vineland

RESEARCH & INNOVATION CENTRE

Tree Species Selector

Final Report

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Background

We often hear the old adage "the right tree in the right place", which really means, "the right tree species for the planting condition". This saying tends to oversimply a complex process, even for highly qualified arborists. Each site and planting condition is unique, and it can be difficult to have a mental list of all the tree species that may be best suited for each situation. Appropriate tree selection is not just a challenge for municipal foresters and those working on restoration projects with conservation authorities, but is also an emerging issue for non-profit tree-planting groups, many who may have a limited background in arboriculture.

There are a few free resources and tree species selector tools available to aid in this difficult decision process. However, these tools are often limited in scope (e.g. Mytree), frame questions only suited for a tree expert to answer (e.g. soil quality, site constraints), or are developed for practitioners in more southerly regions (e.g. Tree Wizard). Just over around 10 years ago, the Vineland Research and Innovation Centre created an extensive tree database to assist anyone in eastern Canada with selecting tree species for different planting conditions. The database was developed into a web-based tree selector tool that has demonstrated itself to be beneficial to a specific segment of the arboriculture community. However, this initially tool suffered some of the failings of the other tree species selector tools, and required an update for better ease of use and accessibility.

Vineland's initial tree species selector was intended for use by other professionals who understand tree attributes and tree requirements, to be able to select tree species unique for their site conditions (e.g. soil quality, infrastructure below and above ground, etc.). However, this level of understanding of tree species and characteristics does not align well with the broader audience of those now planting trees. The tool was also difficult to use on some devices, as it was built with laptop use primarily in-mind. As well, the tool is lacking in detail for some specific species and needs updates to reflect current forest management pests (e.g. Oak wilt).

With this project to update Vineland's Tree Selector Tool, our goal was to:

1. Reframe the questions that this tool poses to identify ideal tree species for a site so that the tool is accessible to all tree-planting audiences.

2. Update information on tree species selection including new pests and diseases that may impact specific genera.

3. Assure this database and tool is integrated into a platform with the greatest accessibility for all attended audiences.

Vineland is actively sharing this tool through the Greening the Landscape Research Consortium and broader networks such as Landscape Ontario. This free, user-friendly tool is designed to help Canadians select the right tree for the right place—supporting efforts to grow urban canopy cover and increase species diversity.

Methods

Literature Review: Challenges in Urban Tree Species Selection

We began by conducting a literature review to better understand current challenges in tree species selection. The review highlighted a common misalignment between tree planting goals and species selection practices. We found that while planting objectives often aim to deliver environmental services, aesthetic value, and community benefits, actual species selection is typically limited by on-the-ground urban constraints—such as soil compaction, drought, heat exposure, or nearby infrastructure. As a result, urban-tolerant and/or strictly native species are often prioritized, which reduces the pool of usable species and limits planting diversity[1,2].

We also found that tree species diversity remains a long-standing concern in Ontario. Forestlands have been repeatedly affected by diseases and pests (e.g. Dutch Elm Disease and Emerald Ash Borer). Although a variety of ornamental species exist, urban canopies are still dominated by a few species like Norway maple and honey locust, making them more vulnerable to future pests and diseases. A well-designed tree selector tool could help guide forestry practitioners across the province in making more informed species choices and support efforts to meet diversity targets.

Tool Design and Development Process

Review and Evaluation of Current Tree Selection Tools

Selecting trees is complex: species must survive today's urban conditions and remain resilient over decades of environmental change. To inform our tool development, we compared potential platforms available for Ontario based on functionality, cost, ease of use, ability to update, and compatibility across devices.

Guided by the classification criteria proposed by Hirons (2019), we grouped existing tools and aids into two main categories:

- **Primary criteria**—which focus on site constraints and tree ecophysiology (e.g., Eastern Canada Tree Species Selector, Cornell Woody Plants Database).
- **Secondary criteria**—which emphasize ecosystem services and aesthetics (e.g., i-Tree, Conservation Ontario).

These considerations, outlined in Figure 1, also form the foundation of our tool's selection logic.

