



The Effect of Hog Grazing on Non-target Organisms in Michigan Apple Orchards

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Introduction

Rotational grazing of hogs is an alternative method for controlling a few insect pest species that attack apples. Hog grazing targets the pests Plum Curculio, Codling Moth, and Oriental Fruit Moth in their larval life stage when they are present inside developing apples. Hogs are released during the 'June drop' period to consume any apples on the orchard floor. Many of these dropped apples contain the pest larvae, which are also consumed by the hogs thereby reducing pest populations. Previous research has shown hog grazing to significantly reduce insect pest damage to fruit. While it is known hogs are impacting the targeted insect pests, it is not known if hogs are impacting any non-target organisms. The hogs may be providing a valuable pest control service, but it is possible they are reducing ecosystem services provided by beneficial organisms already present in the apple orchards. The goal of this study was to determine if hog grazing impacts any non-target organisms in Michigan apple orchards.

Ground Surface Non-targets

Organisms found:



Methods

We conducted the study in a high density organic apple orchard in Genesee Co., MI. There were 3 control plots and 3 hog grazed plots. Each plot was ~2 acres with 10 rows of trees. Grazed plots were bordered by electric fencing to prevent hogs from escaping. Twenty-four Berkshire hogs were rotated through each grazed plot twice for 1.5 weeks per rotation, for a total of 3 weeks per grazed plot. Hogs ranged from 50 - 90 lbs each. Rotation began June 7, 2012 and ended August 17, 2012.



Figure 1: Berkshire Hogs

All samples were equally distributed within each plot. All samples were taken back to the lab where non-targets were counted and identified.

Flying Non-targets

- 12 yellow sticky cards per plot
- hung in trees 6 ft off the ground
- 1 week before hogs (5/30/12 - 6/6/12)
- 1 week after hogs (8/23/12 - 8/30/12)



Figure 2: Yellow Sticky Card

Ground Surface Non-targets

- 12 pitfall traps per plot
- 16 oz deli cup filled with 50% ethylene glycol solution
- 1 week before hogs (5/30/12 - 6/6/12)
- 1 week after hogs (8/23/12 - 8/30/12)



Figure 3: Pitfall trap

Flying Non-targets

We quantified beneficial and pest flying non-targets.

Beneficial insects found:

Parasitoids



Dolichopodids

Syrphids

Tachinids

Lady beetles

Lacewings



Pest insects we found:

Thrips

Leafhoppers

Aphids

Apple maggot flies



Beneficial Flying Non-targets

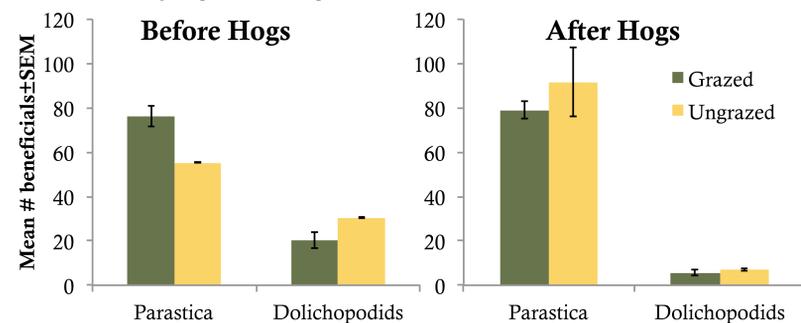


Figure 5: Mean Number of Beneficial Flying Non-targets.

