

# Influence of Variety Selection on Leaf Spot Management with Various Fungicide Programs in North Carolina

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## Introduction

- Early and late leaf spot (*Passalora arachidicola* and *Nothopassalora personata*, respectively) can reduce yield as much as 50% in peanut (*Arachis hypogaea*) that are not treated with fungicides [1].
- Selection of cultivars that show partial resistance to leaf spot can increase leaf spot management.
- Current fungicide spray programs in North Carolina start approximately 45 days after planting (DAP) and can continue until 120 DAP based on weather conditions.
- Typical fungicide sprays are applied every 2 weeks, while some fungicides remaining effective for 3-4 weeks.
- Farmers could spray 5-6 times during the growing season
- Cultivars Bailey II and Sullivan have shown to have partial resistance to leaf spot [2].

## Objective

- Determining effectiveness of fungicide programs based on cultivar resistance to pathogens is important for establishing recommendations to farmers.

Trmt	Spray: 1	Spray: 2	Spray: 3	Spray: 4	Spray: 5
1	None	None	None	None	None
2	Chlorothalonil	Miravis plus Elatus	None	Provost Silver	Chlorothalonil
3	Chlorothalonil	Provost Silver	Revytek	Lucento	Chlorothalonil
4	Chlorothalonil	Chlorothalonil plus Tebuconazole	Chlorothalonil plus Tebuconazole	Chlorothalonil plus Tebuconazole	Chlorothalonil
5	Chlorothalonil	None	Chlorothalonil plus Tebuconazole	None	Chlorothalonil
Approx. DAP	45	60	75	90	105

Table 1: Showing the 5 different fungicide spray treatments at each of the 5 different spray timings that are approximately 45, 60, 75, 90, and 105 day after planting (DAP).

## Material and Methods

- At three different locations in North Carolina (Lewiston-Woodville, Rocky Mount, and Whiteville) three different Virginia market type cultivars Bailey II, Emery, and Sullivan were planted early to mid-May treated with 5 different fungicide spray programs for leaf spot and stem rot (Table 1).
- 4 rows by 30 feet plot.
- Split plot design (variety as whole plot unit, fungicide as sub-plot unit), with 4 replications.
- Fungicide sprays were applied using a backpack sprayed at 15 gallons per acre, with 11002 nozzles, at 3 mph, and 31 psi.
- Visual ratings for leaf spot incidence (percentage of leaves with lesions) and percent canopy defoliation caused by leaf spot disease ratings were recorded using a 0 to 100% scale 10 days before harvest and at harvest (Image 1).
- At each location, pod maturity was similar for all varieties and peanut pods were dug and vines inverted on the same day.
- Pod yield data was recorded.
- Data were subjected to ANOVA using Proc GLIMMIX in SAS with locations and replications considered random effects and cultivars and fungicide programs considered fixed effects.

## Results

- When pooled over the three locations, applying fungicide increased control of leaf spot and protected yield compared with non-treated peanut.
- Generally, Bailey II was affected less by leaf spot than Sullivan, and both Bailey II and Sullivan expressed greater resistance to leaf spot than Emery (Figure 1).
- The least effective fungicide program was treatment 5, when the intervals between applications of chlorothalonil alone and chlorothalonil plus tebuconazole was increased from 2 weeks to 4 weeks. This program was designed to demonstrate the value of cultivar resistance when fungicide sprays are limited and is not a recommended program.
- In contrast, fungicide program treatment 4, that included chlorothalonil alone or with tebuconazole, was the most effective fungicide program when fungicides were applied.
- Fungicide programs including Miravis (treatment 2) or Revytek and Lucento (treatment 3) suppressed leaf spot and protected yield but not as well as the chlorothalonil plus tebuconazole bi-weekly program (Figure 2).

