

TREEIB[®]

THE SET OF TOOLS

for watering large/mature/established trees

TREEIB[®] is:

The only portable **non-invasive** watering system and method for mature trees in the world, which is usable **SAFELY** in large scale in the urban landscape.

the method and the product, which maximizes tree survival rate and, above that, **maximizes ecosystem services** provided by trees, based on science.

A patent pending method and product under application
US 20210400890 A

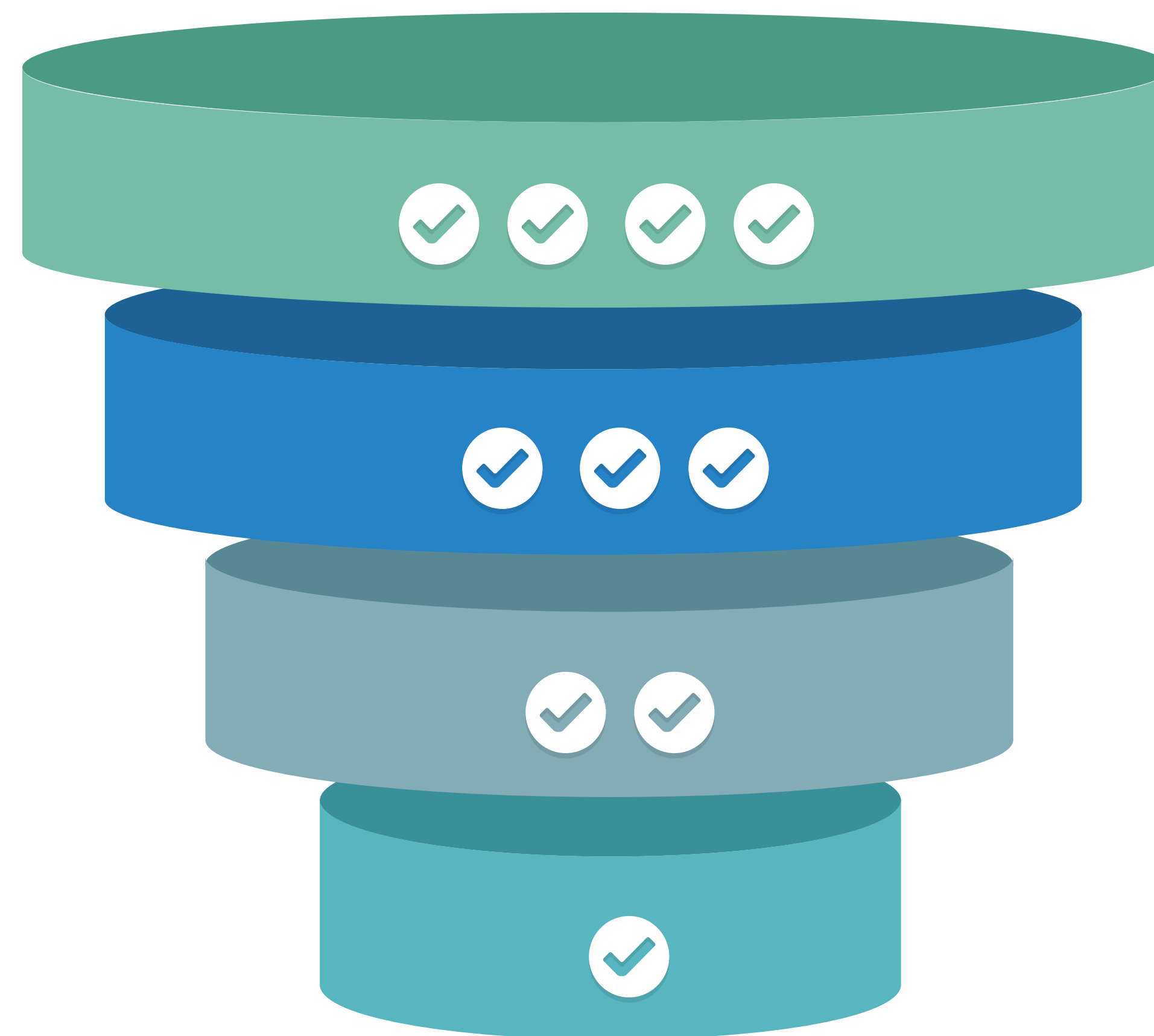


Survival of mature trees is crucial, but it is not enough!

