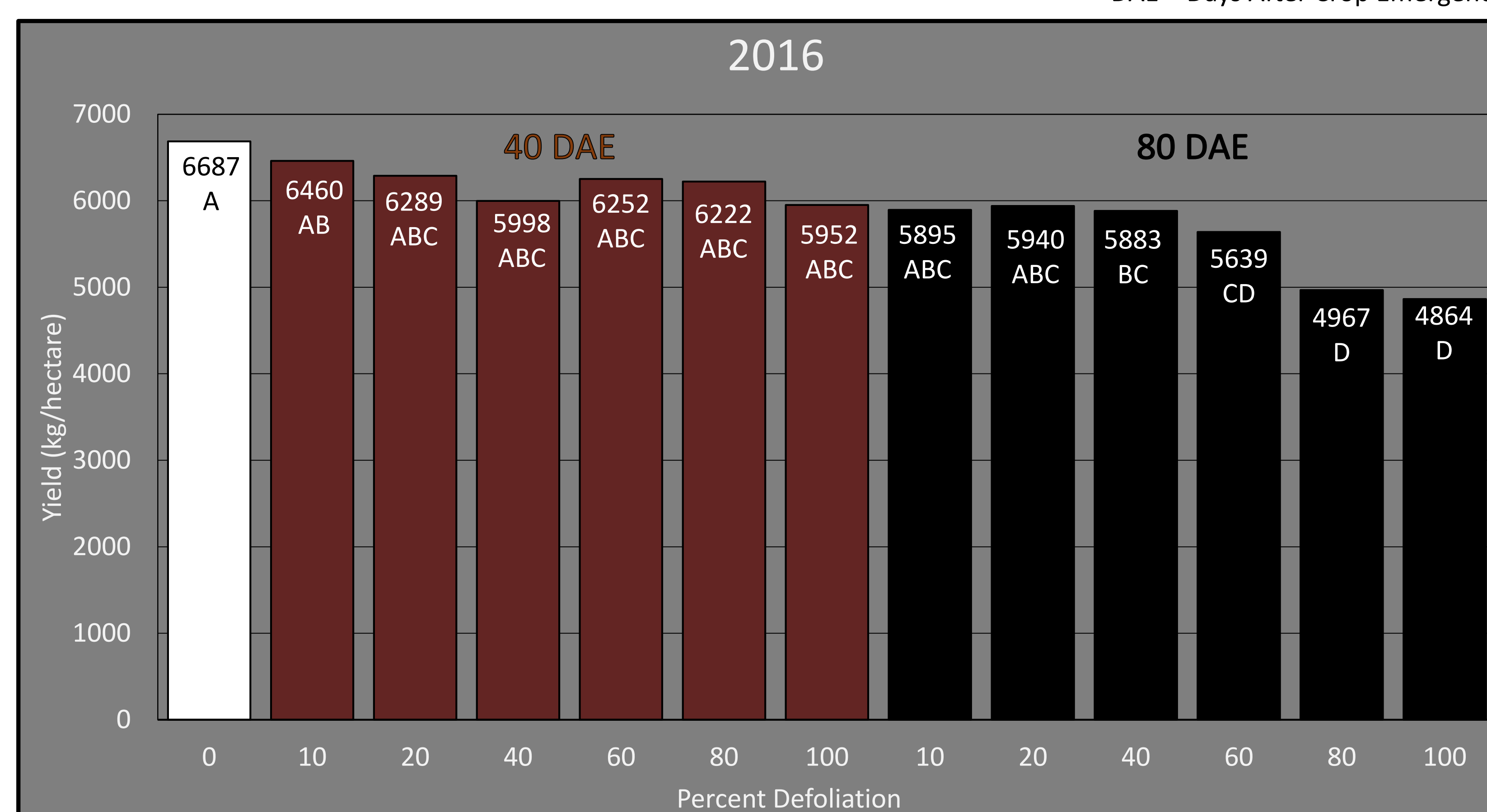
Future Research

Future research is needed to determine numbers of caterpillars and duration of feeding needed to cause each level of defoliation.

These numbers will be used to create defoliator-count-based thresholds that may be used in addition to these defoliation percentage-based thresholds in order to give growers, agents, and consultants as many tools as possible when making management decisions.



*DAE = Days After Crop Emergence



Analysis and Discussion

At 40 DAE, peanut plants are typically starting reproductive growth and are beginning to flower vigorously. Because no yield loss occurred at the 40 DAE timing, growers should have little concern about defoliation prior to pod set and fill, as the indeterminate peanut plant has shown the ability to compensate for stresses at that point in the season.

Peanut plants are setting and filling pods at 80 DAE, and as a result are at their peak demand for water and nutrients. Pod yields were consistently reduced at this timing when defoliation was 40% and above. In 2015, a 20% defoliation reduced yield, meaning growers should be highly aware of defoliation at times of peak demand.

Because of the dense canopy the crop produces, growers, consultants, and extension personnel have shown little concern for defoliators in peanuts relative to other crops. This research shows that defoliation can significantly reduce yield, meaning those making management decisions in peanut should be sensitive to defoliating pests, especially during mid-late reproductive growth phases.

References

- Boote, K. J., Jones, J. W., Smerage, G. H., Barfield, C. S., and R. D. Berger. 1980. Photosynthesis of Peanut Canopies as Affected by Leafspot and Artificial Defoliation. *Agronomy Journal*. 72:247-252.
- Bourgeois, G., and K. J. Boote. 1992. Leaflet and canopy photosynthesis of peanut affected by late leaf spot. *Agronomy Journal*. 84:359-366.