Curb-Cut Rain Garden Research

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Introduction

Project Description

In 2015 several curb-cut rain gardens were installed in the Alger Heights neighborhood. These gardens receive stormwater runoff from the street gutters through a cut in the curb (Fig 1). We assessed the success of 11 of these gardens, as well as the success of individual species planted within them after 1 year of growth.

Figure 1: In a curb-cut rain garden stormwater runoff enters into a rocky basin through a literal cut in the curb; native plants assist in filtering and evapotranspiring the trapped rainwater.

Objectives

- Identify which gardens are the most successful
- Identify variables that influence garden success
- Evaluate survivorship of native species
- Evaluate performance of native species

Figure 2: Plaster Creek Stewards Summer Staff examining one of the more successful curb-cut rain gardens

Methods

Garden Assessment

Between June 7 and 13 we evaluated the gardens by recording growth variables for each species (height, number of leaves, number of stalks, number of buds, clump width). We also scored each species with a 'performance' rating from 1-10, 10 being a species that had filled in well and was seeding in new plants, 1 being a plant that had survived but had grown very little (Figure 3). Garden performance values were generated by taking the mean performance value for each species within a garden.

Figure 3. Examples of low and high performance values. *Echinacea* (left) has no flowering stalks, no buds, and has not spread received a performance value of 1; *Liatris* (right) has grown wider and taller, is flowering profusely and received a performance value of 10.

Species Assessment

To quantify the relative success of species, we measured a random sample of 5 individuals of each species in every garden. We averaged data across all gardens and compared mean values using a Chi-squared test of significance. This allowed for an evaluation of the relative success of each native species that was planted in these urban, curb-cut rain gardens.

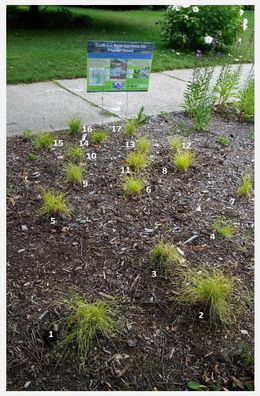
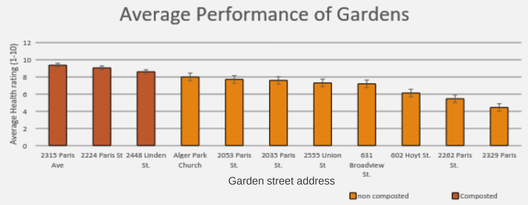


Figure 4. All the individuals within a species were numbered. 5 of them were then randomly selected for data collection.

Results

Garden Results



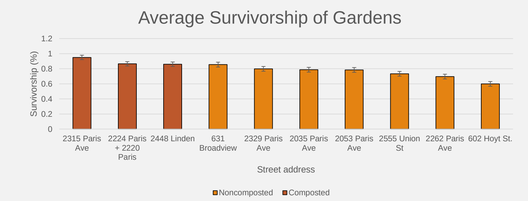


Figure 5: Comparison of average performance and survivorship of Composted (dark orange) and non composted (lighter orange) gardens.

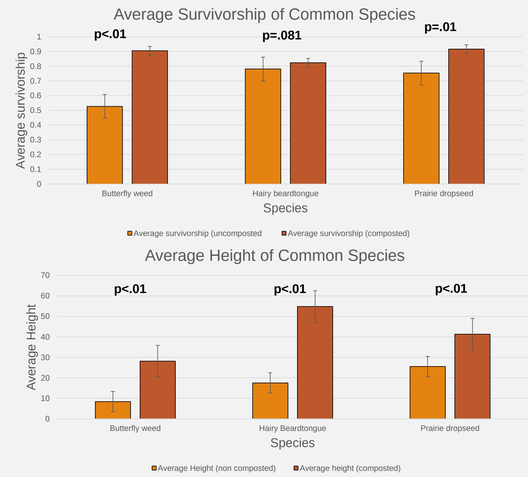


Figure 6: Comparison of survivorship (top) and performance (bottom) of three species found across all gardens (n=6 for non-composted gardens, n=3 for composted gardens). Error bars represent one standard error about the mean.

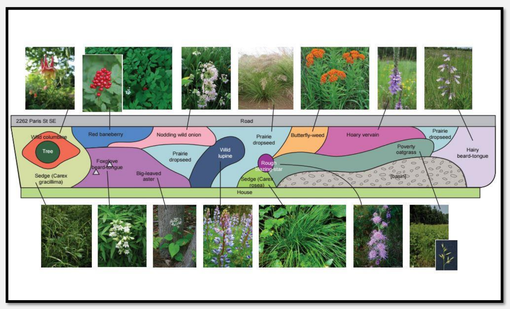


Figure 7: Example of rain garden map given to each homeowner

Species Results

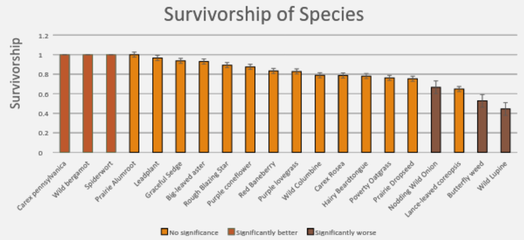


Figure 8: Pennsylvania sedge (p=.05), Wild bergamot (p=.04), and Ohio spiderwort (p=.05) had significantly higher survivorship than the overall average (Chi-square test). Nodding wild onion, Butterfly weed, and Wild lupine (all p<.01) had significantly lower survivorship than the overall average.

Conclusions

Garden-by-Garden

Garden success was strongly influenced by the addition of compost. Composted gardens had higher performance ratings and survivorship than non-composted rain gardens. Other variables, including amount of care provided by homeowners, volume of water entering the curb-cut, amount of shade or sun, etc., are also likely contributors and should be assessed in future studies.

Species

The best species to use in these urban curb-cut rain gardens are Wild bergamot, Ohio spiderwort, and Pennsylvania sedge, although several others did well too. The species that struggled the most were Butterfly weed and Wild Lupine. Given the popularity of these two species in particular, learning how best to improve their performance should be a priority.

Acknowledgements

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