In drought periods, we try to keep the trees from dying. But this is only a partial solution to what we need in times of climate change:
TO MAXIMISE ECOSYSTEM SERVICES WHILE MAINTAINING THE TREE'S LONG-TERM PERSPECTIVE with reasonable costs.

THIS REQUIRES A STRATEGIC APPROACH.

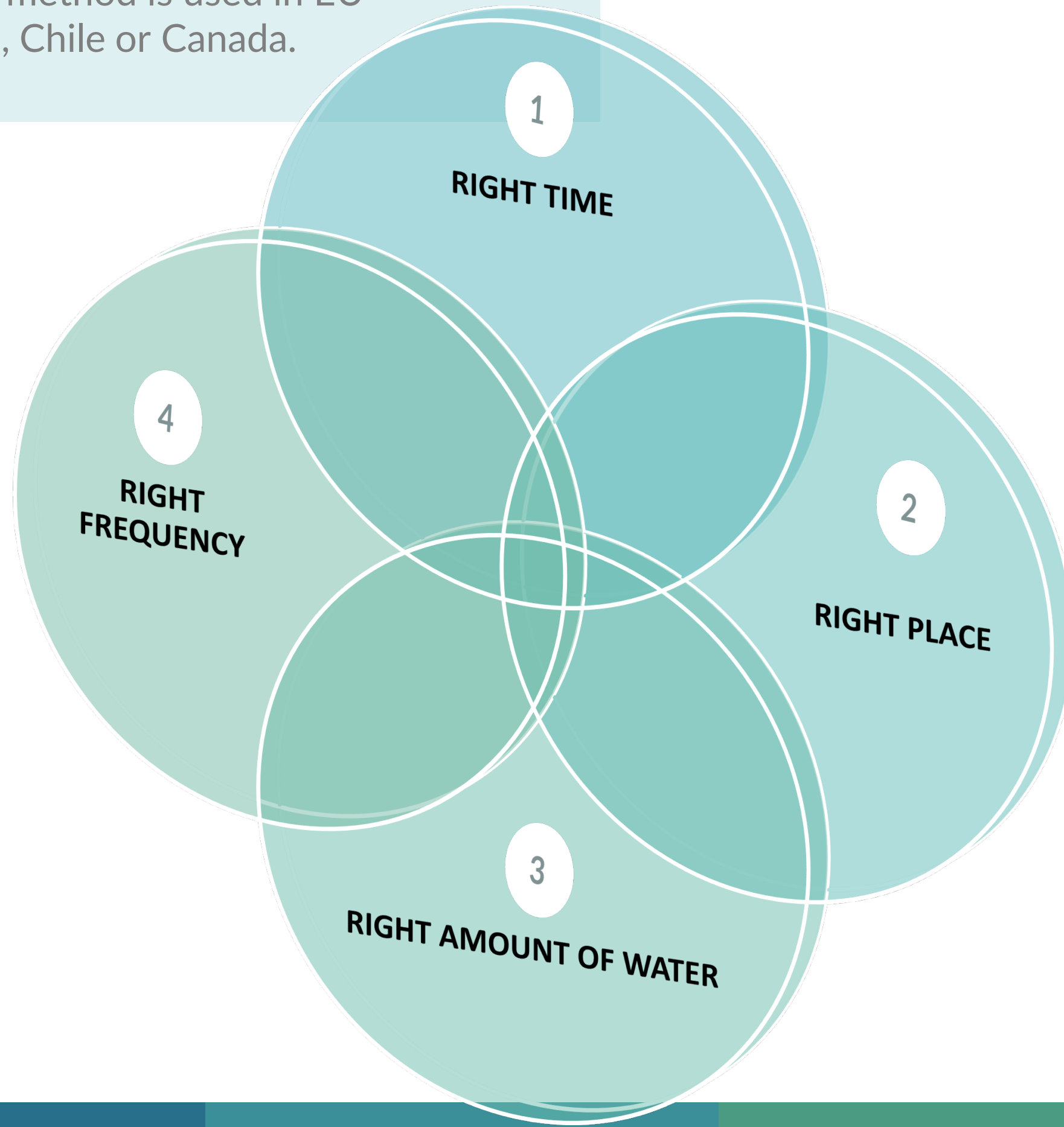
- 4** **MAXIMISING ECOSYSTEM SERVICES**
Promoting the maximum benefits of trees.
- 3** **VITALITY**
Maintaining and expanding the root system so that the tree has a long-term perspective, sufficient leaf area and is not susceptible to collapse due to any stress.
- 2** **SAFETY**
Maintaining the tree stability by maintaining the correct shape and extent of the root system.
- 1** **SURVIVAL**
Simple tree preservation.



