What Grows on Your Rose?

Gall Wasp Communities in Urban and Rural Roses

Claire O'Connor, Jeremy Davis PhD – University of Washington Tacoma

INTRODUCTION

As human populations continue to expand and fragment natural landscapes, the understanding of urbanization and land use on species biodiversity becomes increasingly important. Gall-inducing insects are specialized organisms which cause abnormal growths on host-plants to be used for shelter, reproduction, and nutrition. These developing galls also harbor parasitoids and inquilines of the gall-inducer, all together forming mini-communities which can serve as a tool to explore the impacts of urbanization on community assemblages.

This study aimed to compare communities that develop in the galls of the mossy rose gall wasp (*Diplolepis rosae*) collected in urban and rural areas in Western Washington.

METHODS

- Sample sites identified via foot survey, community outreach, and iNaturalist pinpoints.
- Between 1/7/2022 and 2/24/2022 – Dog Rose bushes were measured and approximately 20 galls were taken at each site.
- Galls were measured and held individually at room temperature for approximately 3 weeks until wasps emerged and were identified.

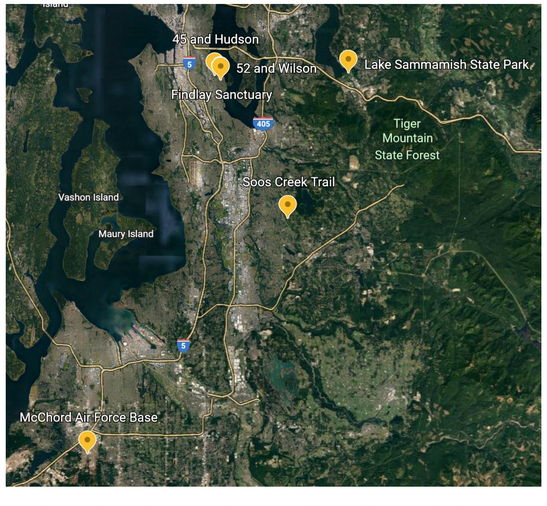

Figure 1: Map of the six sites sampled between 1/7 and 2/24 of 2022. Includes the three urban sites – 45 and Hudson, 52 and Wilson, and Findlay Sanctuary – as well as the three rural sites – Soos Creek Trail, McChord Air Force Base, and Lake Sammamish State Park.

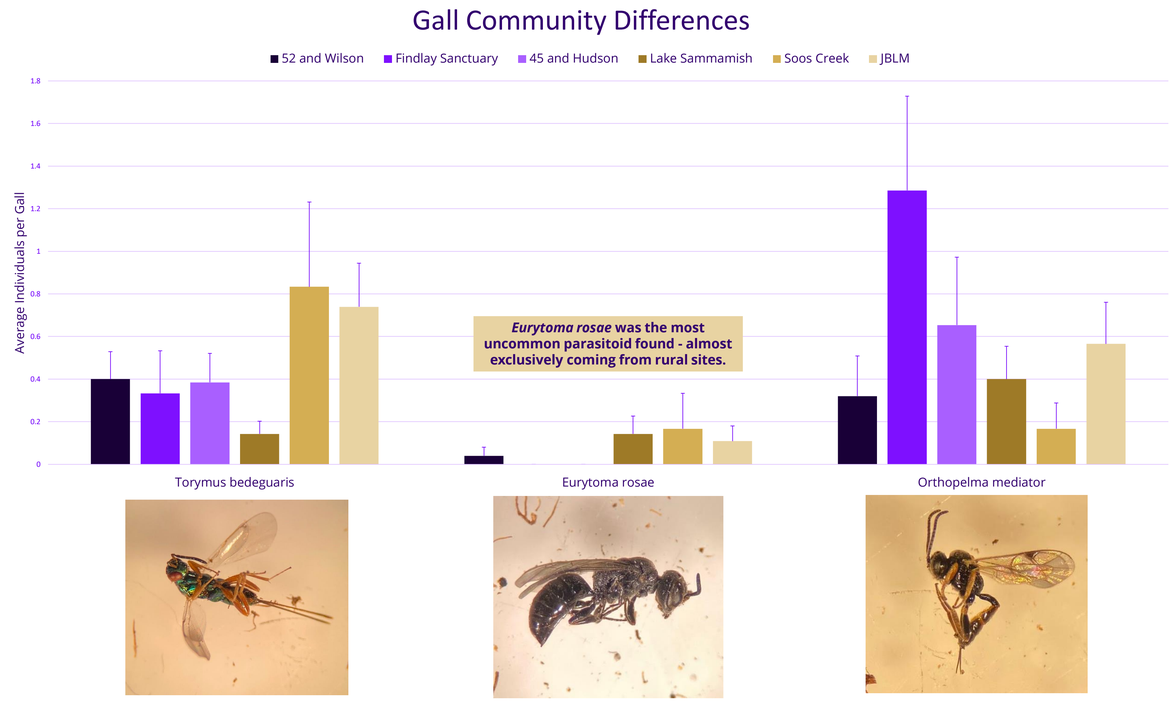

Figure 2: Differences in the average abundance of gall parasitoids found in each gall at each site in urban (purple) versus rural (gold) galls. Pictured are three parasitoids of *Diplolepis rosae* found in mossy rose galls. From left to right - *Torymus bedeguaris*, *Eurytoma rosae*, and *Orthopelma mediator*.

