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

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

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**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.

**Hypothesis**

* the number of trapped spiders increases with log(population)
* the number of trapped spiders increases with natural habitat support. Ecological justification: from the research, beneficial insect population increases with SNH.
* the impact of population on trapped spiders increases with natural habitat support (ie, the association (or, parameter “interaction”) of trapped spiders and log population depends on the presence of natural habitat.) Ecological justification: more prey, more spider movement, more encounters with the trap.

**Materials and Methods**

* Ampelos Vineyards : central coast oak savanna, biodynamic / organic operations
* Un-baited vane traps were suspended in the fruit zone
* 2 transects with 30 traps each extending 100 m into the vineyard center
* Morning and evening sampling, 3X 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)

**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

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* 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

**Discussion**

* SNH and control population differences at the vineyard margin should be evaluated in the context of possible micro-climate temperature influences
* The effect of vineyard fungicide applications should be modelled