THE RIGHT METHODOLOGY

The right way how to water mature trees, based on the current science knowledge

We gathered the latest scientific knowledge on tree physiology, developed our methodology and tested it for 3 years with very positive results. Now this method is used in EU countries, Chile or Canada.



based on **tree physiology**
secures **trees long-term safety**

The results:



So that soil gas exchange is possible and shallow rooting of the tree is prevented.

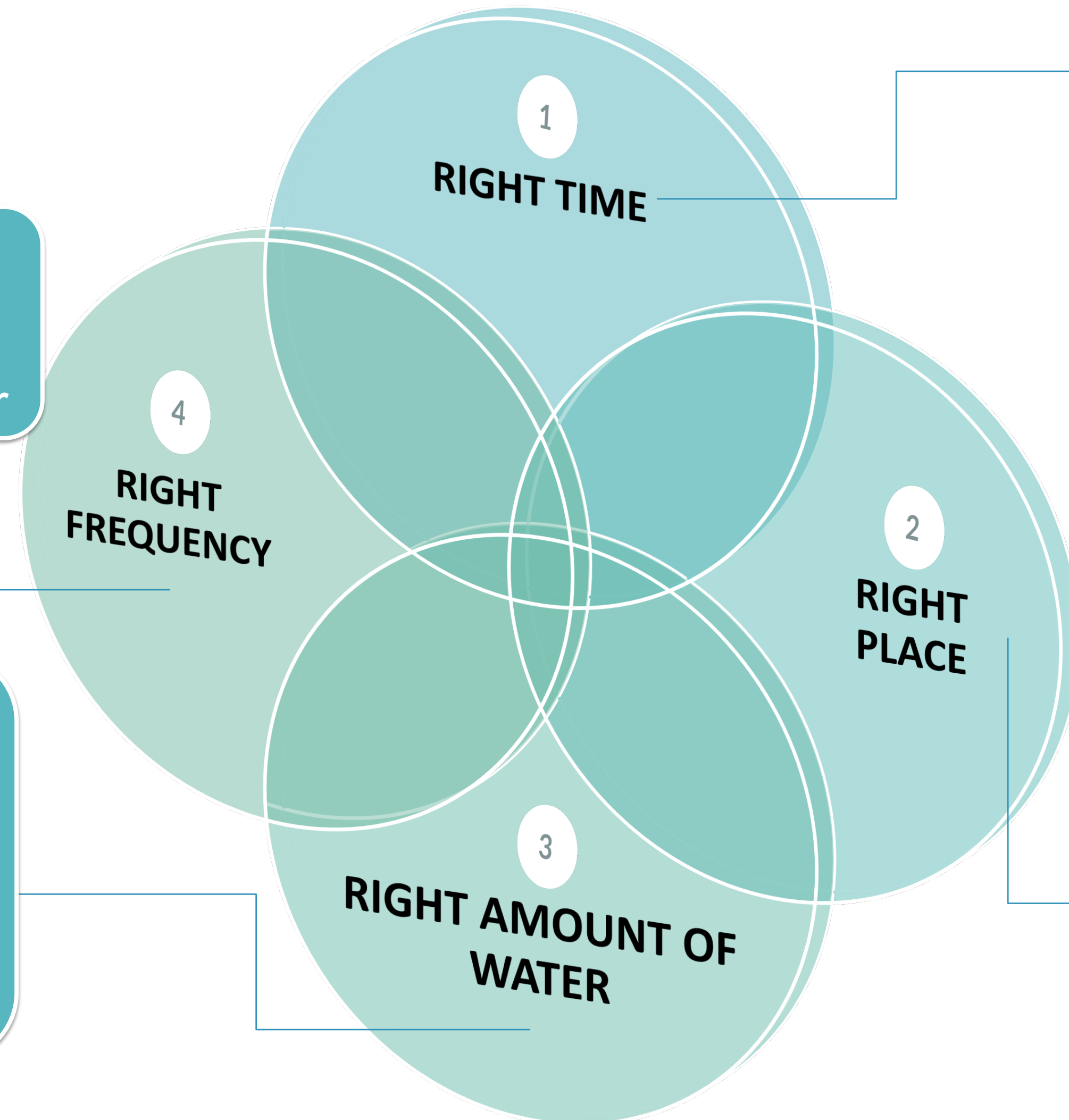
4-5 times per year

The soil must dry out so that the root system does not become lazy. Vertical soil hydraulics is restored, as we cannot replace all the water the tree needs.

