

Successfully Revitalizing Urban Trees in Croatia, EU

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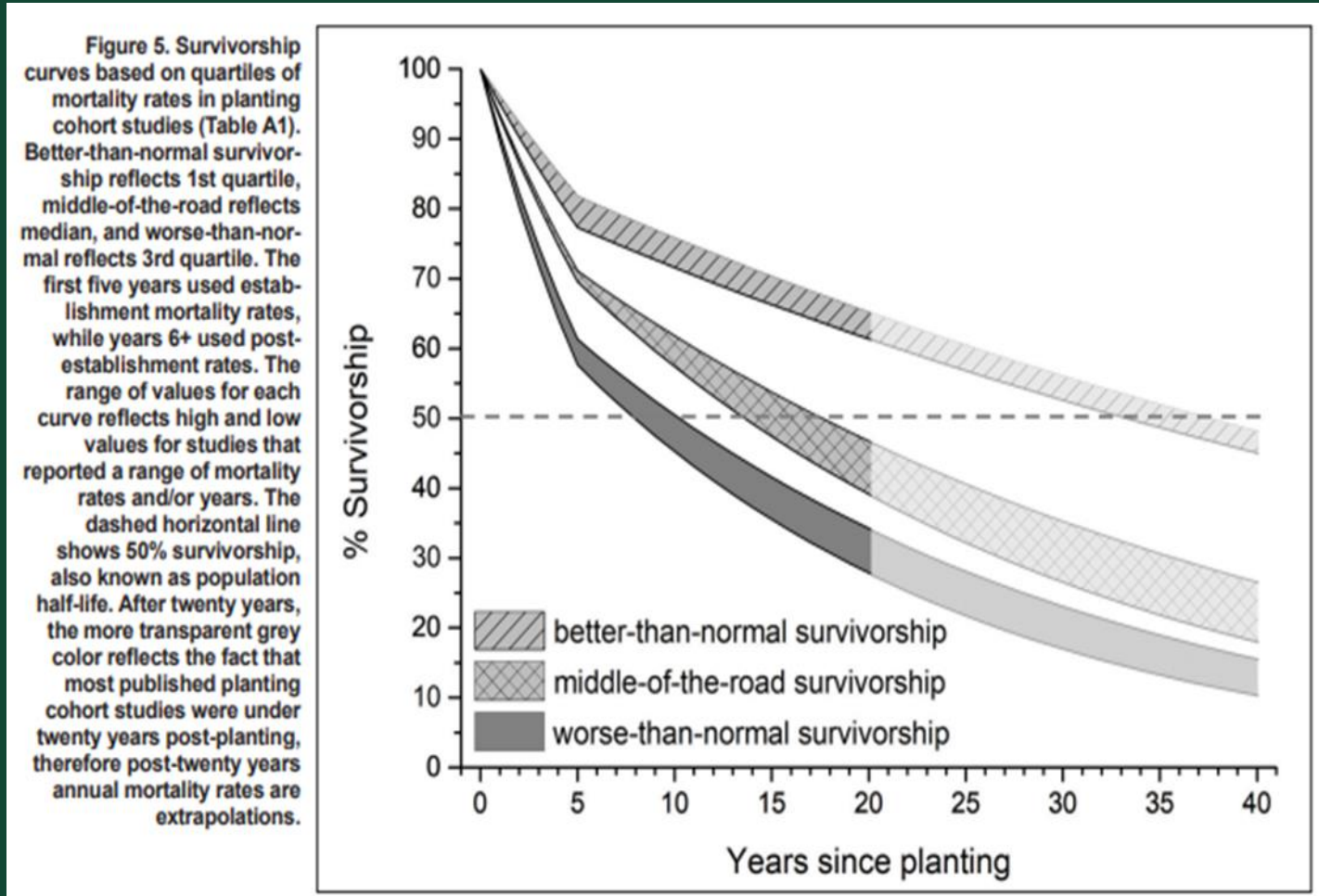
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You are in the right place if:

1. You are concerned about the loss of mature urban trees and would like tools to address early signs of distress, and avoid costs of replacement.
2. You would like to improve the survival of newly planted trees and avoid the ~30% survival loss that is common.



