UIUC Tree Diversity and Stability

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Tree Diversity

The initial task of this project was the sorting of the Davey tree census data into species, genus, and family groups. Once sorted, each group was evaluated for compliance with the 10-20-30 diversity rule. This rule recommends that any urban forest should have no more than 10% of any single species, no more than 20% of any single genus, and no more than 30% of any single family. We currently comply with the 10-20-30 rule for urban forest diversity, which recommends a healthy baseline of diversity to prevent largescale loss. This rule was proposed by Frank Santamour of the U.S. National Arboretum in response to the massive losses of elm trees due to Dutch elm disease in urban areas. Santamour's rule has received criticism lately for not being stringent enough. Not only should we aim to maintain the 10/20/30 ratio, we could set goals for an even more diverse urban forest. 187 species, 74 genera, and 38 families are represented on the Illinois campus (% breakdowns on last page).

Urban forests are dynamic. Understanding the diversity of the canopy can be used to develop a sustainable and strategic plan for future plantings as older trees are removed. Recommendations should be based on several factors, including:

1. Maintaining 30/20/10 ratio of diversity
2. Climate resilience
3. Historical success on site/maintenance needs
4. Aesthetic value

Predicting Change

Using the U.S. Forest service Tree Atlas, MODFACs climate stability scores were collected for the native species present on campus. This score evaluates the response of each species to disturbances as found in the scientific literature. Below there is an example of the many disturbance factors used to create the MODFACs score. This information can be used during the selection of new trees to predict their stability and identify potential threats to their health.

The next step in this project is the continue collecting climate adaptability information for non-native species present on campus. An important source of information is recent tree removal data from the UIUC campus. This will give an indication of which trees are currently failing and will need to be replaced. Additionally, keeping an eye on emerging diseases/pests is critical in order to be prepared to treat or remove susceptible species. Once this is completed, ecosystem services metrics could be another useful lens to be used during tree selection.

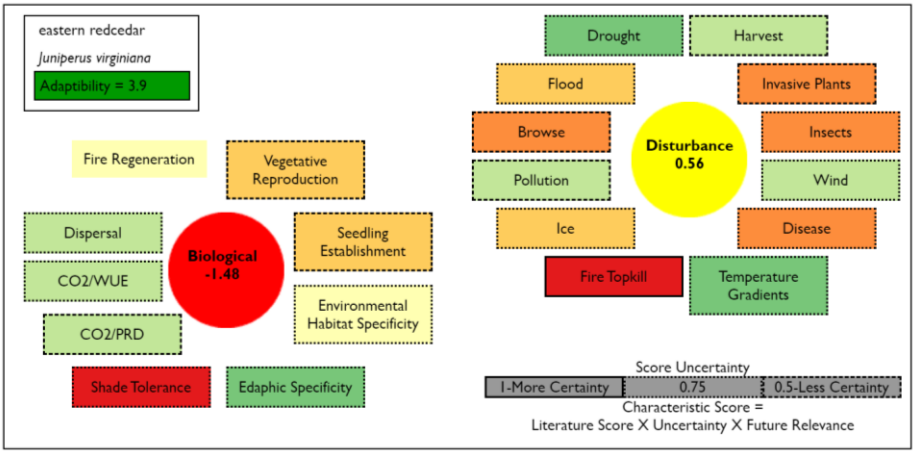
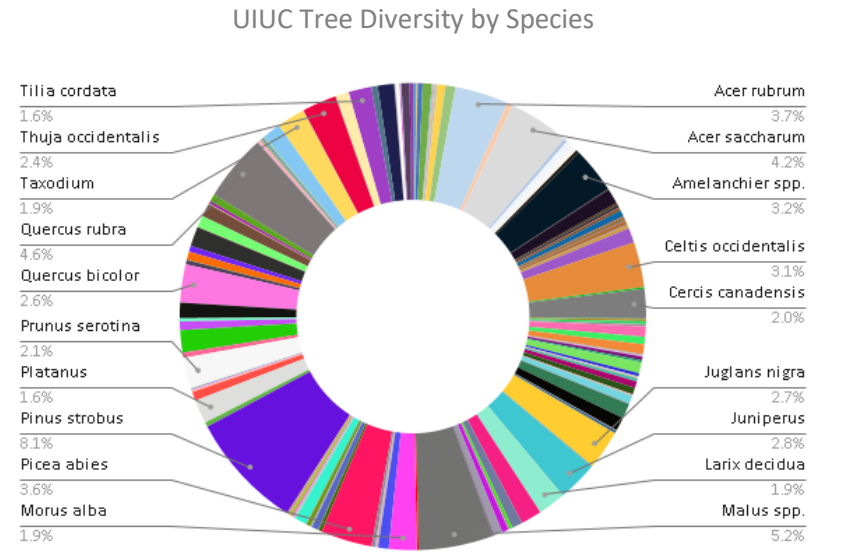