Enough to replace evapotranspiration volume for a minimum of 10 days

800-9,000 liters/
211-2,400 US gal.

A sufficient volume of water must reach a minimum depth of 60 cm / 2 ft.



Whenever the substrate temperature is above

6°C/42°F

an adequate amount of water must be accessible to the tree with possible irregularity to prevent die off the feeder roots.

Where we want the roots to be

On and beyond the canopy dripline

The extent and shape of the root system should be close to the natural shape of the root system of the taxon.

THE RIGHT TIME





Where we want the roots to be

6°C/42°F

OBJECTIVE:

The tree has the largest root system as possible, including feeding roots. **Do not disrupt the growth cycle by root dieback and maximizing the tree growth.**

The biomass of the leaves corresponds approximately to that of the fine roots. If we want to generate enough nutrients over the growing season, we need to have as much fine root biomass as possible.

-  It is widely acknowledged that soil temperature is one of the primary factors affecting plant growth. In fact, soil temperature could be even more important than air temperature, because it usually lags behind (although it tracks) air temperature in spring (1). On the other hand it supports incorporate autumn mature tree irrigation into yearly tree management routine because vice versa soil temperature in autumn mornings is usually higher than air temperature.
-  The roots, unlike the leaves and other parts of the tree, grow all year round, especially in spring and in autumn (3). If the soil temperature drops below 41-42°F (1),(2), growth stops. The main condition of the tree roots grow in this period is water availability in the soil. If there is not enough water in the soil, the already grown fine roots die. The growth potential of the tree is lost, as well as the nutrients stored in the fine roots.
-  The root grow during spring has different function against root grow in autumn. When in spring the root system grows to secure enough nutrients and water for developing the tree foliage and blossoming, in autumn the root grow secure depositing of metabolites (like starches) to their tissue. This energy is saved for the spring grow spurt of tree in the next season.
-  Therefore, in general, we recommend watering in the following scheme:
 - very early spring, before the leaves appear
 - during the rapid growth phase in spring, at flowering period
 - in summer to overcome dry periods (maximum once a month)
 - in autumn to keep the feeding roots alive until the temperature drops

(1) Pregitzer, Kurt & King, John & Burton, Andrew & Brown, Shannon. (2000). Responses of tree fine roots to temperature. *New Phytologist*. 147. 105-115. [10.1046/j.1469-8137.2000.00689.x](https://doi.org/10.1046/j.1469-8137.2000.00689.x).

(2) ALVAREZ-URIA, P. and KÖRNER, C. (2007), Low temperature limits of root growth in deciduous and evergreen temperate tree species. *Functional Ecology*, 21: 211-218. <https://doi.org/10.1111/j.1365-2435.2007.01231.x>

(3) Montagnoli, Antonio & Dumroese, R. Kasten & Terzaghi, Mattia & Onelli, Elisabetta & Scippa, Gabriella & Chiatante, Donato. (2018). Seasonality of fine root dynamics and activity of root and shoot vascular cambium in a *Quercus ilex* L. forest (Italy). *Forest Ecology and Management*. 10.1016/j.foreco.2018.06.044

THE RIGHT PLACE

When the soil temperature is higher than
**On and beyond the canopy
dripline**

OBJECTIVE:

The tree has the largest a root system as possible, including stabilization roots. **Safety and stability of the tree.**

The tree root system is a dynamic system, which can move quite rapidly. That's why we recommend watering trees on / beyond the canopy dripline.

- ✓ Longevity of the roots of the first order is relatively short (about 90% less than 1 year(1)) and the FO roots grow, where water and nutrients are available. It means that FO roots can move to the source of water or nutrients within one year. We have a documented observations of the fact.
- ✓ If the tree is watered near the trunk, within a short time the roots of the first order form close to the trunk and the others gradually disappear. As the FO roots form higher order roots that stabilise the whole tree, in the medium term the higher order roots further away from the trunk die and the stability of the tree is threatened.
- ✓ Deformation of the root system also occurs when the lawn and trees are watered together. This was well demonstrated, for example, in Salt Lake City during the September 2020 windstorm. The city lost tens of thousands of large trees in a matter of hours. According to a written statement from the local ISA-ARBOR chapter that we have access to, this was a direct result of lawn irrigation where trees rooted shallowly and became
- ✓ Watering close to the trunk or under the crown, as well as applying / injecting fertilizers to the same area, cause tree instability.
- ✓ This can be avoided if the tree is watered beyond the crown, where we naturally maintain/expand the root system similar to the natural environment. Even trees that are in a paved sidewalk should be watered beyond the canopy dripline.