From Hilbert et al. *Urban tree Mortality: A literature Review*
Arboriculture & Urban Forestry 2019. 45(5):167–200

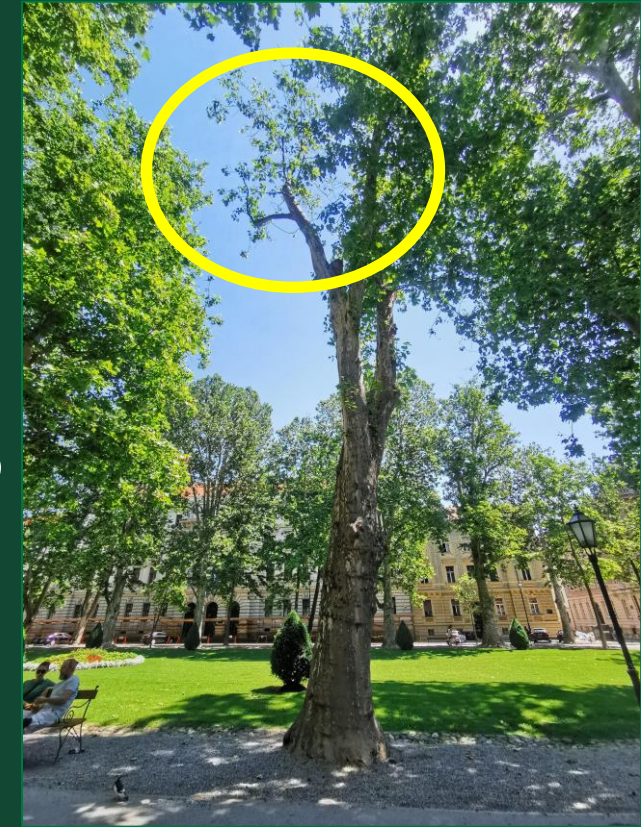
The impact of climate change on urban trees is accelerating.

Traditional solutions are becoming unsustainable and insufficient for maintaining the urban forest. Net costs for pruning, removal, and replanting are becoming prohibitive



Urban trees are experiencing stress and decline, starting from their upper branches.

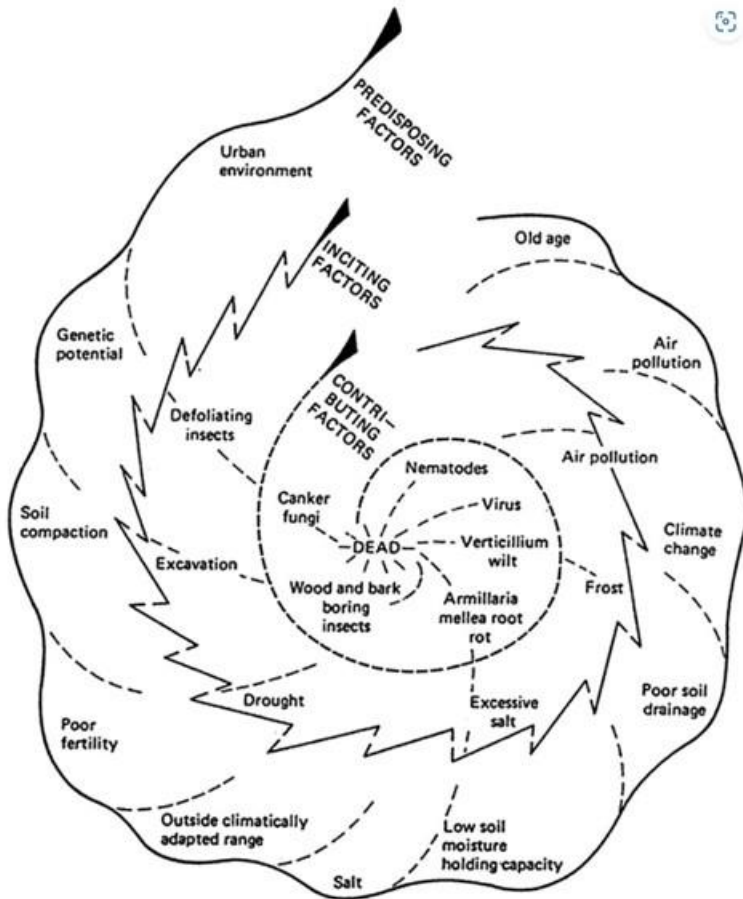
Urban trees are beginning to dry and die.



