Urban Tree Planting

A Guide for Civic Projects in Vojvodina

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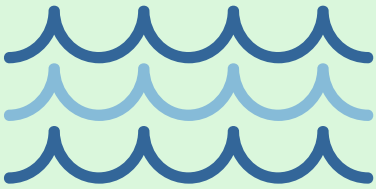
Why Plant Trees?

Trees lessen the impacts of climate change in three ways.

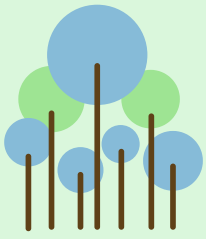
CLIMATE

As trees grow, they absorb the carbon dioxide that warms our atmosphere. Trees can store carbon dioxide for tens to hundreds of years.



WATER AND WIND

Trees slow the movement of water and wind, and reduce the erosion caused by both. This reduces loss of soil during droughts and floods, which are becoming more destructive due to climate change.



HABITAT

Trees provide shelter, shade, and substrate for many living beings. In cities, people benefit from the cooling effect, birds find a place to perch, and shade-loving plants can find a place to grow.

You can find more information about the benefits of planting trees at http://www.fao.org/3/a-c0024e.pdf

Tree Selection

Different trees thrive in different conditions. Evaluating these conditions allows you to choose the right tree to plant.

SOIL

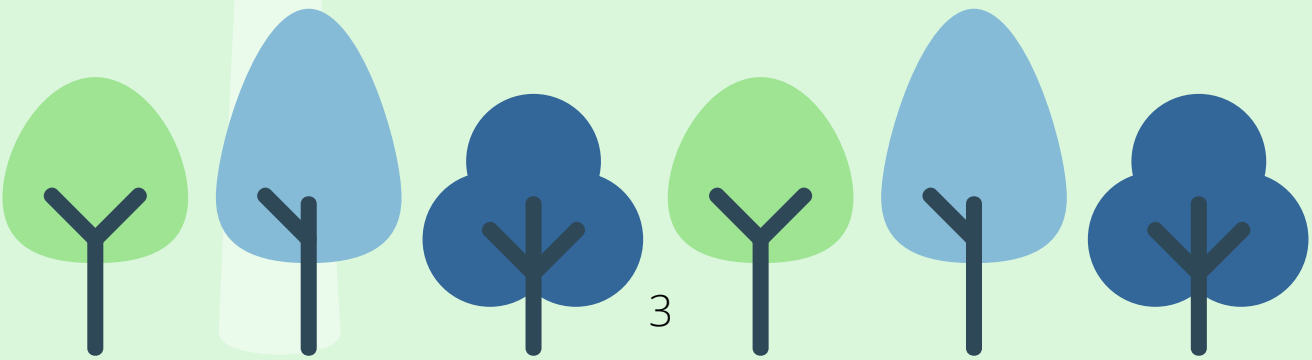
Soils differ in the amount of nutrients, as well as in the ratio of sand, silt, clay, and organic matter. Trees have different nutrient and soil structure requirements.

WATER

Different tree species need different amounts of water to live. Ensuring the right amount of water is key to long-term health.

SURROUNDINGS

A tree's surroundings affect how much light it receives, how compacted the soil is, and how much space the tree has to grow.



Understanding Soil

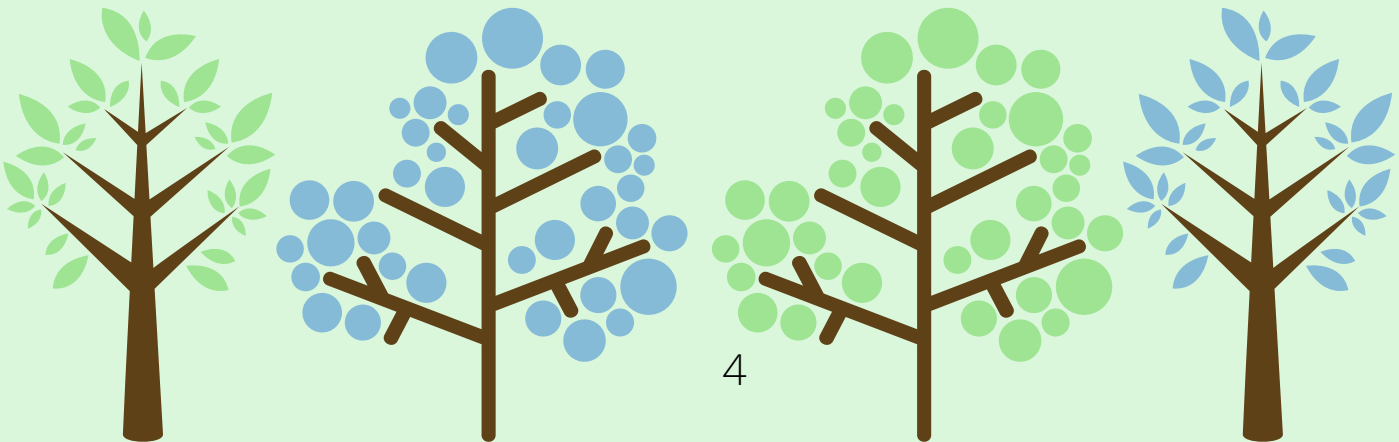
Soil is a mixture of organic matter (such as bacteria and plant remains) and inorganic material (sand, silt, and clay), whose composition and structure determine what life it can support.

