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Stomatal Conductance and Reed Canary Grass Suppression of Native Michigan Trees

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Introduction

Reed canary grass (*Phalaris arundinacea*), a prominent invasive understory species, threatens native Michigan biodiversity statewide. A notable affected area includes a stretch of agricultural land along Schooley Drain in Caledonia, MI, located in the headwaters of the Plaster Creek watershed. Our study pursues the following questions: "Do native trees provide enough shade to reduce the growth of Reed canary grass?" and "Which native trees best transpire water from a floodplain?": To answer these questions, we initiated a long-term evaluation of seven different species of native Michigan trees to investigate which species best inhibits the growth of reed canary grass and transpires the most water. Information generated from this research will help to support the utility of trees in riparian restoration projects.

Study Area

Schooley Drain, shown below, resides in the headwaters of Plaster Creek in Caledonia, MI near 84th St. SE and East Paris Ave. SE. The surrounding area consists of an agricultural landscape. Reed canary grass has enveloped both banks, smothering native growth, biodiversity, and limiting drainage capability. The grass encroaches into the drain, blocking water flow, which can lead to localized flooding after heavy rain events.

Methods

Overview

192 trees were planted in the fall of 2020 along Schooley Drain. Trees were planted in single-species clusters of 4 so that the interior area forms a square [1]. Species in our project include bur oak (*Quercus macrocarpa*), hackberry (*Celtis occidentalis*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), swamp white oak (*Quercus bicolor*), sycamore (*Platanus occidentalis*), and tulip tree (*Liriodendron tulipifera*). 7 to 8 clusters for each species were planted, with 48 clusters established in total. The clusters were planted 4.5 meters apart from each other. Within each cluster, trees were planted approximately 3 meters apart.

Figure 1. A single-species cluster of four trees

Reed Canary Grass Data

From July 15 to 16 , randomized 0.5m x 0.5m cell samples of vegetation biomass were collected from the interior area of each cluster to determine the extent of Reed canary grass viability following the planting. To obtain these measurements we used quadrats to sample each cluster and separated the collected biomass into categories of Reed canary grass and other species, which were then dried and weighed.

Stomatal Conductance Data

Stomatal conductance data were collected from 2 randomly chosen trees per cluster during two sampling intervals: June 15 to 24 and July 20 to 22. An SC-1 Leaf Porometer was used to take a 30 second sample from one leaf per tree selected.

Figure 2. Measuring the stomatal conductance of a Hackberry leaf

Figure 3. A map of Schooley Drain in Caledonia, MI. The area designated for planting is outlined in red.

Conclusions

From both intervals of stomatal conductance data collection, we found that the leaves of sycamores, bur oaks, and swamp white oaks respectively respired the greatest volumes of water. In our initial collection, sugar maple clusters had the lowest median value of reed canary grass biomass.

