

Pilot Survey on Diversity and Density of Dung Beetles in Cattle Pastures in New York

Ken Wise-NYS IPM Field Crops and Livestock Coordinator

Introduction

Dung beetles on pasture are an important part of the agro-ecosystem. They recycle manure, increase soil health and compete with horn & face flies for resources. We plan to determine the diversity and abundance of species of dung beetles in pastures in New York. This research will determine the effects livestock insecticides have on dung beetle populations in cattle pastures.

Objectives

1. Test dung beetle collection equipment (2021)
2. Identify which species and abundance of dung beetles are in cattle pastures across New York State (2021-2022)
3. Compare the differences in dung beetle populations and species diversity with producers that use and do not use ivermectin and feed through insecticides (2022)
4. Determine the life cycle time gaps of decreased dung beetle activity, and possible opportunities for augmentation of certain species of dung beetles to fill those gaps as a means to control face and horn flies (2022)

Materials and Methods

We tested a system of collecting dung beetles weekly on farms using a modified berlese funnel. This is contained in a large tote called a dung beetle lab. To test the equipment we collected beetles weekly on an organic dairy and a no-pesticide beef grazing operation. Manure samples (1.5 cups) were collected from four dung pats per farm weekly and placed in the funnels. The manure would stay in the funnel system a week. We collected the beetles at the end of each week and placed new samples into the funnels. We collected four manure samples per farm weekly from May 1 to September 30. The dung beetles were identified in the fall.



On-Farm Dung Beetle Lab

Results

Manure samples were collected weekly and placed into a modified berlese funnel and harvested beetles from May 1 to Sept. 30. The total number of Scarabaeidae beetles caught were 1135. Seven species were Aphidiini and two species were Onthophagini. The predominant species collected were Aphidiini. Aphidiini that were collected were: *Calamosternus granarius*, *Colobopterus erraticus*, *Aphodius fimetarius*, *Otophorus haemorrhoidalis*, *Oscarinus rusicola*, *Teuchestes fossor*, and *Blackburneus stercorosus*. Onthophagini species that were collected were *Onthophagus taurus* and *Onthophagus hecate*. *Colobopterus erraticus* was the most abundant species. Many beetles in the family of hydrophilidae collected.

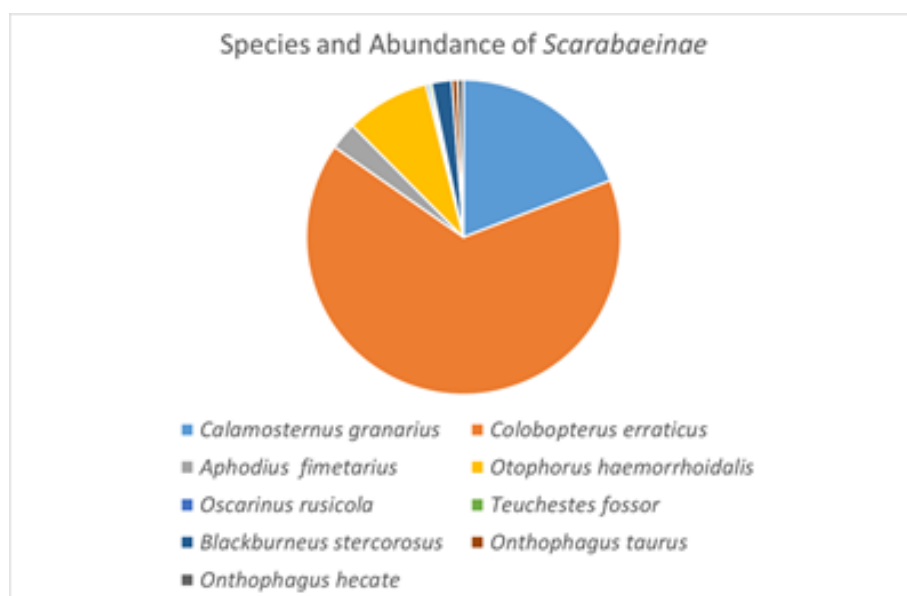


Figure 1: Species and Abundance of Scarabaeidae

Alt text: This is a pie graph showing the percentage of species of dung beetles collected over the full season.