MEDIUM FOR PLANT GROWTH

- Soils support roots and keep plants upright for growth.
- Soils provide plants with essential nutrients.
- Soils provide air spaces for gaseous exchange between roots and the atmosphere.
- Soils protect plants from erosion and other destructive physical, biological, and chemical activity.
- Soils hold water (moisture) and maintain adequate aeration.

FILTRATION SYSTEM FOR SURFACE WATER

After rainfall and snowmelt, water flows along the ground to lakes and other water bodies, or infiltrates into the ground. As water moves downwards through the ground, soil can filter out chemical and other contaminants.



CARBON STORAGE AND MAINTENANCE OF ATMOSPHERIC GASES

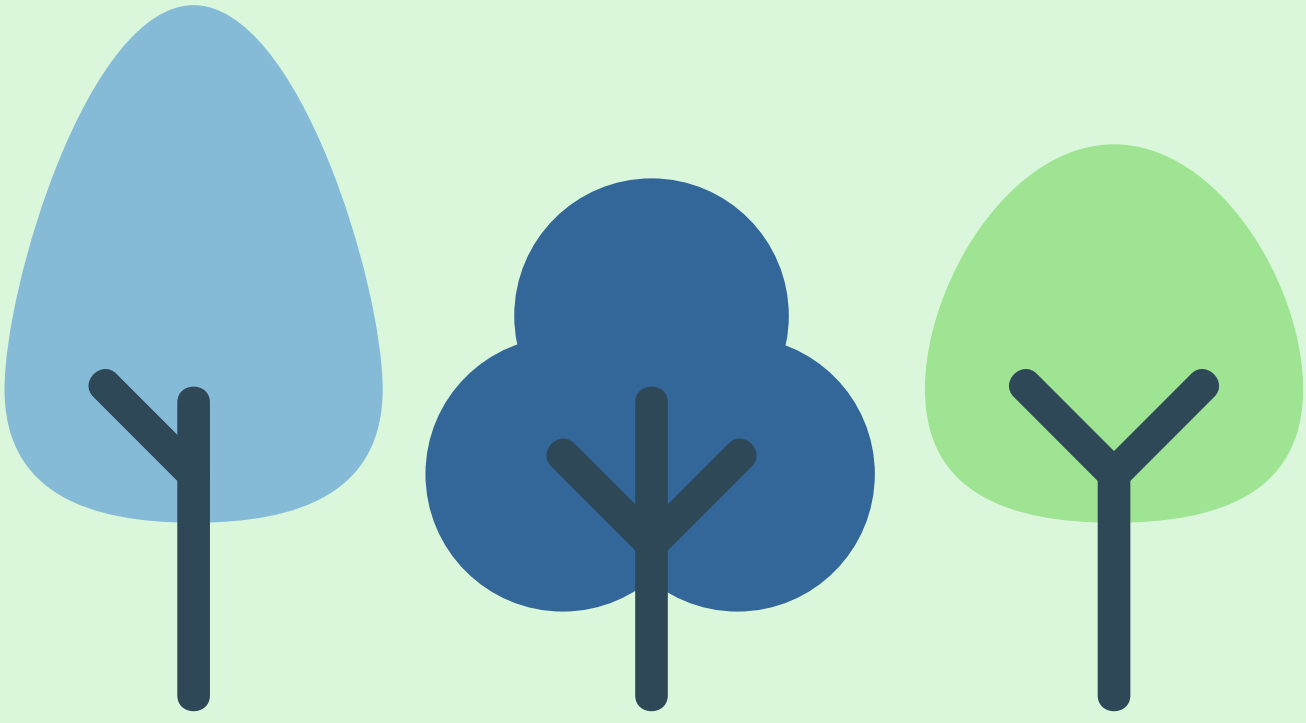
Soils help regulate atmospheric carbon dioxide by storing carbon.