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Results

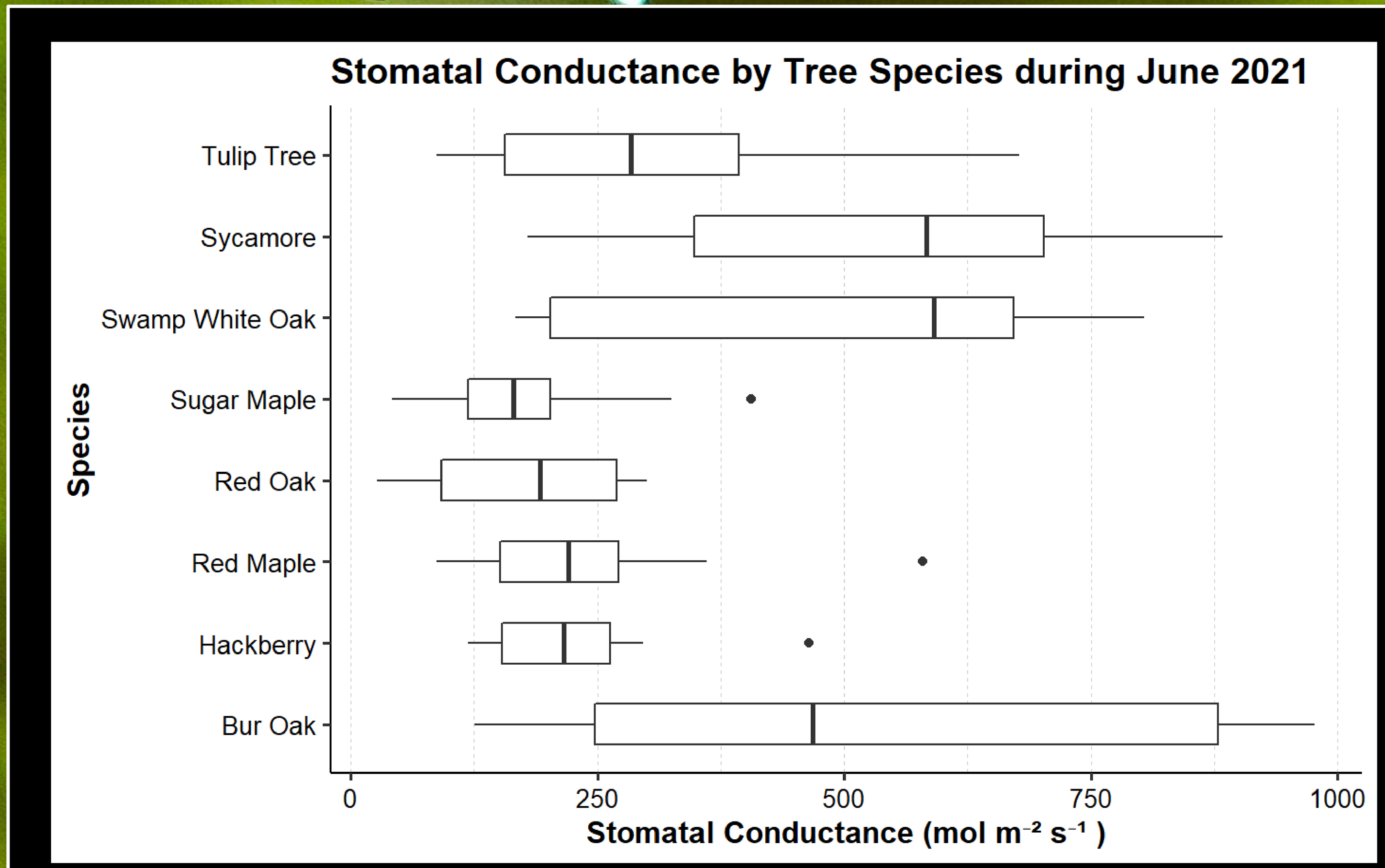

Figure 4. A boxplot depicting median volumes of stomatal conductance

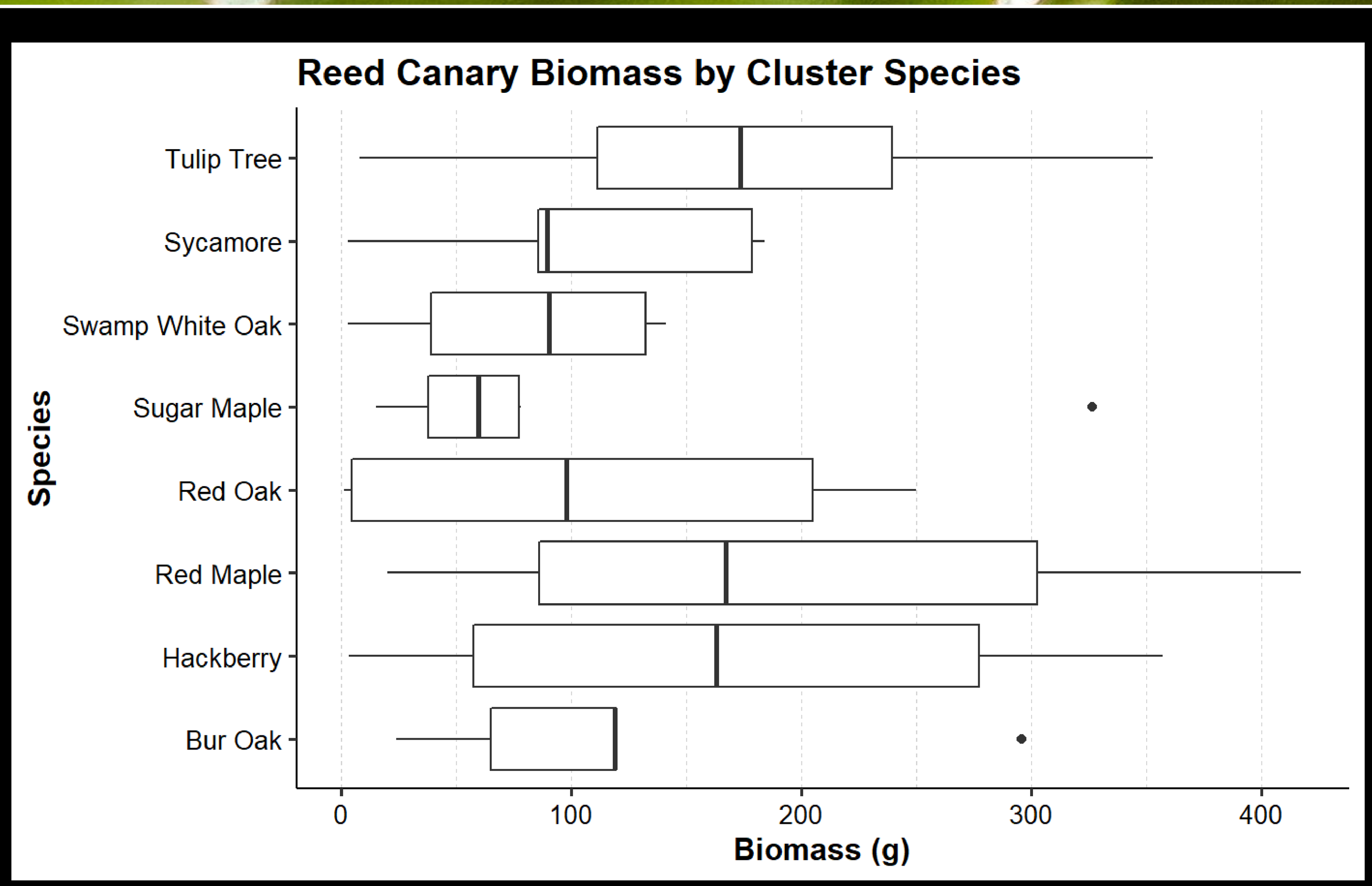

Figure 5. A boxplot depicting median masses of what we identified as reed canary grass

References

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[2] Blozan, T. (2006). Tree Measuring Guidelines of the Eastern Native Tree Society. Bulletin of the Eastern Native Tree Society, 1(1), 3-9.