

# The Impact of Propagation Trays on Tree Establishment

A Five-Year Field Trial Comparing Four Trays

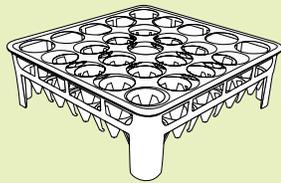


# The Study

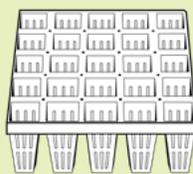
A five-year field establishment trial conducted by Vineland Research and Innovation Centre (Vineland) assessed the impact of propagation trays on tree establishment. Two types of trees were propagated in four different trays and planted in Vineland's test field. Each year, researchers dug up a row of trees and analyzed the root systems. The study aimed to determine whether root defects occurring in propagation would persist in the field, and whether an open-wall tray (RootSmart™) would promote healthier root systems.

RootSmart™ is an open-wall tray that uses air pruning to promote healthy root development and prevent root defects during propagation. It was designed by Vineland Research and Innovation Centre and commercialized with support from A.M.A. Horticulture Inc.

# The Trays



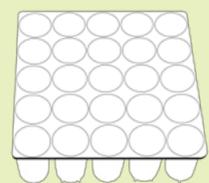
RootSmart™  
(Open-Wall Tray)



Semi-Open  
Tray 1



Semi-Open  
Tray 2



Closed-Wall  
Tray



# The Trees

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Black cherry  
*Prunus serotina*



Eastern cottonwood  
*Populus deltoides*



Vineland research team digging up trees in the field trial.

# The Findings

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Root defects occurring in propagation were **persistent and sustained** after five years in the field.

The open-wall tray (RootSmart™) **consistently produced critical features of high-quality root systems** compared to other trays in three key categories: root quality, root distribution and root-soil contact.



Vineland scientist analyzing and recording root measurements.

# Root Quality

Quality root systems have a high number of lateral roots and few diving or defected roots. This helps prevent girdling or circling roots – a key cause of mortality in urban trees.

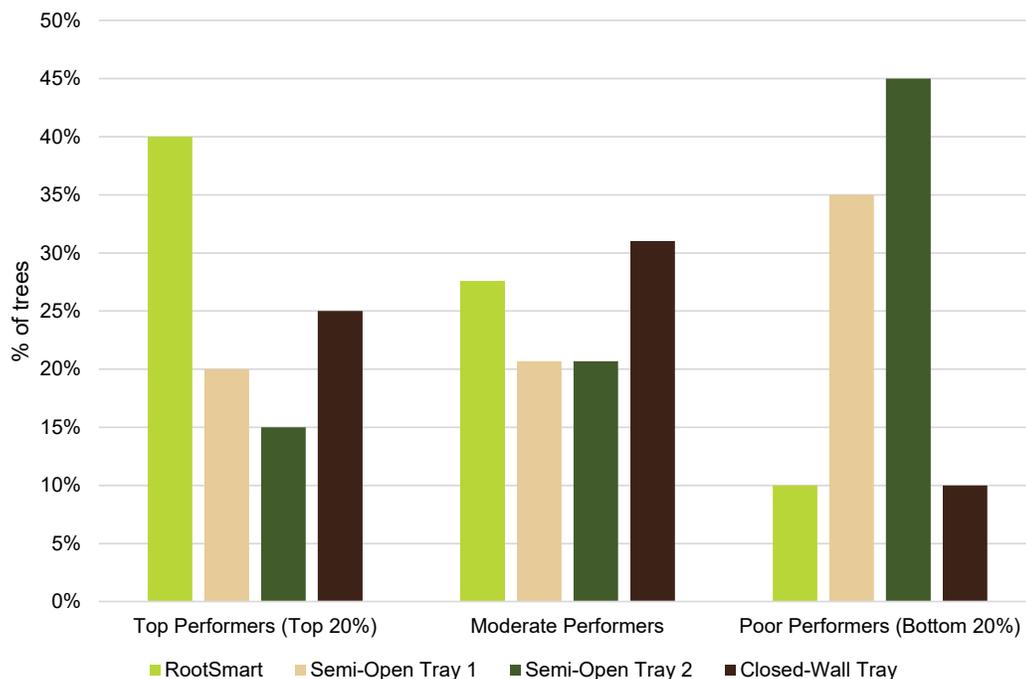
- RootSmart™ consistently promoted higher quality roots in all trees compared to other trays
- Nearly 2x more top performing trees propagated in RootSmart™ (40%) compared to other trays
- 44% of top performing black cherry trees were propagated in RootSmart™, with none among the worst performers (bottom 20%)



Black cherry propagated in RootSmart™ (Open-Wall Tray)



Black cherry propagated in Semi-Open Tray 1



# Root Distribution

Quality root distribution means roots are evenly distributed around the central stem, like the rays of a sun. This helps improve stability and safety, and prevents windthrow.