(1) Huo, C., and Cheng, W.. 2019. Improved root turnover assessment using field scanning rhizotrons with branch order analysis. *Ecosphere* 10(8):e02793. 10.1002/ecs2.2793

THE RIGHT AMOUNT OF WATER

Enough to replace evapotranspiration volume for a minimum of 10 days

211-2,400 US gal.

OBJECTIVE:

Deep rooting. **Safety and stability of the tree.** Restoring vertical soil hydraulics.

Depending on their size, trees can evapotranspire up to 200 gallons of water per day. We recommend an irrigation rate of at least ten times the daily evapotranspiration volume.

- ✓ Although values may vary between taxons, as well as between individuals of the same species in different locations, it can generally be said that 90% of feeding roots are found at depths of up to 40 cm/16 inch (1).
- ✓ The soil must be moistened to at least this depth to prevent shallow rooting. There are not many ways to get water to such a depth, even in the dry season.
- ✓ The only way that is practically applicable is large irrigation doses applied by drip irrigation.

(1) Meinen, Catharina & Leuschner, Christoph & Ryan, Nicholas & Hertel, Dietrich. (2009). No evidence of spatial root system segregation and elevated fine root biomass in multi-species temperate broad-leaved forests. *Trees*. 23. 10.1007/s00468-009-0336-x.

So that soil gas exchange is possible and shallow rooting of the tree is prevented.

4-5 TIMES a year

OBJECTIVE:

Maintaining the soil gases exchange. Making watering of trees economically accessible. Avoiding tree collapse in case of watering interruption.

- ✓ The presence of oxygen in the soil and the overall exchange of gases between the soil and the atmosphere is a factor that influences the growth and health of the tree. If the soil water content increases, the soil gas content decreases and vice versa. Overall, we should aim to keep the soil gas/moisture ratio as close to 'normal' as possible. This means that the soil substrate needs to dry out from time to time to allow the exchange of gases (1).
- ✓ We consider it completely pointless and dangerous for established trees to be watered every day or even once a week. This is appropriate for newly planted trees, not for the established ones.
- ✓ We have set an initial test frequency of 4-5 times per year for irrigation dose of mature trees in our test plot with minimum volume of 10x estimated evapotranspiration volume. After four years, we can say that this frequency has proven to be sufficient and very beneficial. We have verified experimentally that water applied with our product in heavy soil penetrates to a depth of 2-3 feet and moistens the entire soil profile.
- ✓ The above mentioned frequency minimizes the risk we lose the tree if the watering is not possible from any reason. The root system of the tree is still robust enough to get supply water and nutrients to the tree.

(1) Poorter, H., Niklas, K.J., Reich, P.B., Oleksyn, J., Poot, P. and Mommer, L. (2012), Biomass allocation to leaves, stems and roots: meta-analyses of interspecific variation and environmental control. *New Phytologist*, 193: 30-50. doi:10.1111/j.1469-8137.2011.03952.x

THE PRODUCT

OBJECTIVE:

To develop a product range, which can provide tree watering according to the scientific evidence mentioned before. To develop a product, which is safe for the tree and for the investor, visually acceptable, durable and usable in large scale in urbanized environment.

- ✓ To start with product information click here: [PRODUCT](#)
- ✓ To see how the products look like in use click here: [GALLERY](#)
- ✓ To see our results and information of the testing plot click here: [RESULTS](#)
- ✓ To see how we solved security for the tree and the owner click here: [SAFETY](#)
- ✓ To see the custom design options click here: [COLORS](#) and [CUSTOM PRINT](#)

WHO WE ARE

A family business based in the Czech Republic, Europe.

50% run and owned by woman, including intellectual property.

We're discovering and inventing, for our beloved trees and the civilisation.

Our careers started in large corporations, but we soon realized that we were not the best employees. We are too creative and perfectionistic.

