Vegetative Injury Occurring at Different Intensity and Growth Stage Effect on Peanut

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Introduction

- Physical injury of crops can occur from different sources:
  - Hail storm damage
  - Animal feeding
  - Movement of animals or equipment through the field
- Understanding this injury aids management decisions after it occurs.
- Evaluating recovery through yield loss, unharvested pods, and Normalized Difference Vegetation Index (NDVI) compared to non-injured plants will help growers and insurance adjusters decide the best course of action for management after injury.

Objective – Determine if physical injury to vegetation impacts peanut production.

Materials and Methods

- Experiment conducted in Tifton, GA in 2020 using Georgia-06G seed planted at 19.7 seed m^{-1}.
- Used Randomized Complete Block design with factorial arrangement of injury timing x intensity.
- Four replications.
- ANOVA with PROC GLIMMIX in SAS 9.4 with mean separation using pairwise t-tests.
- Injury treatments applied using gas powered weed trimmer with flexible rubber tines at wide angle at varying RPM (Figures 1 and 2).
- Injury treatments applied at four times in the season at three intensities:
  - 30, 60, 90, and 120 Days After Planting (DAP)
  - 33, 66, and 99% injury levels (Figure 3)
- Unharvested pods collected by sifting through the inversion zone to scavenge remaining pods left in the soil after digging.
- NDVI measured using a Crop Circle Active Light Sensor (Holland Scientific).

Figure 1. Injured peanut plant after treatment

Figure 2. Injury simulation

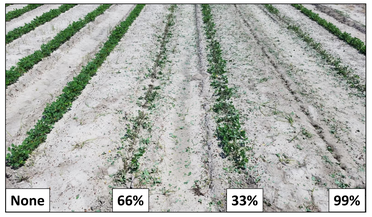

Figure 3. Calibration rows, injury levels at 30 DAP

Results

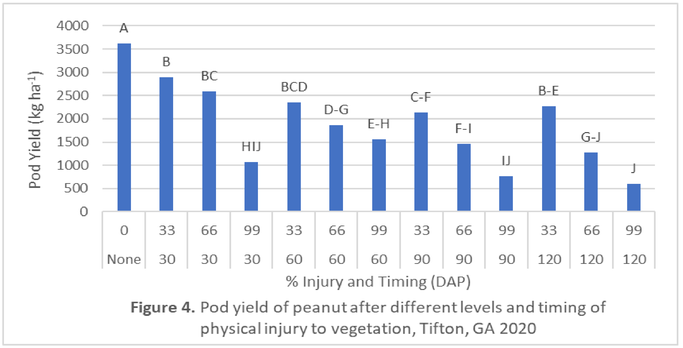

Figure 4. Pod yield of peanut after different levels and timing of physical injury to vegetation, Tifton, GA 2020

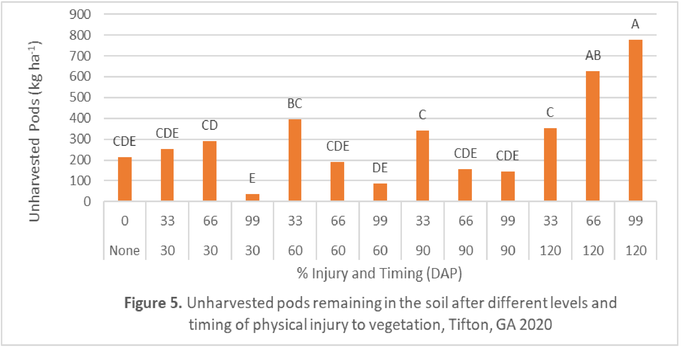

Figure 5. Unharvested pods remaining in the soil after different levels and timing of physical injury to vegetation, Tifton, GA 2020

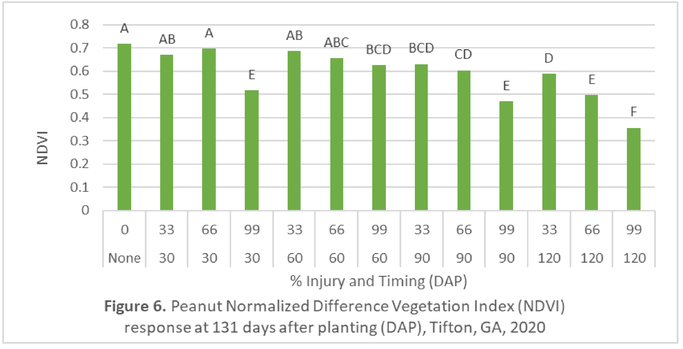

Figure 6. Peanut Normalized Difference Vegetation Index (NDVI) response at 131 days after planting (DAP), Tifton, GA, 2020

Yield (Figure 4)

- All treatments that sustained physical damage had yield reduction.
- Yield reduced with increasing intensity for any given treatment date.
- For 33% and 66% intensities, yield at 30 DAP was greater than at least one later date at similar intensity, then stabilized after 90 DAP.
- Largest reduction in yield between 60 and 90 DAP timings for 99% intensity. Continued management after 99% intensity not recommended regardless of timing.
- Economic analysis needed to determine breakeven for other timings and intensity levels.

Unharvested Pods (Figure 5)

- Unharvested pods greatest at 120 DAP with 66% and 99% injury.
- Injury at 66 or 99% intensity may salvage yield potential with fewer losses if harvested immediately since no opportunity for recovery.
- Greater pod loss with lighter intensity at 30 and 60 DAP may be offset with different management strategies to recuperate yield potential. More research needed.

NDVI (Figure 6)

- NDVI values recovered for 33% and 66% injury levels at 30 and 60 DAP.
- Greatest opportunity for vegetative recovery at 60 DAP timing across all intensities.
- Canopy recovery reduced when injury occurred at 90 or 120 DAP. This response likely because of shift to reproductive production.

Conclusions

- Physical injury to peanut canopy had a negative influence on yield
- Plants can recover from less severe damage that occurs early in the season but are unable to recover from severe damage occurring late in the season.