What causes trees to dry out and die back?

Paul Manion's "Death (Decline) Spiral"

- Tree maintenance focus should not be on attacks from pests, instead addressing the underlying causes of stress in trees (**predisposing factors**).
- **Predisposing factors** stem from disturbances in soil relationships, root conditions, temperature, and water availability
- Disease and pests are typically secondary (**Inciting or Contributing factors**)
- Diseases and pests are **primarily a result of the tree's vitality decline, not a cause of the decline**



Original "death spiral" from Manion (1991) describing biotic and abiotic factors leading to plant mortality.
Reproduced from Prentice-Hall (Pearson)

The decline of urban trees intensifies more and more each year

Climate Change (a challenge already for even forest trees):

- **Prolonged high temperature**
- **Reduced precipitation** during the growing season

But then combined with:

- **Improper planting** in overly small plots with poor soil
- **Mechanical damage** to roots & trunks
- **Soil compaction** and limited **rooting depth**
- **Loss of organic matter** below trees areas over decades
 - Loss of complex soil micro and macrobiome
- Emergence of **new, "imported" diseases and pests** that spread rapidly on trees with reduced vitality



For the Arborist:

- Preventative Arboriculture complements (not competes) with existing tree care practices
- Adds to the arborists toolbox and expertise
- Provides new opportunities for skilled services to property owners and municipalities



Preventative Arboriculture

SOLUTION 1: PREVENTIVE ARBORICULTURE (Existing Trees)

- Efforts are concentrated on improving soil aeration, promoting a healthy soil micro biome and increased root structure
 - Any required pruning occurs at a subsequent stage. **Recovery first, not cutting!**
- The DRILL 2 FILL method for Preventative Arboriculture is:
 - Highly cost-effective compared to drastic pruning, tree removal and tree replacement
 - Implementable in various physical locations (including under concrete pavement)
 - Does not require large investments in equipment or time to treat trees on site.



Simple and quick installation process (approximately 1 minute per installed HerbaFertil bag) - Video



https://www.linkedin.com/posts/maks-udov-2a61663b-urbanforestry-arboriculture-horticulture-activity-7156177160553037824-8hYt?utm_source=share&utm_medium=member_ios

DRILL 2 FILL Technology: *How is it done?*

1. Correct as possible original planting defects (buried root flare)
2. Assess extent of foliage decline as may have impacted recession of the root system
3. Drill test holes to confirm position of tree root location
4. Drill holes where roots are present in a circle around the circumference of tree
5. Insert HerbaFertil-filled burlap bags and liquid additives (proprietary), and fill in any open spaces
6. Cover with coarse bark, water-in the holes, and rake out removed dirt to blend with grass/soil



Current results of research on DRILL 2 FILL method:

- **Scientifically tested effectiveness** (University of Zagreb, Croatia, EU).
 - Visual vitality of the canopy, which initially ranged from 20% to 43%, increased to 64% and 86% over the course of one year for an **average vitality increase of 40%**.
- **Successful practical applications** in a number of cities in Croatia and EU.
- **Soil enhancer: key nutrient indicators significantly increase**, both nutrient levels in foliage and movement of nutrients beyond immediate bag-hole area (likely mediated by stimulation of micro and macrobiomes).
- **80% water savings** for irrigation due to the more targeted application possible.
- **Additional large research study being assessed in fall 2024.**

DRILL 2 FILL Technology: *Why does it work?*

- Not just a watering or fertilization effect
- Instead building new feeder and structural roots
 - 6-7 kg (fw) per bag

“Mouth of the Tree”



