

The role of year-round vegetation in ditches as refugia for key insect pests and insect natural enemies affecting Ventura County crops

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Introduction

- Agricultural drainage ditches host year-round weedy vegetation, including invasive plant species and non-native insect pests that may colonize adjacent farms.
- Three key agricultural pests causing multimillion dollar losses to coastal agriculture (*Plutella xylostella*, *Lygus hesperus*, and *Frankliniella occidentalis*) use ditches as refugia, yet little is known about their year-around population dynamics.
- Understanding the role that ditches play in supporting vegetation and harboring arthropods is a vital component of integrated pest management.

Objectives

- Characterize vegetation composition, structure, and seasonal changes of agricultural ditches.
- Explore relationship between ditch vegetation and presence of insect pests.
- Identify if agricultural drainage ditches serve as refugia for insect predators and contribute to pest suppression in adjacent crops.

Methods

Vegetation Surveys

- Eight ditches in the Oxnard Plain, Ventura County.
- Surveys were conducted in **November 2023, and March, June, and September 2024**.



- At each site, **20m transects** were laid out parallel to the waterline with **1m² quadrats** placed every **5m** above and below the transect to record:

- Species composition
- Percent cover

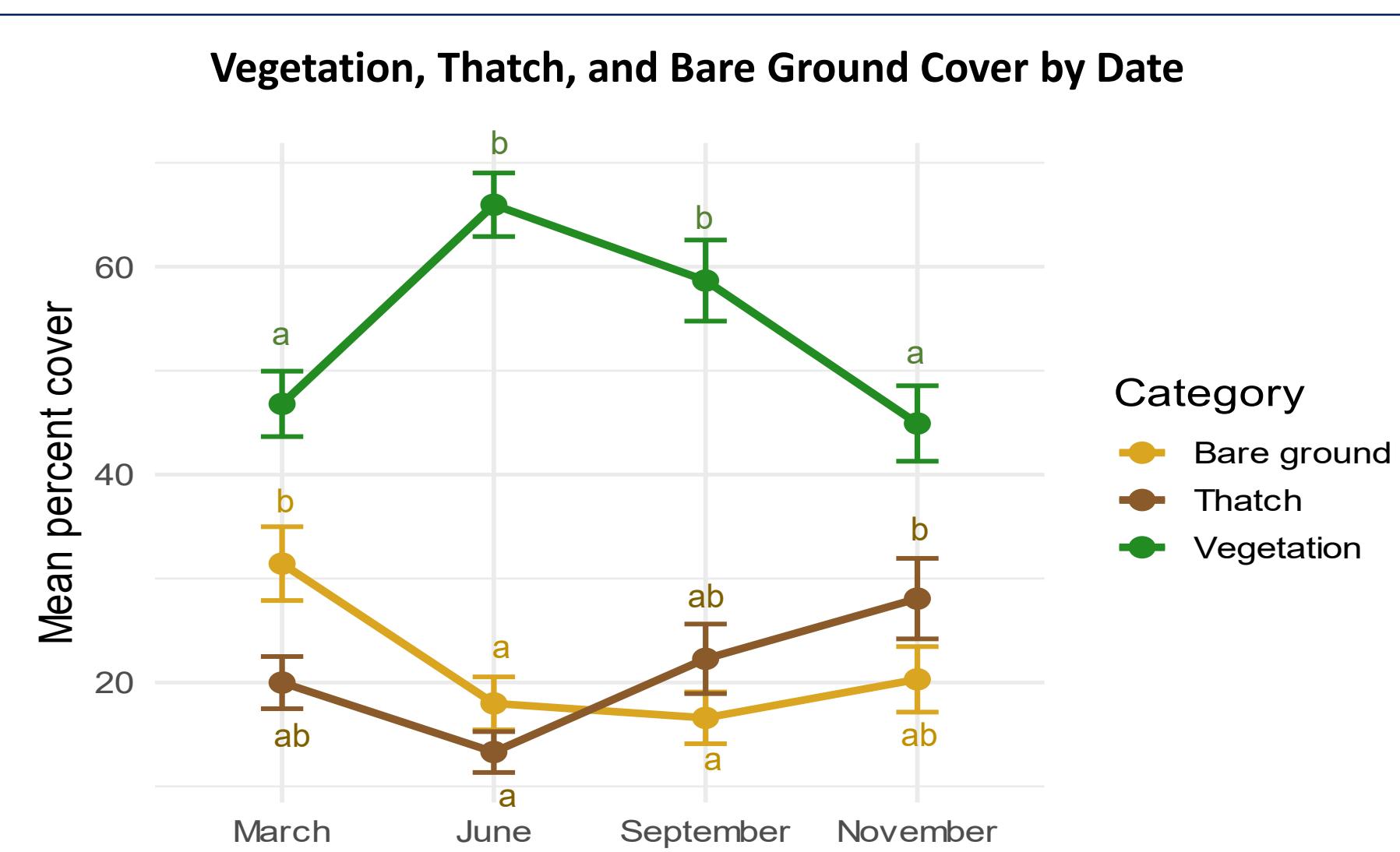


Arthropod Sampling

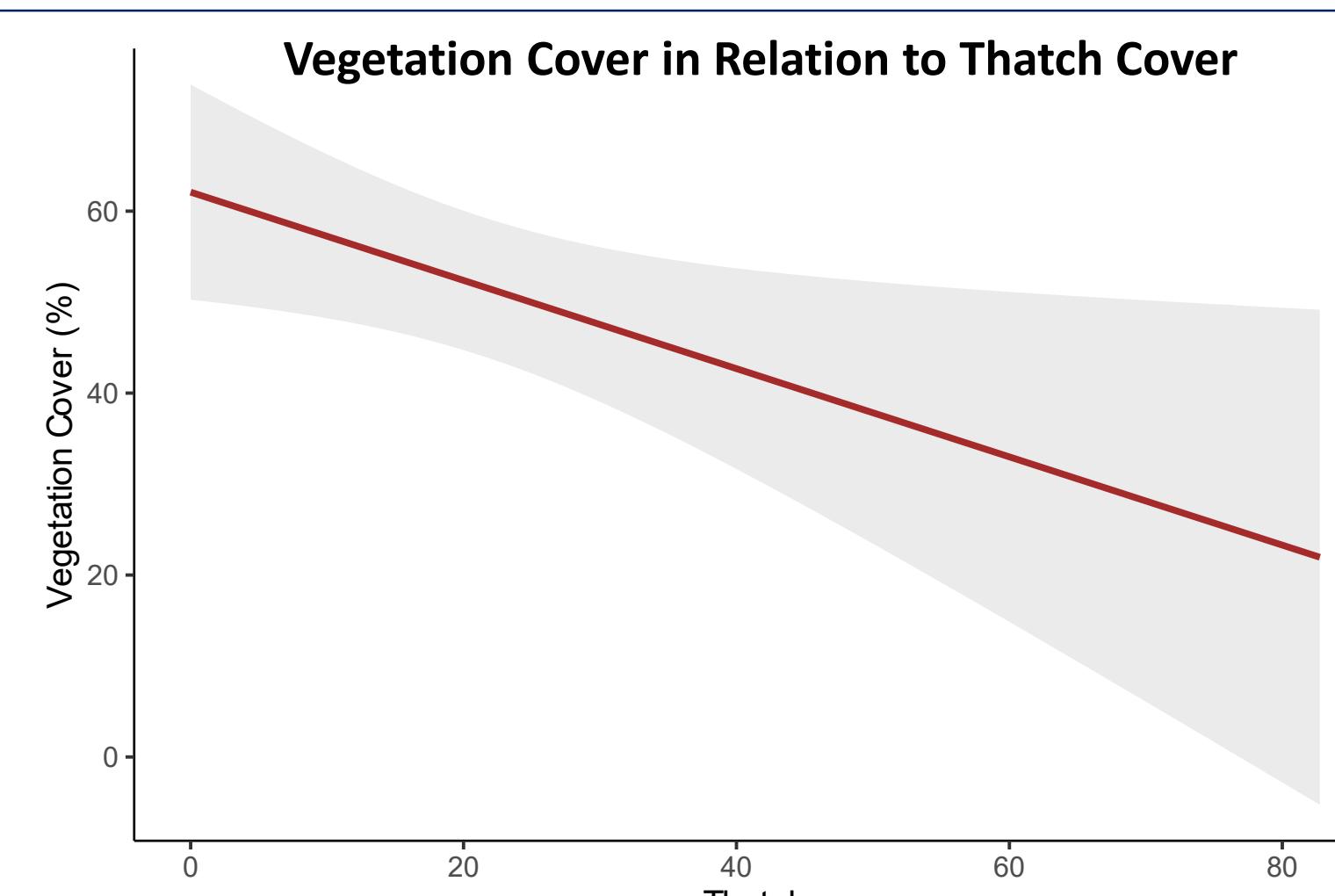
- Collected five 15-second vacuum samples per plant species for 2-3 dominant plant species per site
- Samples were frozen, cleaned, sorted, and identified to the lowest possible taxonomic level.