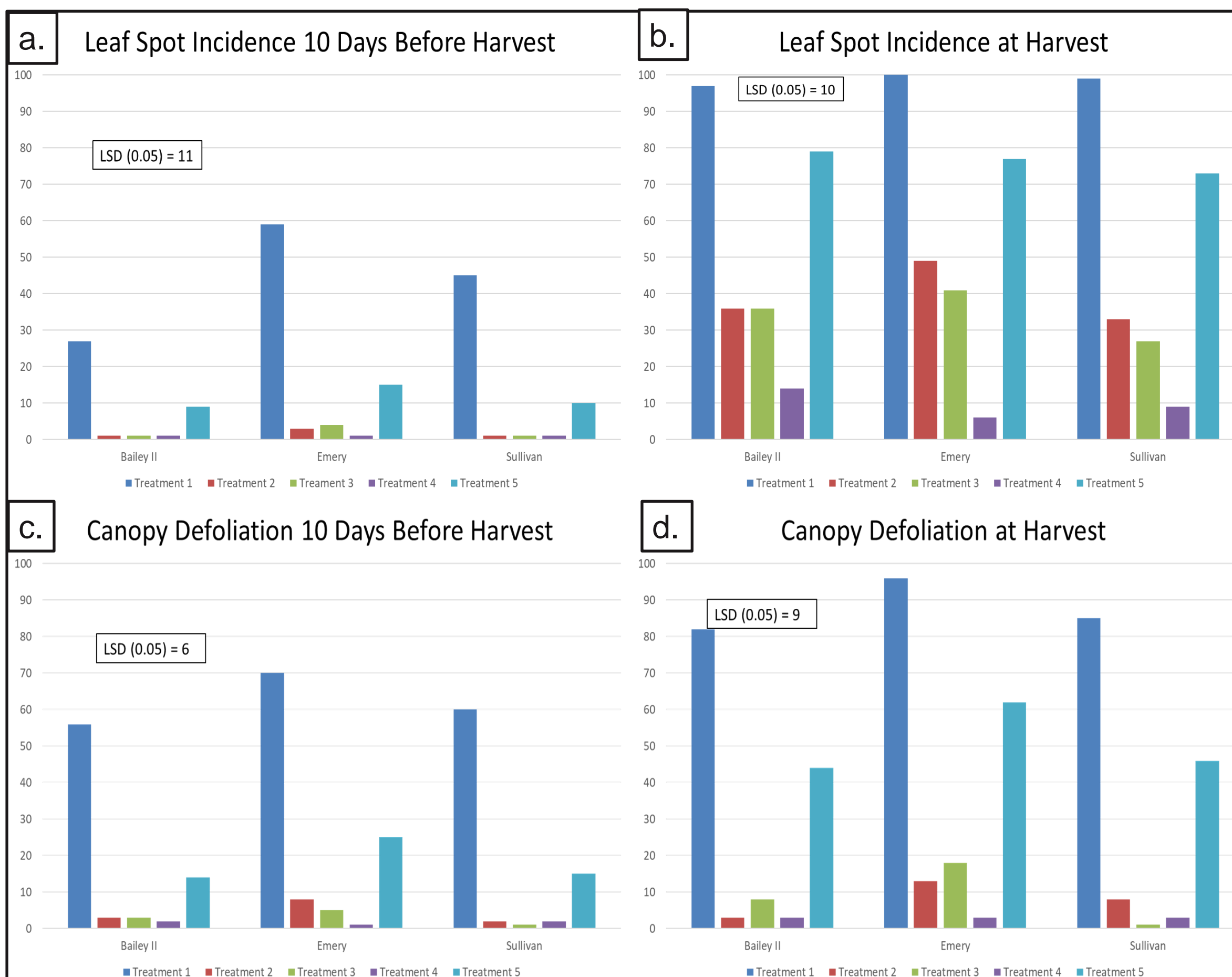


Figure 1: All data is pooled over all three locations and replications in 2021. Incidence is visually rated as percent of leaves with lesions. Defoliation is visually rated as percent of leaves lost. 1a) shows leaf spot incidence taken 10 days before harvest. 1b) shows leaf spot incidence taken at harvest. 1c) shows canopy defoliation taken 10 days before harvest. 1d) shows canopy defoliation taken at harvest.