- Syrphids, tachinids, lady beetles, and lacewings all had means of < 2, so were excluded from Fig. 5
- No significant differences were found for any of the beneficial insects between treatments at either sampling date (ANOVA $\alpha=0.05$)
- There was a significant decrease of Dolichopodids, Syrphids, Tachinids, Lady Beetles, and Lacewings between sampling dates (TukeyHSD $\alpha=0.05$)

Pest Flying Non-targets

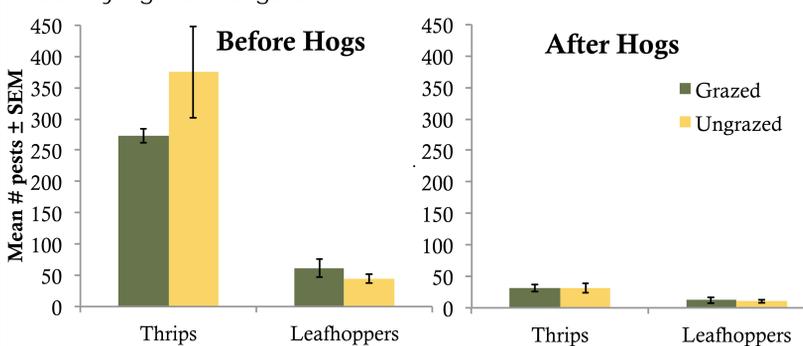
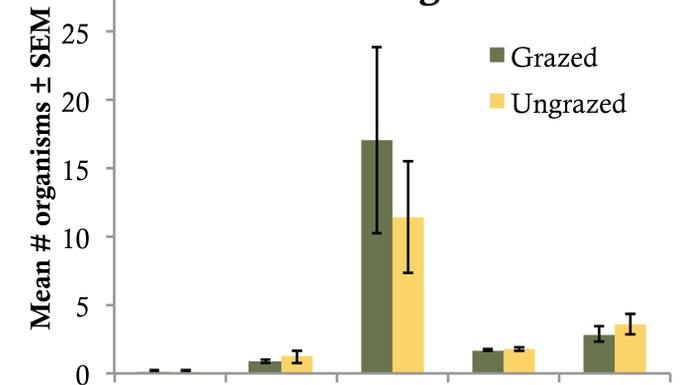


Figure 6: Mean Number of Pest Flying Non-targets

- Aphids and Apple Maggot Flies had means of < 1, so were excluded from Fig. 6
- No significant differences were found for any of the pest insects between treatments at either sampling date (ANOVA $\alpha=0.05$)
- There was a significant decrease of all pest insects between sampling dates (TukeyHSD $\alpha=0.05$)

Before Hogs



After Hogs

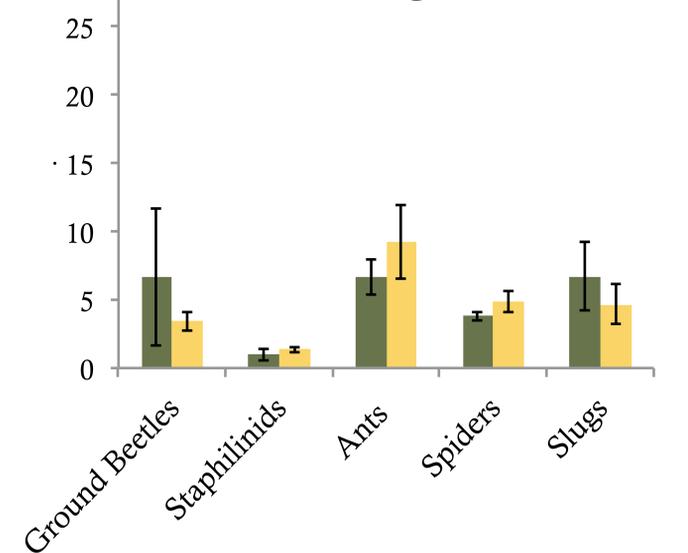


Figure 6: Mean Number of Ground Surface Non-targets

- No significant differences were found for any of the ground surface organisms between treatments at either sampling date (ANOVA $\alpha=0.05$)

Conclusions

- This preliminary study indicates hog grazing does not impact the abundance of flying (Fig. 4 & 5) or ground surface (Fig. 6) non-target organisms in Michigan apple orchards
- The timing of sampling significantly influenced the abundance of certain groups of organisms (Fig. 4 & 5) so it is possible differences between treatments could have been missed for those organisms
- A more in depth study with more sampling dates and species specific sampling methods is needed to confirm the preliminary findings