[1] Roy, 2017
[2] Roy et al., 2017

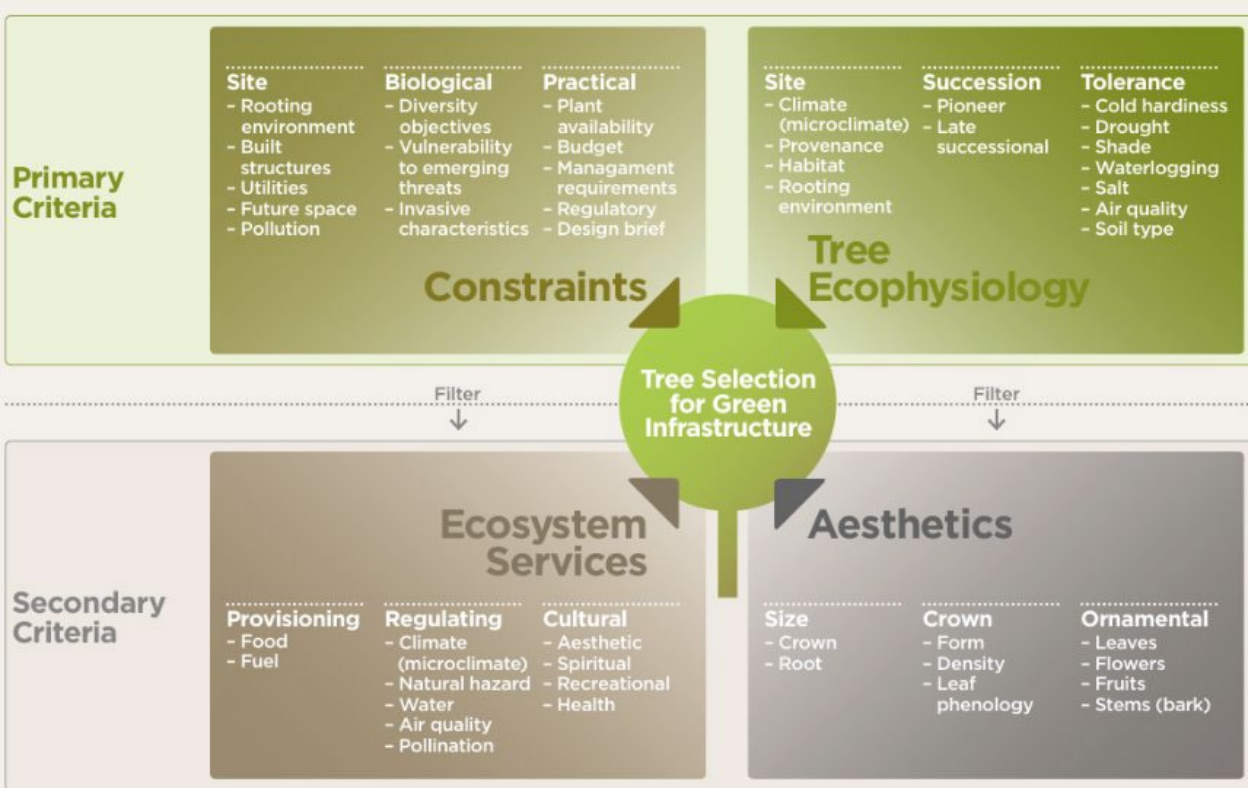

Figure 1: *Tree species selection criteria that needs to be considered for effective tree planting[3].*

Through this process, we identified some critical requirements to build a **user-friendly and effective selector**. This meant creating a tool that:

- Uses simple language to describe site location (no requirement of specific tools or lab tests).
- Demonstrates flexibility to select trees without knowing all site information.
- Allows users to select for both the above and below ground size requirements.
- Sorts out native/non-native trees.
- Recommends a diversity of trees depending on location – (e.g. no recommendation of 'bullet proof' trees for all sites).
- Shares pictures, species description, and local knowledge.
- Suggests appropriate cultivars and trees to 'plant instead'.
- Can be updated with ease.

[3] Hirons and Sjöman, 2019

Incorporating Vineland's Tree Species Dataset

We integrated Vineland's in-house dataset into the platform. This dataset includes detailed information on tree characteristics, environmental tolerances (e.g., drought, waterlogging), recommended planting contexts (e.g., street, park), and native ranges. To refine the species list, we consulted with experts from Landscape Ontario's Urban Tree Group to discuss what constitutes an ideal urban tree list. Based on these discussions, we reviewed and updated the list and descriptions for all 213 tree species included in the tool.

User responses to the tool's guiding questions automatically generate suitable tree species lists based on this dataset. To ensure accuracy, each species entry was reviewed individually and updated using the latest available information from both print and online sources, including recent guidance on management practices and emerging pest and disease threats.

The guiding questions within the selector were developed by Vineland's Plant Responses team, ensuring they were scientifically grounded. Input from the Vineland's Consumer Insights team further helped make the questions accessible to non-expert users by aligning them with typical user preferences and language.

Design, Build, and Deployment of the Tree Selector Tool

The development of the new Tree Selector Tool was led by Vineland's Horticultural Technology Solutions team. The transition to Webflow involved a complete rebuild of the Tree Species Selector Tool from the ground up. We started by leveraging the existing Excel-based tree database from the old tool, which served as a foundation. From there, we significantly restructured and expanded the dataset—adding updates, new fields, and key columns needed to support dynamic filtering and display requirements within Webflow.