## Reference

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2. North Carolina Crop Improvement Association. (n.d.). Peanut Varieties. Retrieved from <https://nccrop.com/varieties.php/6/Peanut>
3. Campbell W. V. 1978. Effect of Pesticide Interactions on the Twospotted Spider Mite on Peanuts. Peanut Science; 5 (2): 83–86. doi: <https://doi.org/10.3146/i0095-3679-5-2-7>
4. Shew, B. 2020. NC State Extension Publications: Peanut Leaf Spots. Retrieved from <https://content.ces.ncsu.edu/early-leaf-spot-of-peanut-1>

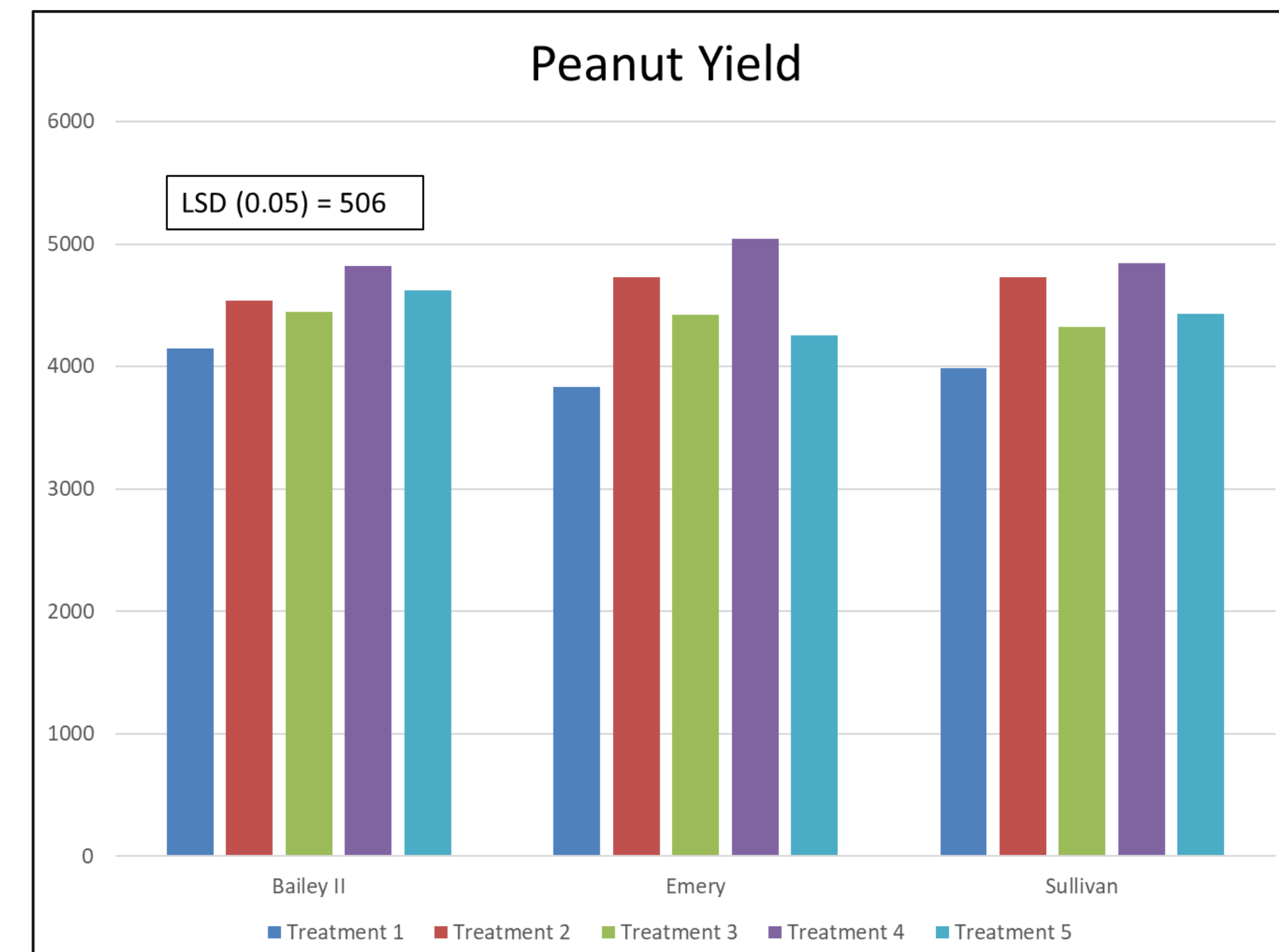


Figure 2: Showing pod yield, adjusted to pounds per acre, with fungicide and variety data pooled over 3 location in 2021.