On a global scale, soils contain about twice as much carbon as the atmosphere and about three times as much as vegetation. This results in the accumulation of organic matter in the soil which is high in carbon content. Nitrogen, phosphorus, and many other nutrients are stored, transformed, and cycled in the soil.

COMMON SOIL TYPES IN VOJVODINA

Alluvial plain: very fertile soils formed by historical flooding, which are found near river banks.

Chernozem: dark, fertile soils high in organic matter which are found under grasslands.



Understanding Water

The amount of rain that falls near a plant is only part of how much water the tree can use. The way water moves over, into, and through the ground is also important.

SOIL WATER HOLDING

Soils that are a mix of sand, silt, and clay are known as loam soils. They hold more water that is available to plants than do other types of soils. High amounts of organic matter also help the soil to hold more water.

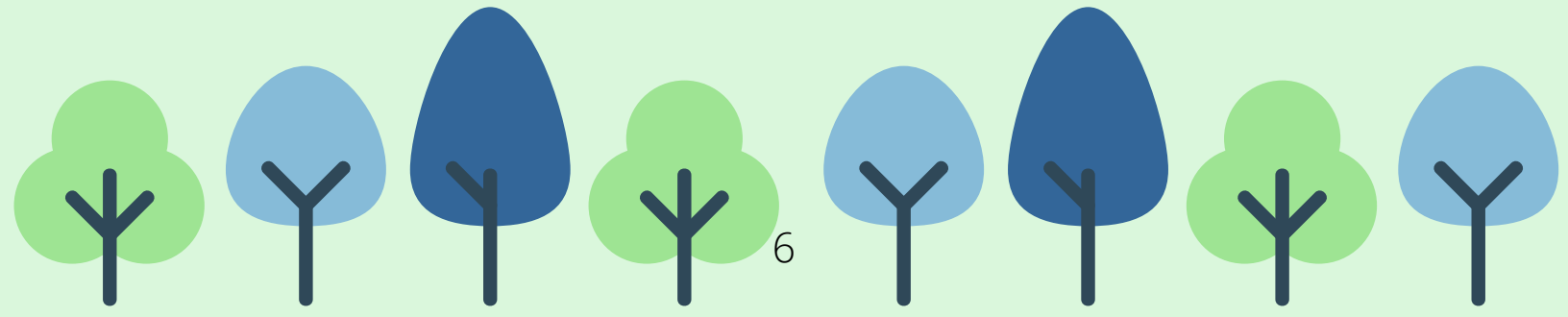
SATURATION

When there is lots of water falling or flowing onto the soil, the water can fill all of the air space, which is called saturation. Some plants are adapted to long periods of saturation, but most trees are not and cannot survive it.

When a soil is well drained, the water drains away quickly and the soil does not stay saturated for long.

WATER AND GROWTH

Trees need water to grow. However, if trees are grown in water conditions that are too dry or too wet, they will not survive.



Understanding Surroundings

Once trees are planted, they need to be able to survive in that exact place for the rest of their lives. They need to be able to grow up and access sunlight in that place. They also need to be able to access water and nutrients.

GROWING ROOM

Obstacles for growing trees include power lines, buildings, roads, and other trees. Ensure that the area where the tree is planted is big enough for the mature height and width of the tree.

ROADS AND SIDEWALKS

Paving, driving, and walking on the ground compacts the soil and can damage tree roots. More room without pathways around the trees will yield stronger trees. Some trees are particularly vulnerable to damage from paving, driving and walking.

SUNLIGHT

The energy of sunlight allows trees to grow, but too much can cause water stress. Know the correct amount of sunlight for the tree you're planting, and assess how other trees, buildings, and hills will affect how much sunlight the tree will receive.

Choosing a Tree

Choose a heading below that fits your site. Once you find recommendations about potential trees that fit the see, see the Species Specifics section (page 12) to learn more.

DROUGHTY

If your site is prone to long periods without rain, or where the soil gets very dry between rainstorms, you need to plant a drought resistant tree.

Next, what is the quality of your soil?

- If your soil has **high organic matter**, it is a good site for Silver Linden (*Tilia tomentosa*), a popular, sturdy tree for streets and parks.
- If your soil **is low in organic matter** or has other indicators of low fertility, it is a good site for Lombardy Poplar (*Populus nigra* 'Italica').
- If your soil is **eroding** by water or wind, the Lombardy Poplar is a good option to stabilize the soil.

FLOODY

If your site is prone to flooding, the London Planetree (*Platanus x acerifolia*) is a good choice. It can live in a wide variety of urban and other conditions.