Results

Surveys revealed **higher non-native species counts** than native species counts in every season, with March peaking at **94% non-natives** while September had the **highest native percentage at 25%**.

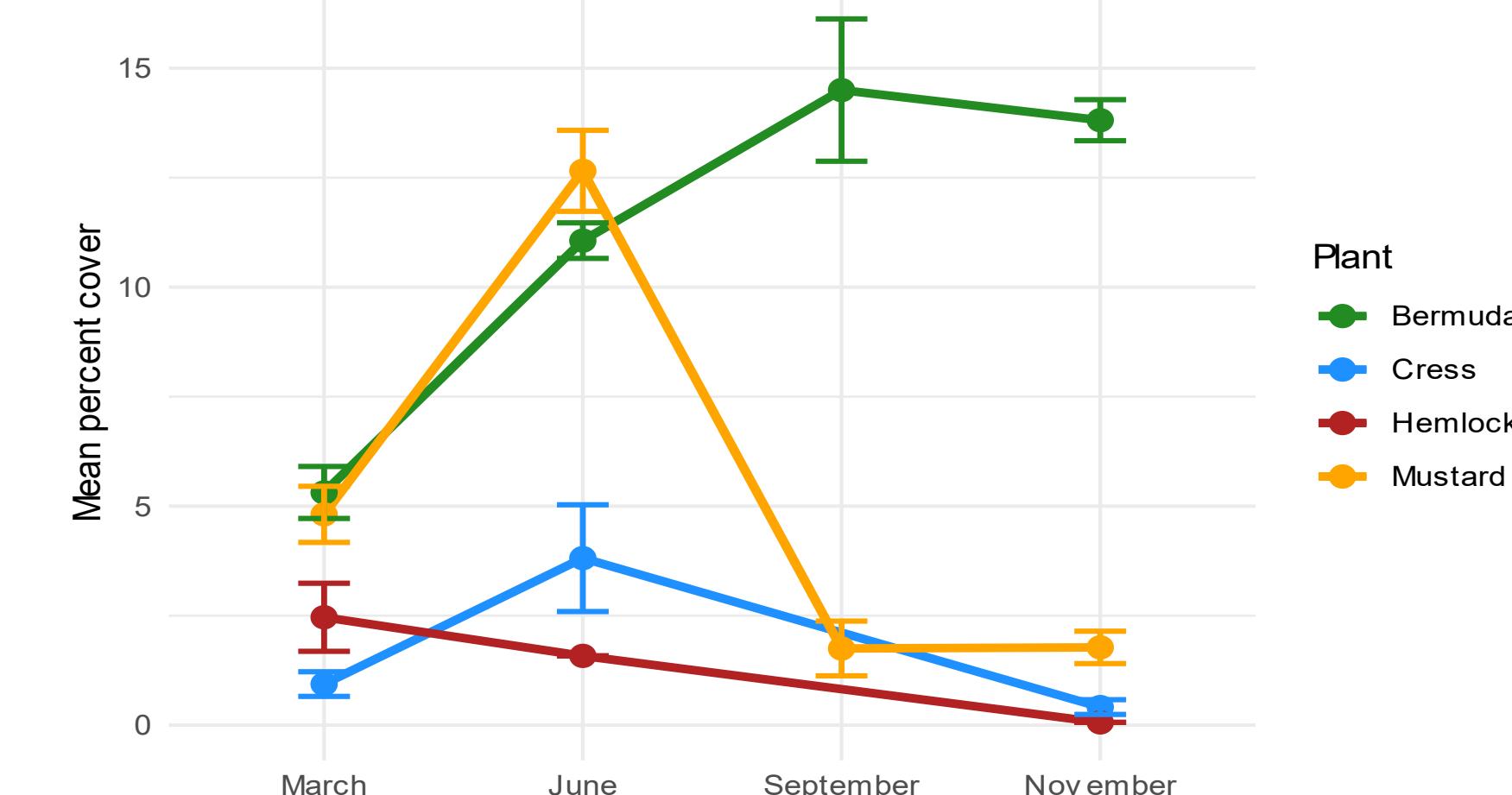


Vegetation ($p=0.006$), bare ground ($p=0.04$), and thatch ($p=0.003$) differed across dates with June (66%) having the highest average vegetation coverage.