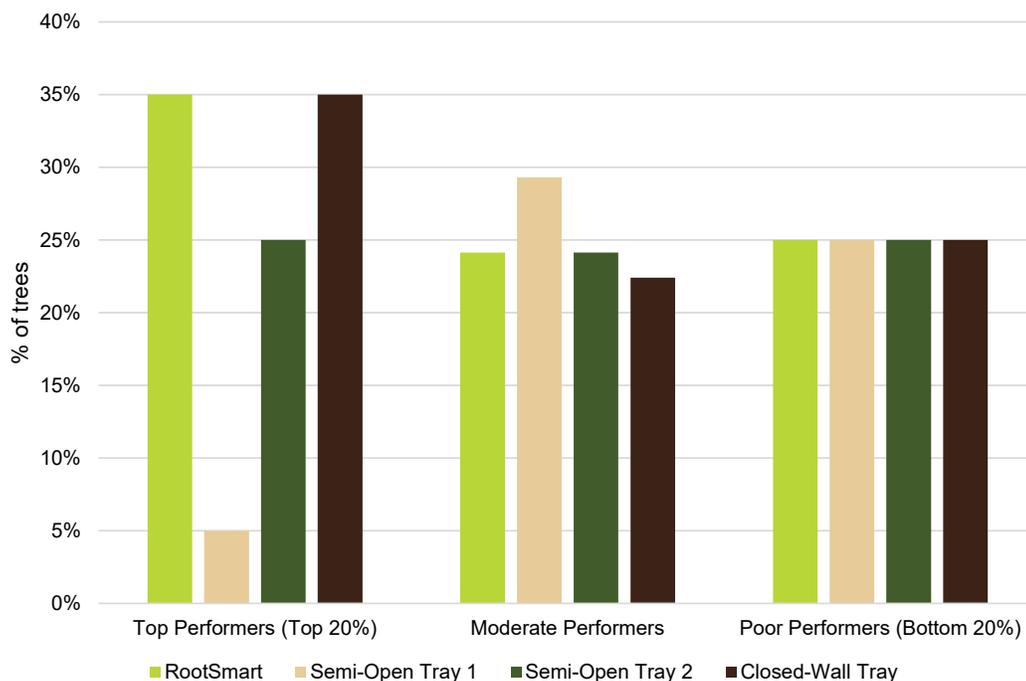
- RootSmart™ promoted the best and most consistent root distribution in all trees compared to other trays
- 35% of all top performing trees were propagated in RootSmart™



Eastern cottonwood propagated in RootSmart™ (Open-Wall Tray)



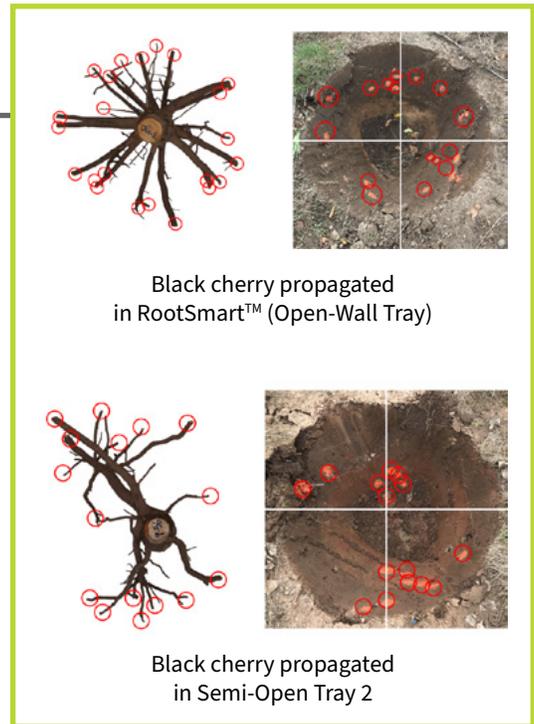
Eastern cottonwood propagated in Semi-Open Tray 2



# Root-Soil Contact

Optimal root-soil contact means there are many contact points between the tree's root system and the soil. The more contact points, the better the uptake of water and nutrients to support proper establishment and growth.

