Does Semi-Natural Habitat Amplify Beneficial Spider Populations in a California Organic Vineyard?

INTRODUCTION

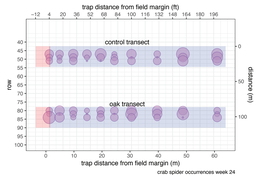
Researchers have examined the role of the "field margin" as a source of insects that could control vineyard pests *(Altieri 2005, Hogg 2010, Hogg 2018, Nichols 2001, Ponti 2005, Thomson 2009, Wilson 2015)*.

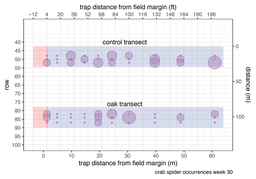
However, the general response of agricultural systems to the composition of surrounding landscape is inconsistent *(Karp 2018)*.

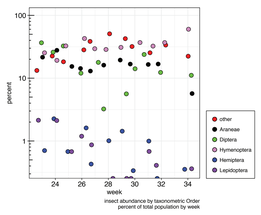
Research Purpose:
to develop insight into spatial and temporal patterns of beneficial insect penetration of organic vineyard rows supported by semi-natural habitat typical of the California Central Coast.

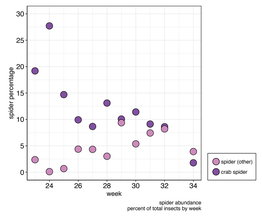
MATERIALS AND METHODS

- Ampelos Vineyards: central coast oak savanna, biodynamic / organic operations.
- Un-baited vane traps were suspended in the fruit zone.
- Two transects with 30 traps each extending 100 m into the vineyard center.
- Morning and evening sampling, 3 times per week.
- Spatial clusters were assessed with R's k-means algorithm (sum-of-squares distance to assigned partition centers is minimized).
- The expectation, or distribution, of the trapped spider count was proposed to follow a Poisson distribution of the average trapped spider rate (λ) for the sample unit time period E(Trapped Spiders) ~ Poisson(λ).
- The model takes the form: log (λ) = α + β1 × log (population) + β2 × SNH_ contact + β3 × SNH_contact × log (population).









California Central Coast **semi-natural habitat** pressures beneficial **spider populations** at **vineyard edges.**

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RESULTS

- 4,679 insects were collected and classified.
- Hymenoptera were found to be most abundant.
- Flies and spiders were equally abundant
- The insect population composition changed weekly with changes in micro-climate and available resources.
- Crab spiders were trapped in greater numbers in daylight.
- Crab spider populations decline precipitously into August.
- It is implausible that more trapped spiders will occur at the SNH margin as compared to those expected at the non-SNH margin.
- The plausibility of an SNH effect in the vineyard interior increases as the season progresses.