There was a significant relationship between vegetation and thatch cover, while vegetation cover did not have a significant relationship with percent bare ground.

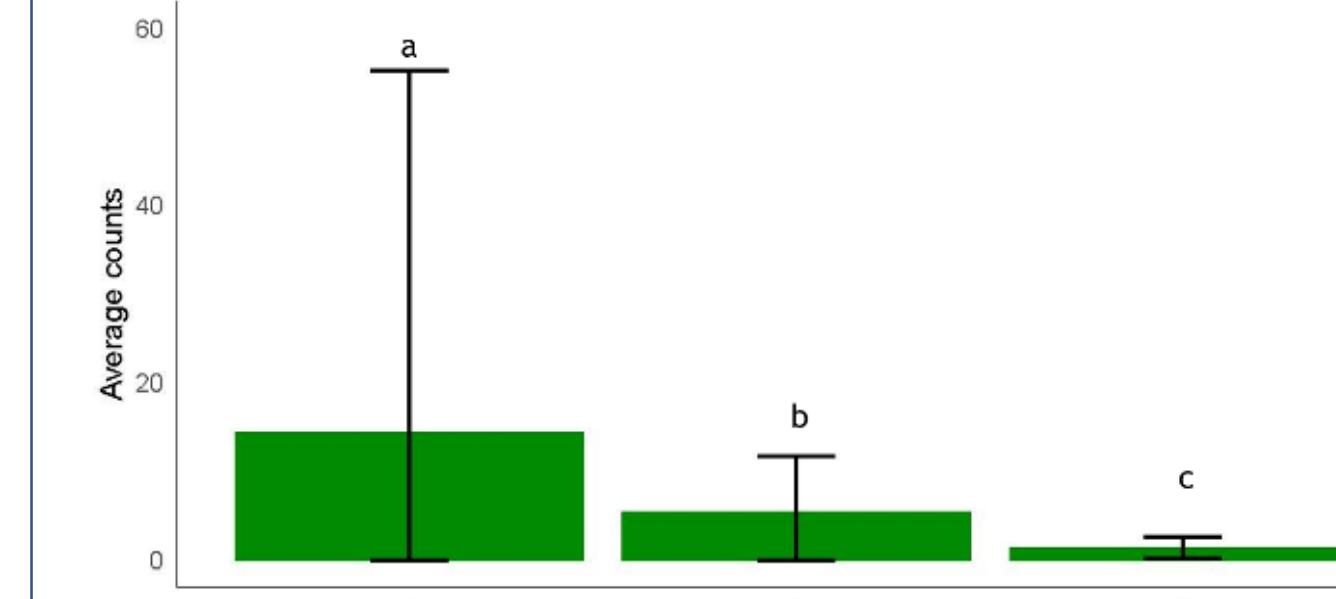
Moderately Invasive Plants and Their Percent Cover Through by Date



Mustards and cress abundance spiked in June, while bermudagrass steadily increased and peaked in September.

