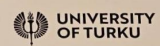


# Predation risk for insects living in different strata: A globally distributed experiment with standardized live prey



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## Abstract

With insect populations declining, it is important to understand predation on different types of insects. This project is a global macro-ecological study with 126 locations world-wide in different habitats. It will contribute to our understanding of factors influencing insect decline and situate studies of insect populations into natural food webs. We will test three hypotheses: (1) Root-feeding insects experience more predation than leaf-feeding insects. (2) Predation on root and leaf-feeding insects will decline with latitude, but especially for leaf-feeding species. (3) Predation by vertebrate and invertebrate predators will decline with increasing latitude. We will conduct an experiment at Fairfield Osborn Preserve using methods developed by Finnish researchers and provided to us to implement the experimental protocol in the same way at every location across the globe. Our task is to test the hypotheses in a temperate forested area.

## Global Experiment



As part of a comprehensive study, the Sonoma site (Fairfield Osborn Preserve) is just one replicate for Temperate zones (Temperate Latitude = 30-60 degrees N/S of the equator).

## Prior Study



Olson received co-authorship for his data contributions!

Predation on Live and Artificial Root-Feeding Beetles (Different Global Latitudes)

Cameron Olson (SSU graduate student) was a participant in the first global study conducted by Dr. Elena Zvereva in 2022. His experiment also took place at Fairfield Osborn Preserve and helped to shape the design of our current study.

## Experimental Design



Buried experimental units are to represent insects who feed on belowground plant biomass (roots).



Surface level experimental units are to represent insects who feed on aboveground plant biomass (leaves).



Branch level experimental units are to represent insects who feed on aboveground plant biomass (leaves).

We are investigating which ecological niche insects are preyed upon the highest. Our experiment used standardized live prey (*Tenebrio molitor* beetle larvae) across 30 blocks and 3 different strata. Per block, we will secure one larva on a tree or shrub branch to represent leaf-feeding insects. Directly below it, we will place one larva on the soil surface and one buried 70mm below the soil surface to represent root-feeding insects. All experimental units will be placed in the field for 24 hours after set up, and then predation rates will be recorded. This experiment will be conducted a second time 4 weeks later to account for seasonal variation in predation.

## Study Site



Site Maps



Woodland



Chaparral

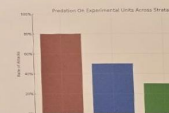


Forest Edge

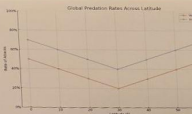
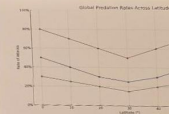


Our experiment will take place at Fairfield Osborn Preserve in Penngrove, CA. Our site located was selected for its woodland habitat and being adjacent to a chaparral community which are representative of our temperate forest region.

## Predicted Results



## Predicted Global Results



## Acknowledgements



A heartfelt thank you to Dr. Elena Zvereva for organizing this global study and allowing us to participate in it. Thank you to Cameron Olson for being a mentor in our experimental set up, data collection, and data analysis. This work could not be completed without the help from Bianca Gaitan in all the field and laboratory work, and data collection. A warm thank you is owed to Dr. Nathan Rank for being a point of support throughout this process. We all graciously thank the Center for Environmental Inquiry for awarding us the Norwick Memorial grant to fund our research and also thank Cali Pearce for supporting our field work at the Fairfield-Osborn preserve.