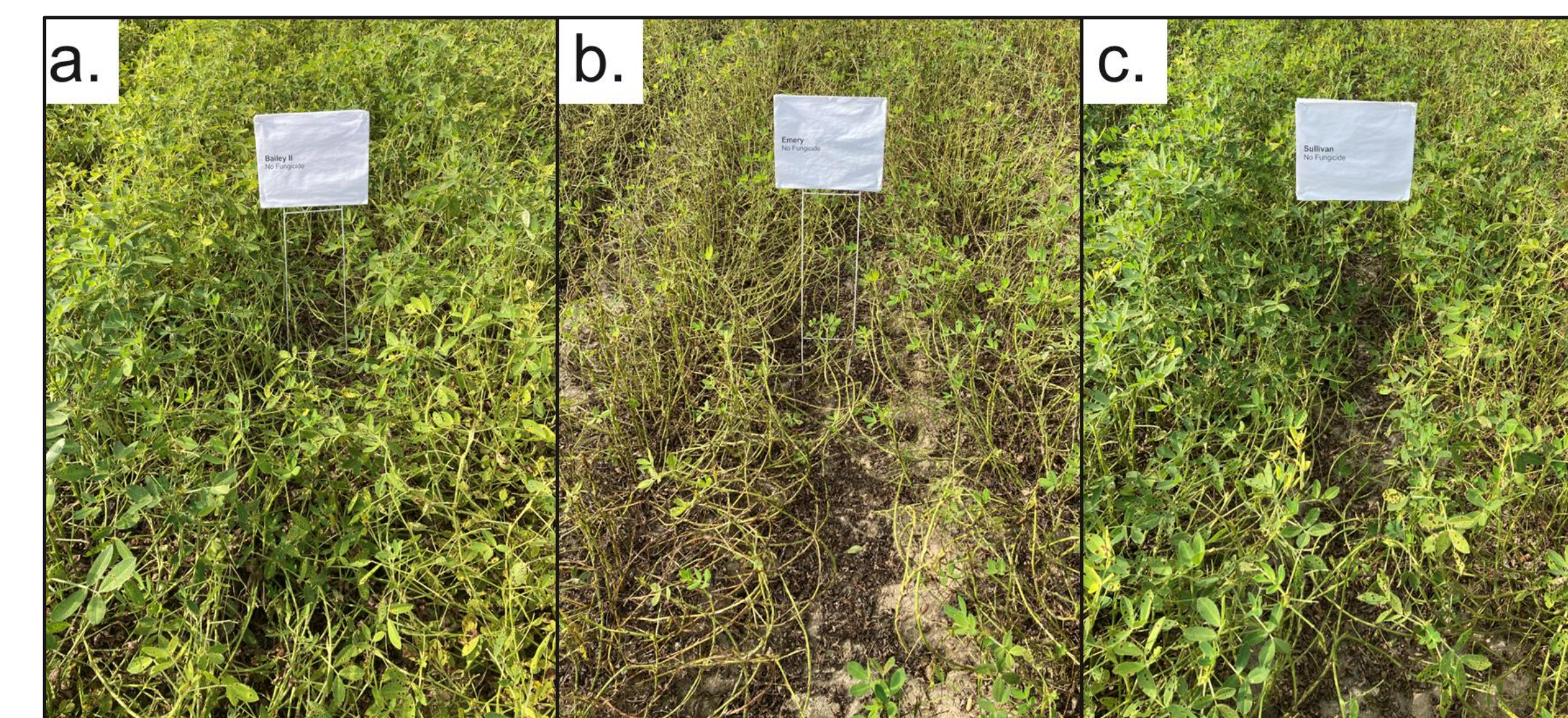


Image 1: 1a) Bailey II with no fungicide treatments. 1b) Emery with no fungicide treatments. 1c) Sullivan with no fungicide treatments

## Discussion

- Bi-weekly applications of chlorothalonil plus tebuconazole is a cost-effective treatment that preformed well across all 3 varieties if a consistent 14-day interval can be maintained.
- Possible concerns with treatment 5 increasing problems with spider mites and Sclerotinia blight [3].
- Replication of this test is being conducted in following years to build a stronger recommendation for the farmers.
- Further similar research could be conducted on other varieties grown in North Carolina.