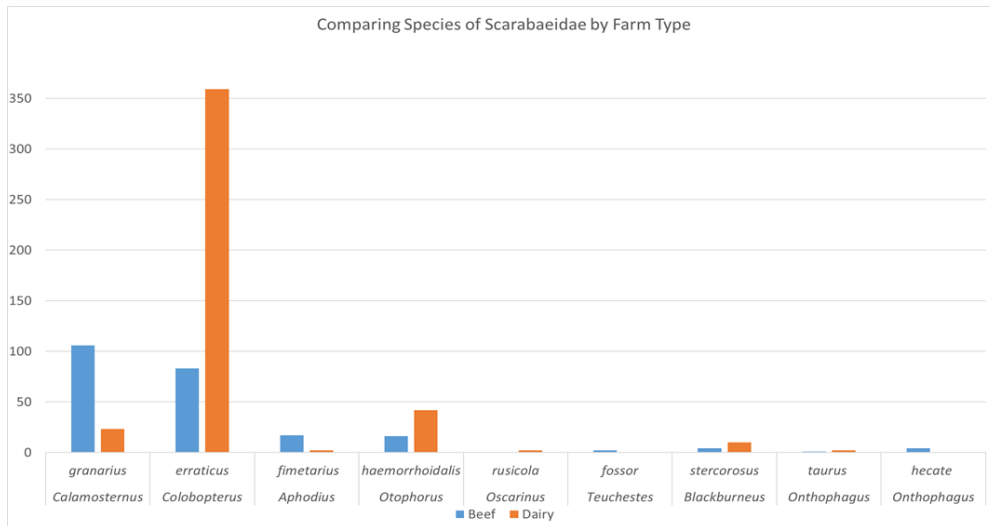


Figure 2: Species and Abundance of Scarabaeidae by cattle type

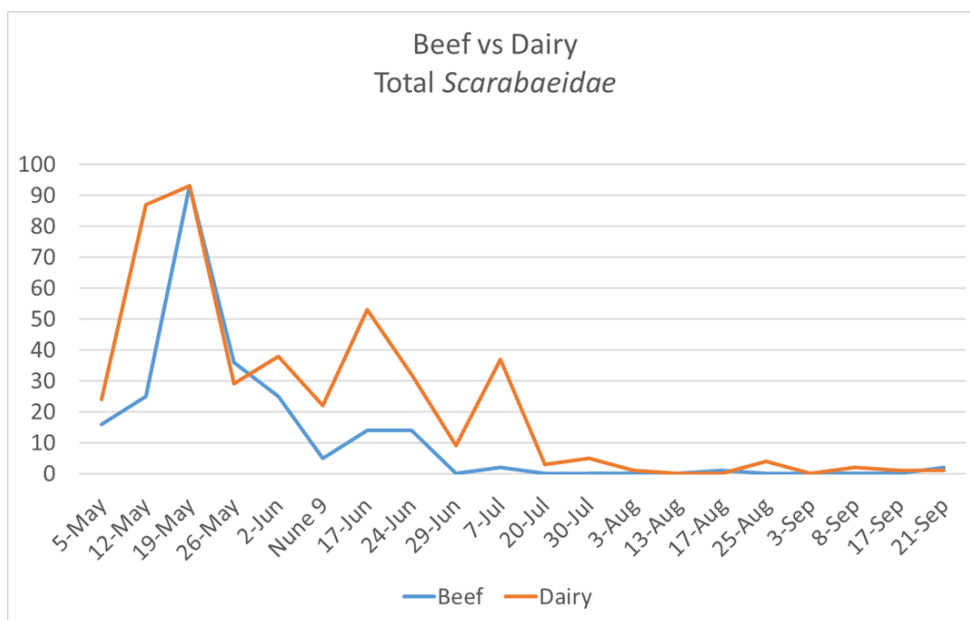


Figure 3: Total number of *Scarabaeidae* by farm weekly captures

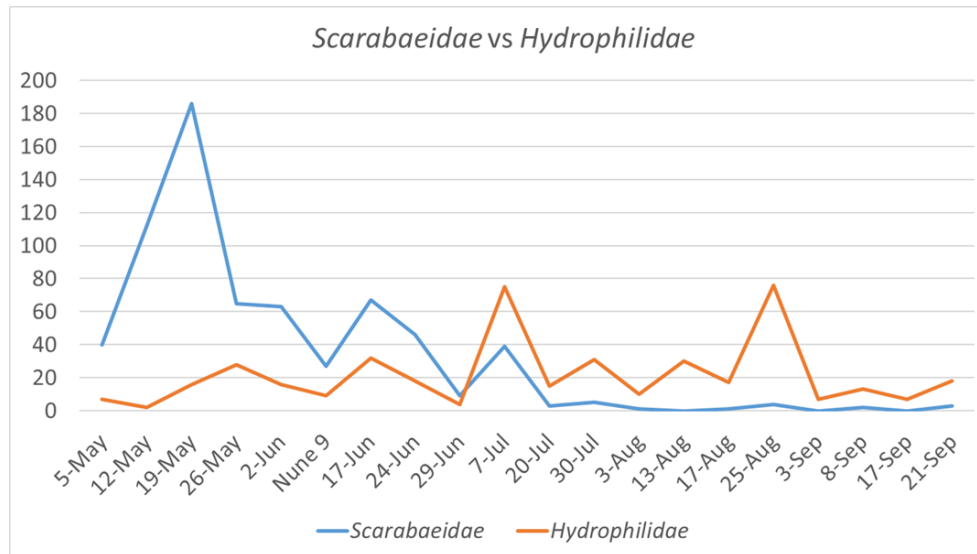


Figure 4: Weekly collected *Scarabaeidae* and *Hydrophilidae*

Discussion

The pilot study was to test the collection equipment and conduct a pre-study to our 2022 10-farm study. We were able to work out collection methods and processing samples. The tribe of *Aphidiini* were the most abundant *Scarabaeidae* collected. *Aphidiini* are not as effective at recycling manure as *Onthophagini*. We collected two species of *Onthophagini*. These beetles are tunnel species and move manure into the soil to lay their eggs. They are very effective at competing with horn and face flies for manure resources.

There were more beetles collected on the dairy farm than the beef farm with the same number of samples collected weekly. The number of *Scarabaeidae* collected declined dramatically by mid-July. As they declined *Hydrophilidae* species of beetles increased.

Future research will evaluate if feed-through insecticides have any effect on *Scarabaeidae* abundance and diversity across New York State. We will pursue in the future the possibility of rearing and releasing *Onthophagini* species found in the 2022 survey to keep populations high when normally as the summer continues dung beetles numbers decline.