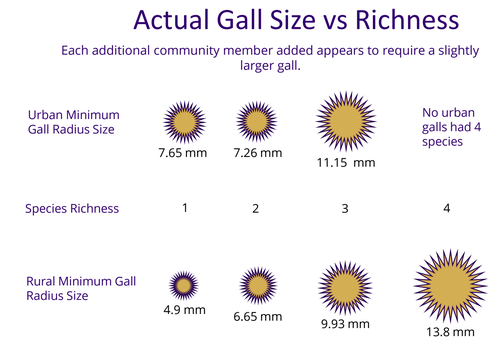

Figure 3: Depiction of minimum gall size per gall species richness for both urban and rural sites. There was a positive relationship between gall size and species richness. In order to support more richness, urban galls appear to be larger.

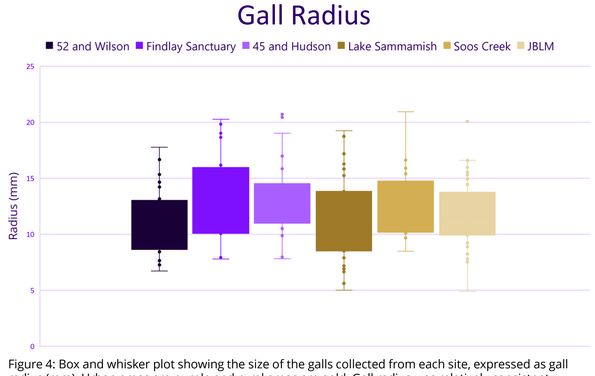

Figure 4: Box and whisker plot showing the size of the galls collected from each site, expressed as gall radius (mm). Urban areas are purple and rural areas are gold. Gall radius was relatively consistent across sites.

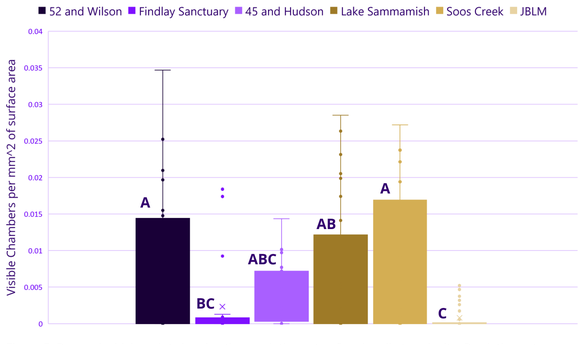

Figure 5: Box and whisker plot showing the predation rate of each gall at each site. Predation rate was measured as the number of visible chambers per mm^2 surface area of gall. Urban areas are purple and rural areas are gold. There were statistically significant differences in predation rate across sites ($F(5,164)= 7.63$, $p<0.0001$), shared letters reflect non-significant pairwise comparisons.

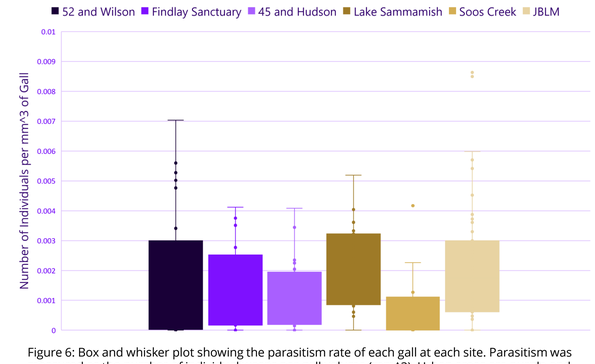

Figure 6: Box and whisker plot showing the parasitism rate of each gall at each site. Parasitism was measured as the number of individual wasps per gall volume (mm^3). Urban areas are purple and rural areas are gold. Parasitism rate was relatively consistent across sites.

WHAT WE FOUND

> No significant differences between urban and rural galls

> Gall predation and species richness was significant by site

> The highest Shannon diversity index was calculated for Soos Creek (rural) at 0.67

> The gall with the highest total wasp abundance was JBLM (rural) with 104 wasps

> There is a positive relationship between gall size and species richness

> The parasitoid wasp *Orthopelma mediator* was found in greater numbers in urban galls

> The parasitoid wasps *Torymus bedeguaris* and *Eurytoma rosae* were found in greater numbers in rural galls

Left: Mossy Rose Gall growing on the Dog Rose (*Rosa canina*) bush at Soos Creek in Kent.

Right: Gall inducer *Diplolepis rosae* under a dissecting microscope.

CONCLUSIONS

These results show significant variability in gall wasp community assemblages sampled from different sites across Western Washington, most notably in predation rate and species richness.

Future work should explore site specific variables which may influence the relationship between gall size and species richness, as well as *Eurytoma rosae's* potential susceptibility to urbanization.

ACKNOWLEDGEMENTS

A special thank you to Rod Gilbert who escorted me onto JBLM and assisted me in sampling. Thank you to my family and friends who have supported me through my academic journey.