- RootSmart™ promoted better root-soil contact in black cherry trees compared to other trays
- 76 root-soil contact points compared to 44 contact points in the figure on the right

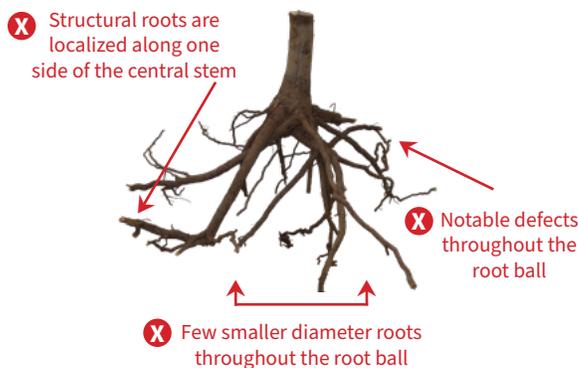


# Long term success?

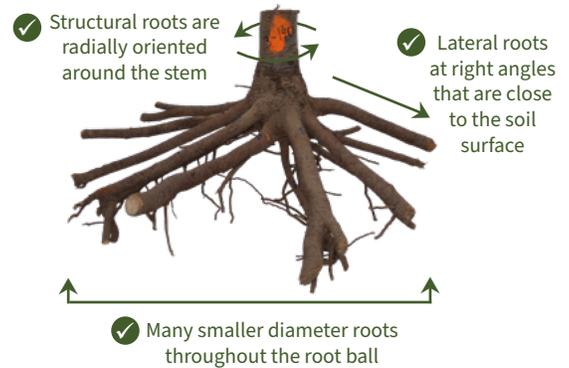
The study confirmed that above-ground performance (tree height and caliper) is not an indicator of root quality, which is known to be essential for a tree's longevity.

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It's what's underground that counts.



Ranked #1 of 82 for height (Black cherry)



Ranked #78 of 82 for height (Black cherry)

# Best Species to Start in RootSmart™

Based on field trial findings, researchers noted the RootSmart™ tray provides a significant advantage to the propagation of key species demonstrating strong tap-rooting systems.



## Native to Canada

Hickory species (*Carya*): Shagbark, Big shellbark, Bitternut

Pine species: White (*Pinus strobus*)

Oak species (*Quercus*): Red, White, Bur, Chinquapin

Hazelnut species (*Corylus*): American, Beaked

Red bud (*Cercis canadensis*)

Douglas fir (*Pseudotsuga menziesii*)

Black walnut (*Juglans nigra*)

Eastern red cedar (*Juniperus virginiana*)

Kentucky coffeetree (*Gymnocladus dioica*)

Black cherry (*Prunus serotina*)

Ironwood (*Ostrya virginiana*)

Sassafras (*Sassafras albidum*)

Black gum (*Nyssa sylvatica*)

American sycamore (*Platanus occidentalis*)

Paw paw (*Asimina triloba*)

## Native to North America

Common persimmon (*Diospyros virginiana*)

Yellowwood (*Cladrastis kentukea*)

Honey locust (*Gleditsia triacanthos*)

Bald cypress (*Taxodium distichum*)

Ohio buckeye (*Aesculus glabra*)

## Other Species

Littleleaf linden (*Tilia cordata*)

Japanese pagoda tree (*Sophora japonica*)

Horse chestnut (*Aesculus hippocastanum*)

# RootSmart™ Grower Guide

Download  
Grower Guide

Any tray is only as good as your approach to propagation management. The RootSmart™ tray has a unique open-wall design and growers may need to adjust their approach for best performance – especially with respect to watering. Vineland has created an evidence-based RootSmart™ Grower Guide to ensure best practices in watering, setup, handling, timing, transitioning and more.

Find the Grower Guide at [www.rootsmart.com](http://www.rootsmart.com).

## Connect with Us



**vineland**  
RESEARCH & INNOVATION CENTRE

Vineland Research and Innovation Centre is a uniquely Canadian results-oriented organization dedicated to horticulture science and innovation. We deliver innovative products, solutions and services through an integrated and collaborative cross-country network to advance Canada's research and commercialization agenda.

We are an independent, not-for-profit organization, funded in part by the Canadian Agricultural Partnership, a five-year, federal-provincial-territorial initiative. For the latest on our research and innovation visit [www.vinelandresearch.com](http://www.vinelandresearch.com).

**Interested in a technology assessment?** We offer a variety of research services and technology licensing. To get started, contact Dr. Rhoda deJonge, Director, Plant Responses & the Environment: [rhoda.dejonge@vinelandresearch.com](mailto:rhoda.dejonge@vinelandresearch.com).



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A.M.A. Horticulture Inc. is a dynamic, solutions-focused supplier that has been serving the horticulture industry since 1982. Our team understands emerging trends, opportunities and pain points in all areas of horticulture, from nursery to greenhouse to garden centre. We help growers pivot and evolve with quality supplies, trusted expertise and friendly, reliable service. Discover how we deliver innovative, custom solutions for your success by visiting [www.amahort.com](http://www.amahort.com).

**Interested in the RootSmart™ propagation tray?** Set up a trial and request a quote by contacting Craig Willett, Manager, Ellepots & Pre-Fill: [cwillett@amahort.com](mailto:cwillett@amahort.com).