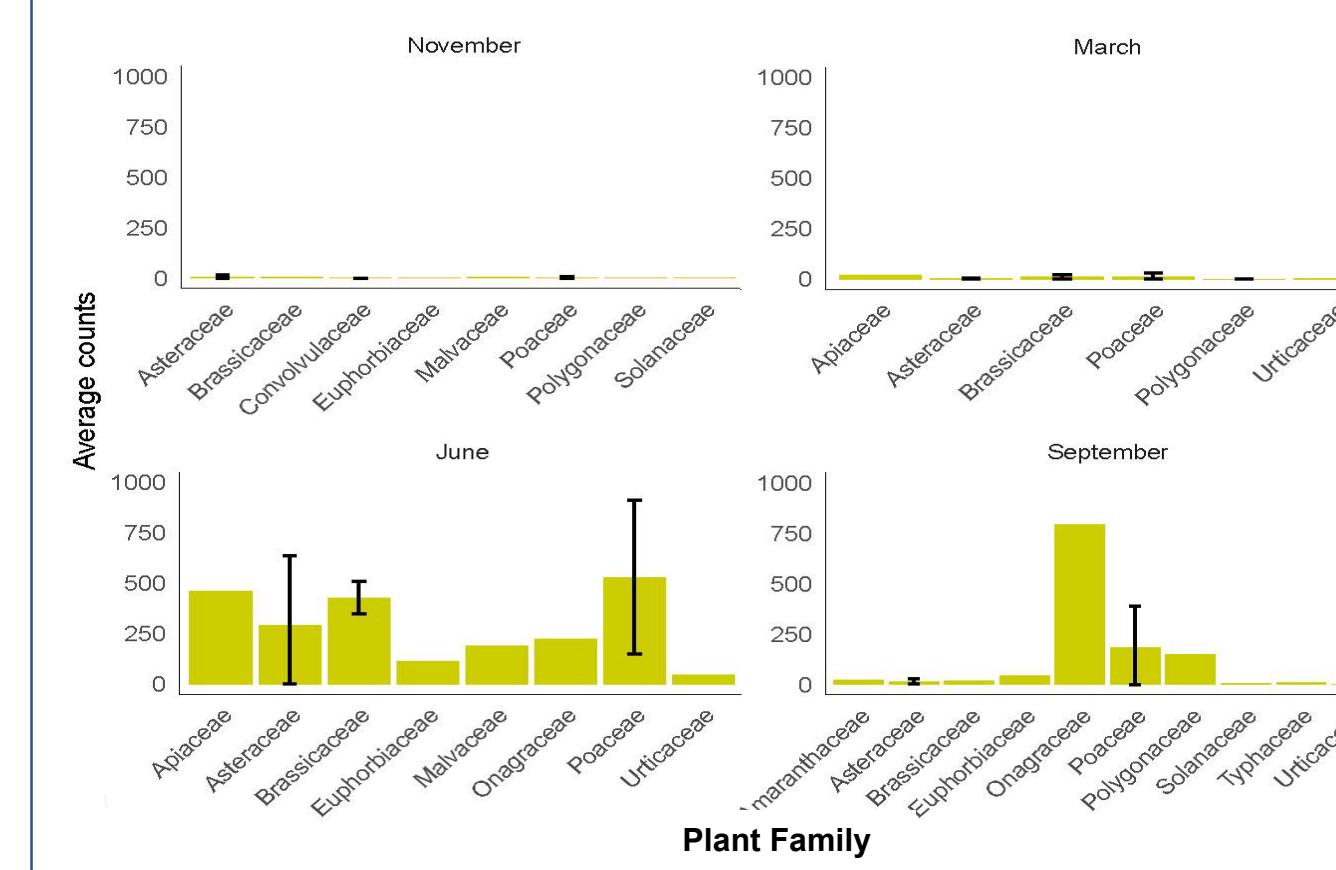
Results

Abundance of Lygus Hesperus by Plant Type



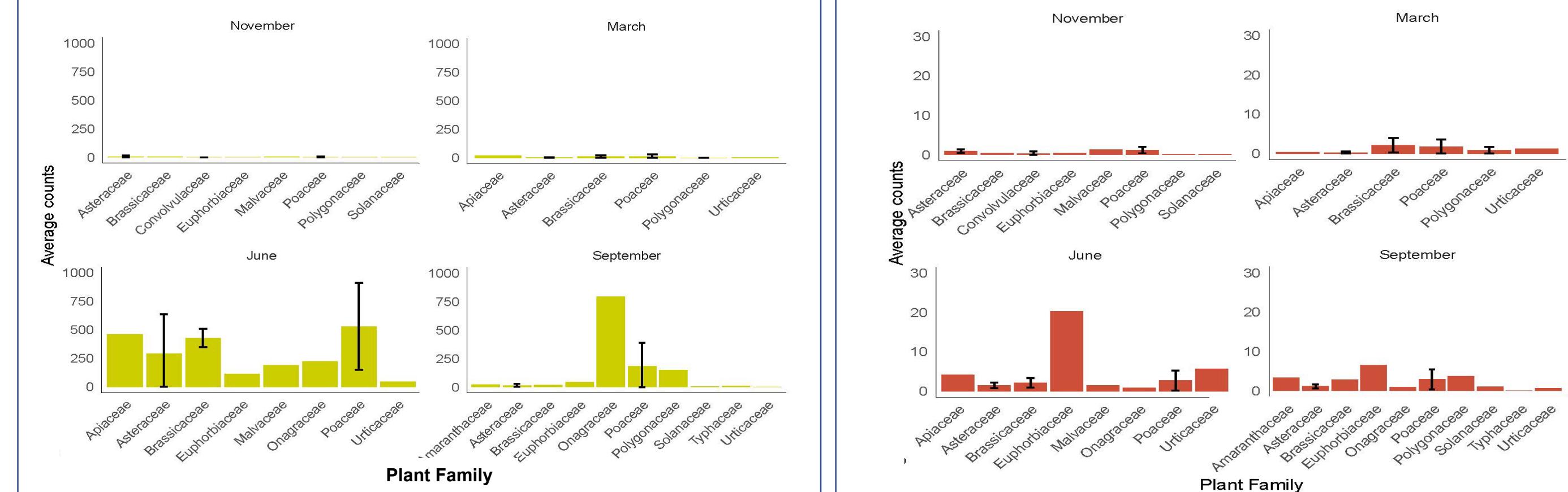
Lygus bug and diamondback moth were observed significantly more on brassicas such as cress and mustards.

Abundance of Western Flower Thrips by Plant Family



Western flower thrips utilized a broad range of plant families.

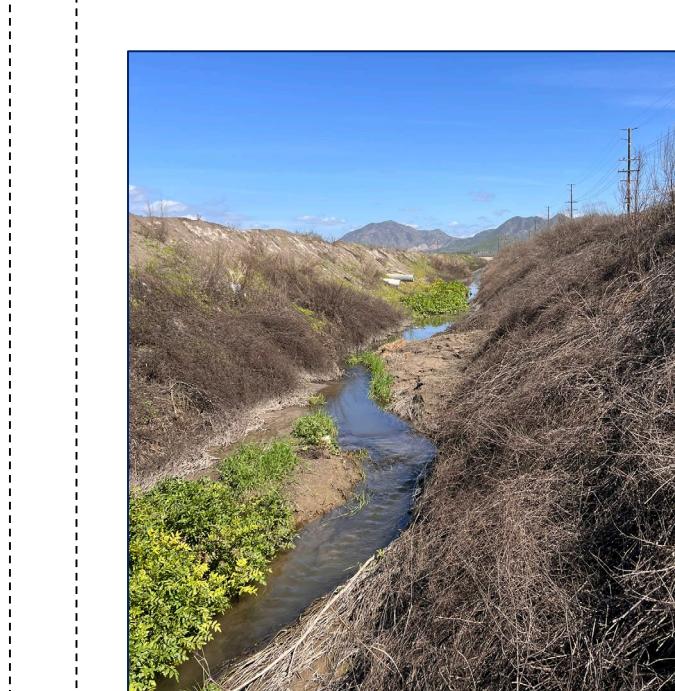
Abundance of General Predators by Plant Family



A variety of general predators were present on plants of many families.

Discussion

- Increased vegetation cover in June coincided with greater pest and general predator abundance, indicating a relationship between arthropod abundance, plant resources, and temperature.
- Seasonal variation in vegetation cover and thatch may have been influenced by the timing of the ditch vegetation management by growers.
- Selective vegetation management in ditches during March and June may reduce the spread of invasive plants into agricultural fields and natural habitats and the abundance of insect pests that use them.
- Effective ditch vegetation management can enhance predator and parasitoid (data not shown) diversity and pest control, but further research is needed to guide plant selection that maximizes benefits and minimizes disservices.



Same ditch a few months apart. Top: March, bottom: June.

Acknowledgements

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