We are born entrepreneurs and innovators.



WHO WE ARE

We were running a creative landscaping business from 2012 and planting **LIVING WILLOW STRUCTURES** was a main job in winters.

Willow requires intensive watering after planting. However, as the drought gradually set in, this was a challenge for the clients.





only

14pp DROP in avg.

rainfall caused huge problems in ecosystems

THE DROUGHT IN THE CZECHIA

2015-2019

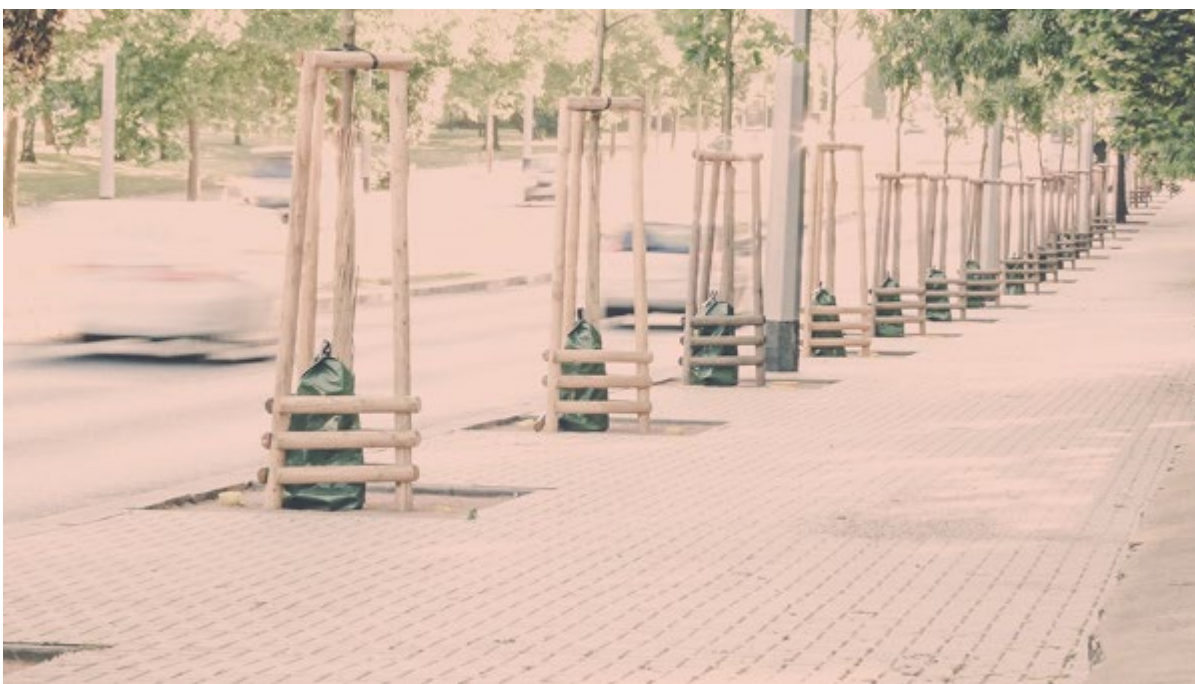
Received average 23,5 inches in comparison with avg. 27 inch (avg. 1981-2010) per year + heat waves

Mortality rate of new tree planting projects increased to 80%

Existing trees started to decline in cities but in landscape as well

Susceptibility to pests and diseases has increased

Although rainfall has returned to normal in the last two years, we are still experiencing the effects.



TREEGATOR® LAUNCH

2016

FROM MORTALITY OF 80% TO ALMOST 0%

When seeking a help to our clients we spot the US invention – watering bag for newly planted trees produced by Spectrum Products, NC.

We become exclusive distribution partner in the region.

In a short time we become the most growing partner of the US brand in Europe.

After partnering with governmental agencies and research institutions we reached decrease of newly planted trees mortality to almost 0%.

We are still leading company in the segment in The Czech republic and Slovakia.

BUT OUR TREES ON OUR PROPERTY WERE SUFFERING FROM THE DROUGHT

and they were at risk of bark beetle infestation from the nearby forest.