On the front end, we designed the interface from scratch to reflect the full range of filters users expect in a modern selection tool. Each filtering function was tied directly to Content Management System fields in Webflow, with Finsweet attributes used to connect user interactions to backend logic. While some custom coding was required (soil scoring logic), the new setup was designed to be largely no-code, making it much easier to maintain and update going forward.

The new Tree Selector Tool is now hosted on Webflow and leverages Finsweet attributes integrated with Webflow's Content Management System, allowing for streamlined, no-code updates via CSV import. This transition gave us full control over both front- and back-end functionality—enabling faster, easier updates to the database and user interface without coding knowledge. Stylistic control and layout customization are now fully accessible through the Webflow UI. One custom-coded filter remains, but it requires no ongoing maintenance.

Real-World Testing

Targeting those primarily responsible for planning, installing, and maintaining tree plantings across managed landscapes, the tool was tested by members of Vineland's Greening the Landscape Research Consortium to gather feedback and improve its usability. We used Survey123 to distribute the survey (aQR code to access the survey is shown in Figure 2), efficiently collect responses, and analyze the data, focusing on collecting user experience feedback (smoothness of use), identifying potential areas for improvement (functionality, filtering criteria, instructions), and effectively helping us gather feedback to guide future improvements.

Figure 2. *QR Code for Tree Selector Tool Feedback Survey*

Results

The Tree Selector Tool's QR code is shown in Figure 3. It features a **two-pane layout**:

- On the left side, users input site-specific requirements such as planting location, hardiness zone, and other optional criteria (table 1).
- On the right side, the tool dynamically generates a recommended planting list of trees that match the criteria provided.

Figure 3. *Vineland's Tree Selector Tool*

Criteria	Description	Options
Planting Site	Where will the tree be planted.	Residential area, Naturalization area, Open spaces, Highway, Wide median/boulevard, Restricted urban site/hardscape landscape, Lower naturalization, Upland naturalization, I don't know
Hardiness Zone	The climate zone of your area, determined by lowest temperatures.	Zone 2, 3, 4, 5, 6; I don't know
Sunlight	How much sunlight the planting site receives.	Full sun (at least 6 hrs direct sunlight), Partial sun (less than 6 hrs direct sunlight), Full shade (filtered or very low light), I don't know
Height	Expected mature height of the tree.	About 4-5 meters, About 6-8 meters, About 9-15 meters, About 16-20 meters, Taller than 21 meters, No preference
Canopy	Mature width of the tree canopy.	Less than 4 meters, 4-5 meters, 6-9 meters, 10-15 meters, 16-20 meters, Greater than 21 meters, No preference

Drainage	How well the site drains after heavy rain.	There is still standing water after 24 hours (poor drainage); Absorbed after 12-24 hours (medium drainage); Absorbed in under 12 hours (high drainage); I don't know
Salt tolerance	Whether the tree needs to tolerate roadside salt exposure (e.g., near sidewalks or roads).	Yes, No, I don't know
Growth rate	Desired growth speed of the tree.	Slow (less than 30cm/year), Moderate (30-60cm/year), Fast (60cm+/year), No preference
Native species	Whether it MUST be native or not.	Native to Ontario, Native to North America, I don't know
Deciduous or Evergreen	Whether the tree should retain leaves year-round or lose them seasonally.	Evergreen (leaves year-round), Deciduous (loses leaves in fall), I don't know
Watering	Whether regular watering is planned after planting.	Yes, No, I don't know
Soil quality	Optional info about soil at the site, whether known or not.	Yes, No

Table 1. *Tree Selector Tool Input Options*

As users refine the site conditions, the tree list on the right updates in real-time, expanding or narrowing the options. None of the parameters are mandatory, so users can input as much or as little information as needed. If the list is too long, users can add more criteria to filter results further. In addition to these filters, the tree list can also be sorted or filtered by scientific name or common name, allowing users to quickly locate a specific species of interest.

One ongoing/required task is displaying tree item image collections, which has been removed and needs to be re-added correctly to the new design. Some page re-designing may be necessary to accommodate this functionality.

As a recommendation for future improvement, migrating to a platform like Airtable could simplify backend filtering and reduce the need for workaround fields currently required by Finsweet's system constraints. Another recommendation would be to re-evaluate the tool's overall design. Some issues with spacing, clustering, and overall design principles were seen and could be quickly addressed.Each tree in the list is accompanied by a tree card (Figure 4) that highlights key features, such as growth characteristics, site suitability, maintenance needs, and potential issues. This interactive approach makes the tool flexible and user-friendly, enabling both experts and community members to find suitable trees for various urban planting scenarios.

Figure 4. *Sample Tree Card Display in the Tree Selector Tool*

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