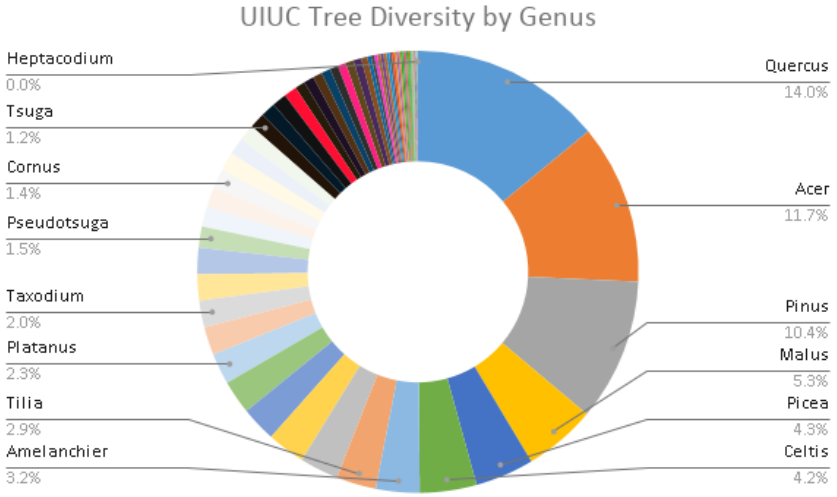
Fig. 1. MODFACs scoring criteria for Juniperus virginiana.

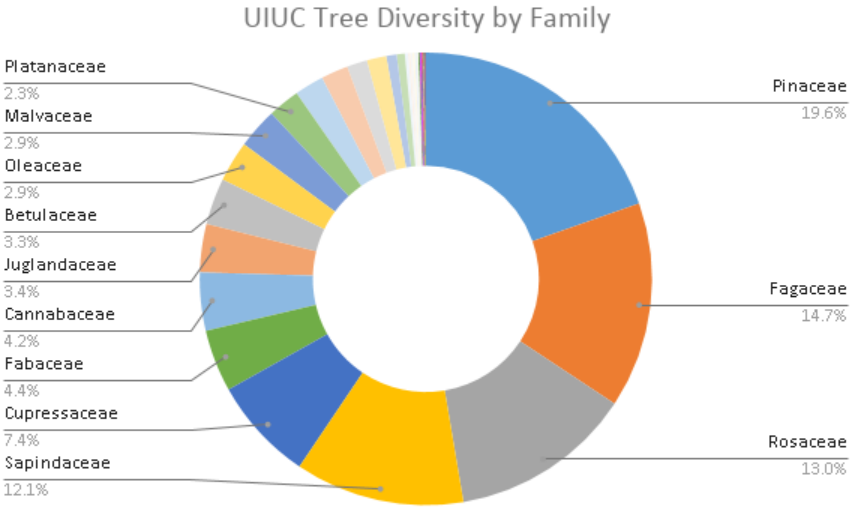
SPECIES	COUNT	% Total	Climate adaptability
Pinus strobus	1348.00	8.11	3.3
Malus spp.	864.00	5.20	n/a
Quercus rubra	772.00	4.64	5.4
Acer saccharum	694.00	4.17	5.8
Acer rubrum	615.00	3.70	8.5
Picea abies	591.00	3.56	n/a
Amelanchier spp.	529.00	3.18	4.8
Celtis occidentalis	518.00	3.12	5.7
Juniperus virginiana	461.00	2.77	3.9
Juglans nigra	448.00	2.69	4.0

Fig. 2. Together, the 10 most prevalent species on campus, listed below, constitute 40.25% (6840 trees) of the UIUC urban forest. The widespread loss of any of these species would have a dramatic effect on the composition of the canopy. For this reason, these species should be carefully examined in order to predict and prepare for potential loss due to pest outbreaks, climate change, or other disturbances.

Fig. 3-6. Tree diversity breakdowns by species, genus, and family. 187 species, 74 genera, and 38 families are represented on the Illinois campus. Note that the most prevalent species is Pinus strobus *(8.1%), the most prevalent genus is* Quercus *(14%), and the most prevalent family is* Pinaceae *(19.6%).*







Link to excel sheets: https://docs.google.com/spreadsheets/d/1SJy_6rA_CdUUL-anmT8o4I5MukrrU9irETF9ZXbAmA8/edit?usp=sharing

SOURCES

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