Do leaves from native and non-native trees decompose at different rates in streams?

Sierra Kleist
Mentor: Dr. Todd Wellnitz

**INTRODUCTION**

Organic matter decomposition is an important ecological process in stream ecosystems (Leite-Rossi 2016). Decaying leaves in particular constitute an important source of food and habitat for microorganisms and macroinvertebrate “shredders,” two groups that play a critical role in leaf breakdown. Bacteria and fungi decompose leaves and macroinvertebrates break the leaves apart as they feed on these microorganisms. Shredder feeding accounts for 50-74% of leaf decomposition in streams (Hubai et al. 2017); however, leaves may differ in their nutritional quality and toughness. Leaves from non-native plants may support different microbial communities and/or be of different nutritional quality for shredders, and this may alter leaf decomposition rates (Elosesi & Pozo 2016, Medina-Villar et al. 2015).

Little Niagara Creek receives leaves from both native and non-native trees. To study the importance of leaf type, microbial decomposition and shredders on leaf breakdown rates, we examined leaves from three native (slippery elm, maple and oak) and two non-native trees (buckthorn and ginkgo).

We hypothesized that native species would be colonized by greater numbers of macroinvertebrate shredders than non-native leaves and would also decompose more rapidly.

**METHODS**

To study the relative importance of leaf type, shredders, and microbial activity on leaf breakdown, 10 g of leaves from native (elm, oak and maple) and non-native trees (ginkgo and buckthorn) were placed into individual, nylon mesh bags. Each set of five bags or “leaf packs” were replicated four times and submerged in Little Niagara Creek.

After 21 days, leaf packs were retrieved from the stream, the leaf remnants were removed from the mesh bags, and leaf-associated macroinvertebrates were separated, counted and identified. Leaf remnants were dried and weighed to calculate mass lost. Leaf nutritional value was determined by measuring sugar content with a refractometer.

**DISCUSSION**

The data partially supported the hypothesis, showing that macroinvertebrates were more likely to inhabit native vs. non-native tree leaves (Fig. 1). There was also a difference in leaf mass lost between natives and non-natives, but the pattern ran counter what was predicted in that non-native buckthorn and ginkgo lost the most (Fig. 2). Non-native species also had higher refractometer readings as compared to native species, although maple had similar readings. These results indicate that leaves from non-native species tended to have a higher sugar content, which may explain their faster rates of decomposition, likely as a result of microbial action. By contrast, macroinvertebrates in general and isopods in particular (Fig. 3), preferred native oak leaves that had a lower sugar content and were largely intact at the end of the study (Fig. 4), suggesting they utilized the leaves more as habitat than food.

**WORKS CITED**