SOLUTION 1: Tree revitalization



Chamaecyparis nootkatensis pendula

SOLUTION 1: Tree revitalization



BEFORE



AFTER

Catalpa bignonioides

SOLUTION 1: Tree revitalization



SOLUTION 1: Tree revitalization



Rescuing urban trees trapped in asphalt

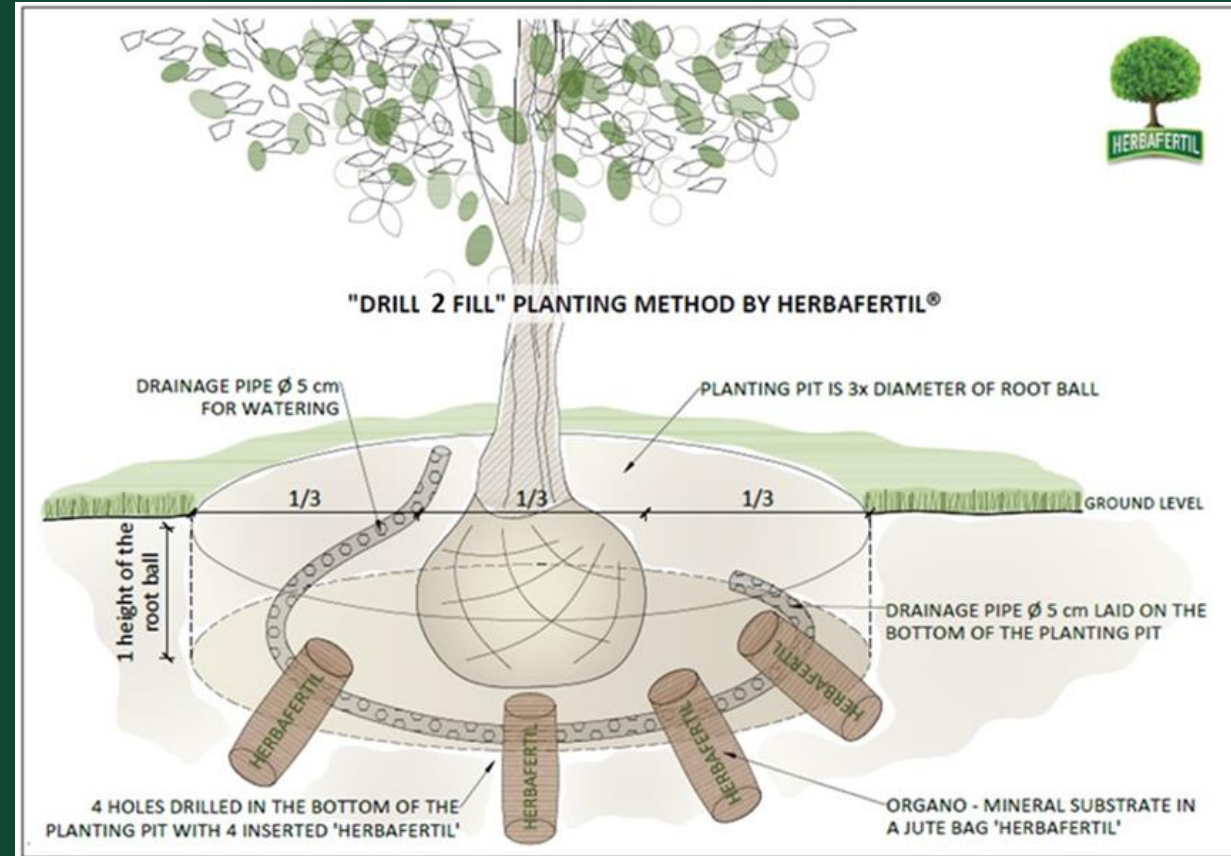
Before and After Videos

<https://lnkd.in/ddhkc2V2>
<https://lnkd.in/ddGwecbD>



SOLUTION 2: DRILL 2 FILL planting method *How is it Different?*

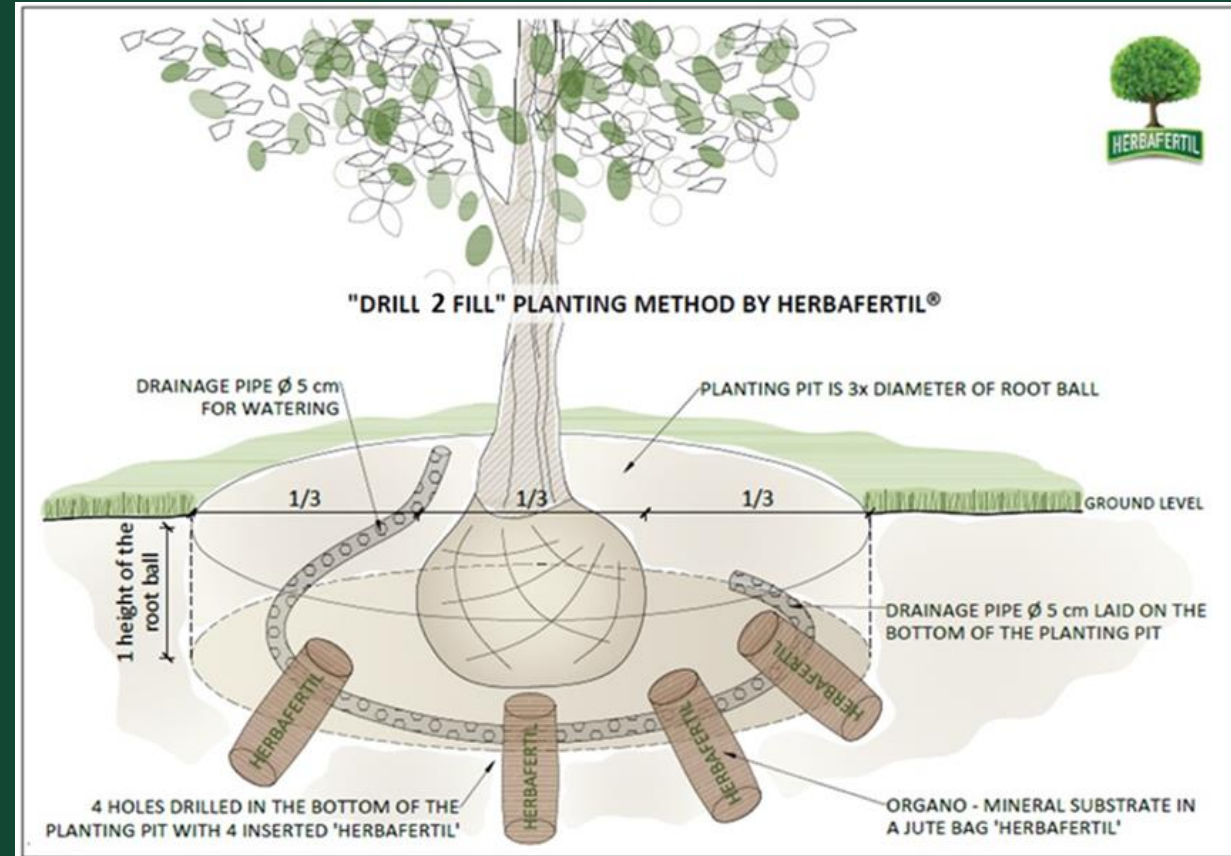
- Planting hole 3X the width of root ball
- Herbafertil bags drilled at angle away from below base of root ball
- Flexible drainage pipe placed to facilitate deep watering to base of hole and jute bags during year 1 as needed



97% planting success (1,466 trees planted) over last 12 years!

SOLUTION 2: DRILL 2 FILL planting method *Why it works*

- Promotes immediate **deeper root growth** (for wind resistance and water access during drought).
- Improves both **root aeration** for root growth and a path for deep/efficient irrigation during initial establishment
- Ensures **better drainage** for seedlings' roots when water is overly abundant.
- **Revitalizes** the existing soil micro biome around the roots & attracts macro biome (earthworms etc) that are natural soil aerators and nutrition distributors.



97% planting survival success

SOLUTION 3: More Sustainable deep irrigation approach

- Deep irrigation can save up to two-thirds of the typical water volume required for watering.
- Optimal outcomes in tree revitalization occur when water nozzles are installed at a depth of 45 cm (bottom) within a HerbaFertil bag. This promotes the extension of tree roots from the planting pit into the native soil, facilitating deeper growth towards available nutrients and water.
- Irrigation can also be done by hand irrigating the bag holes weekly during dry periods.



Summary: DRILL 2 FILL: Why it is unique and valuable?

Multi-faceted benefits for a changing climate

1. Affordable for both existing and newly planted trees.
2. Ability to implement/access trees in any type of landscape situation.
3. Rapidly invisible to the untrained eye following completion.
4. Creates specific access points for highly efficient irrigation that is effective due to new root growth presence.
5. Creates large pore spaces for deep aeration into the soil profile.
6. Resurgence of the native macro and microbiome.



Thank you for your attention!

Desire to discuss further? We do! Lets connect!

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- Founder and Owner of Herbafarm-Magnolija Ltd, Zagreb, Croatia, EU
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Speakers:

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