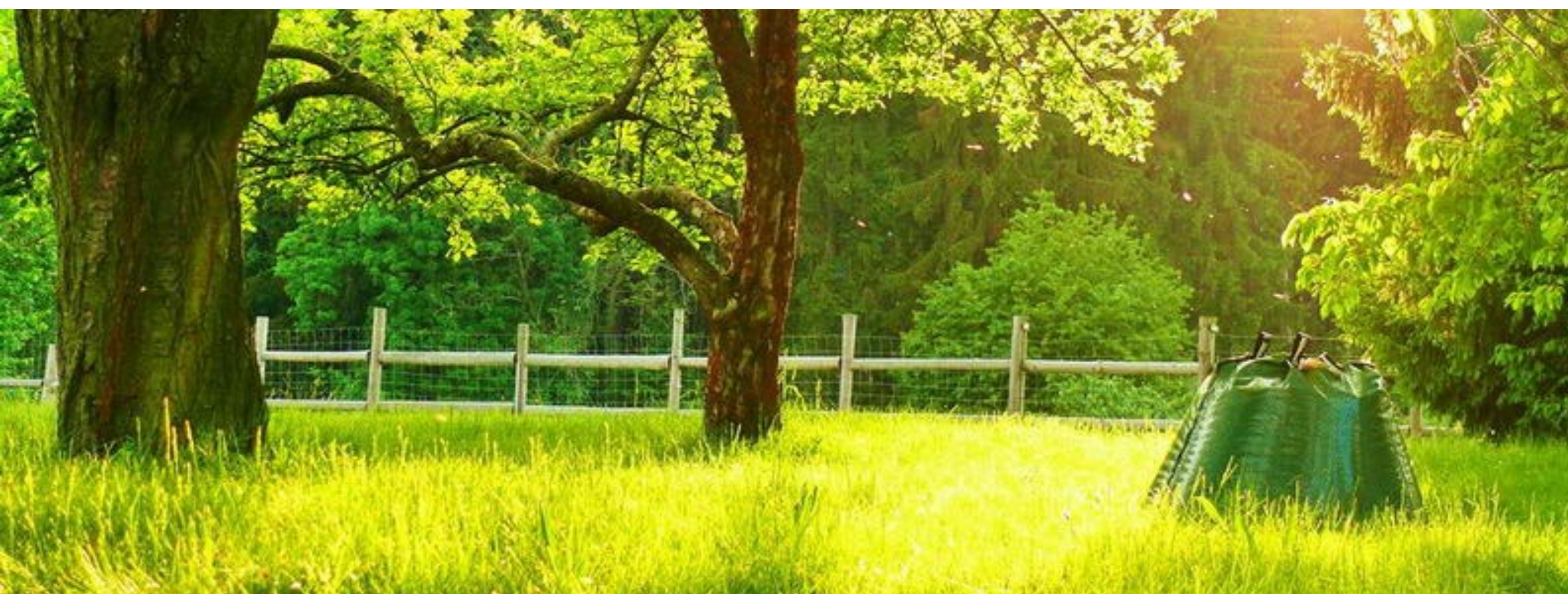
One of the typical manifestations of drought stress on deciduous trees (*Prunus* sp.): branch dieback



Typical drought stress demonstration on conifers (*Abies alba*/Norway spruce): the needles of the older generations falling off

WE WERE LOOKING FOR A SOLUTION

2017



WE WANTED TO IMPORT A PRODUCT TO HELP OUR TREES BUT THERE WAS NOTHING ON THE WORLD MARKET

We used couple of Tregator bags to deliver desired irrigation dose around the tree canopy dripline.

But it took several hours to fill 40 Tregators in the double set up (3800 litres/1000 gallons). It was an unpleasant job.

The solution was not windproof (risk of accident on the street) and also completely unprotected against thieves.

The service person had to be present at the whole time of filling.

The irrigated area was small and also this solution cannot be repaired or branded.



WE WERE THE RIGHT ONES!

We have experienced many stories during the implementation of TREGATOR with our clients that gave us a clear brief. We lived their lives with them and support them to succeed.

We ourselves had a problem we wanted to solve.

And our clients also started to contact us with questions about how to water a mature tree.

CONTACT

LEDASCO s.r.o.



Martin Tušer

The Inventor

martin@treeib.com

LEDASCO s.r.o.

tel.: +420 607 655 614

Felklova 2005, 25263 Roztoky

The Czech Republic

Schedule a meeting with me on [Calendly](#)



Brian Piper

Business Development Director

The U.S. market

USA@treeib.com

bpiper@ibda-inc.com

Global Line: +1 (716) 989-6163

Mobile/What's App:

+ (420) 603-471-475