ROADSIDE

Roadsides and sidewalk lawns can be cramped, and trees are exposed to damage by injury and chemicals.

With **plenty of room**, Silver Linden and Ginkgo (*Ginkgo biloba*) are good choices, but either will need to be removed if they outgrow the space.

In **small spaces**, a suitable tree would be the Lombardy Poplar.

VERY SUNNY

In very sunny conditions, trees must be tolerant of heat and drought.

Lombardy Poplar will take advantage of full light and grow fast**.**

SHADY

Most of these trees prefer lots of sun, which is typical of cities unless there are high buildings nearby. In wide roadways and parks, lots of sun reaches the trees, and they usually don't compete with other trees.

Silver Linden can survive well in more shady sites.

PARKS

Parks with enough room for trees to grow and spread are great places for planting Pendunculate Oak (*Quercus robur*), Silver Linden, and Ginkgo, .

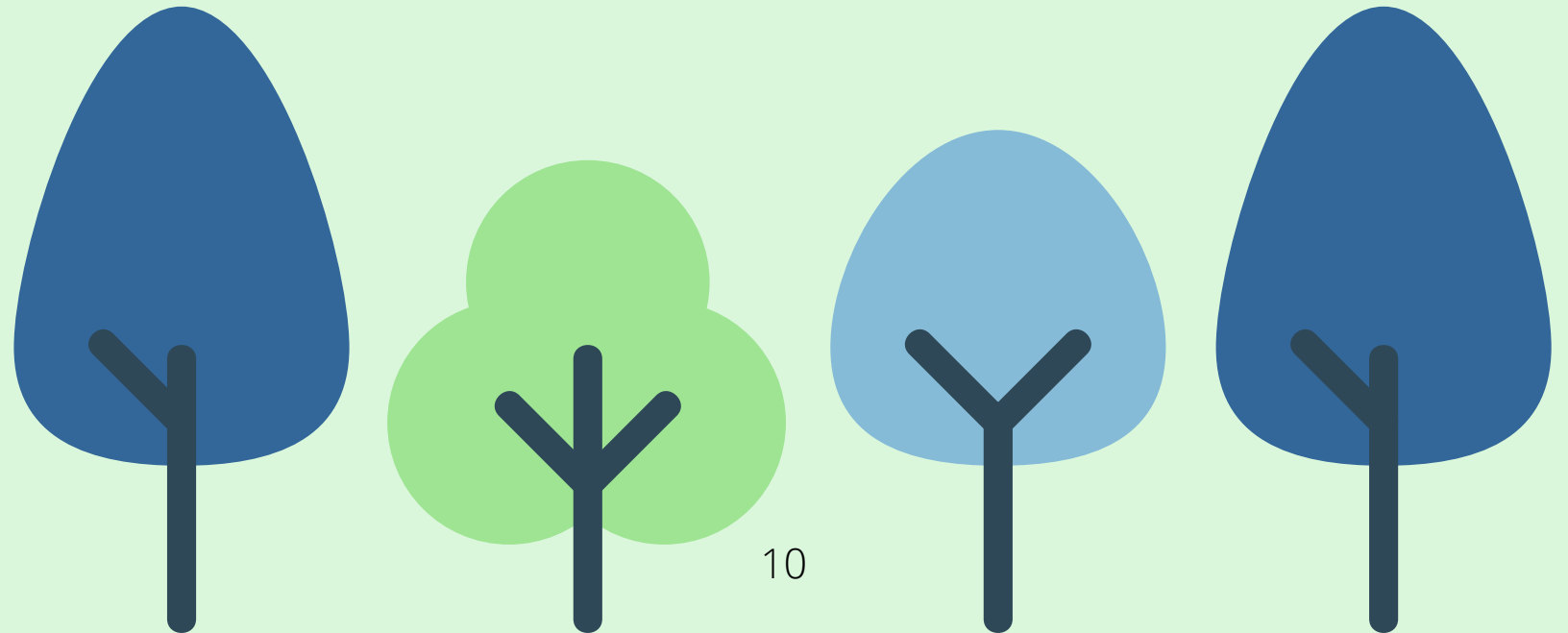
Parks often need **erosion control**, which can be provided by the wind-breaking and water-tolerant Lombardy Poplar.

Parks are also great places to plant **showy trees** — whose flowers, fruits, or leaves, while beautiful, may disrupt streets and sidewalks.

The Common Horsechestnut (*Aesculus hippocastanum*) has large flowers and seeds, as well as interesting leaves.

The Lombardy Poplar and Ginkgo have vibrant autumn leaves.

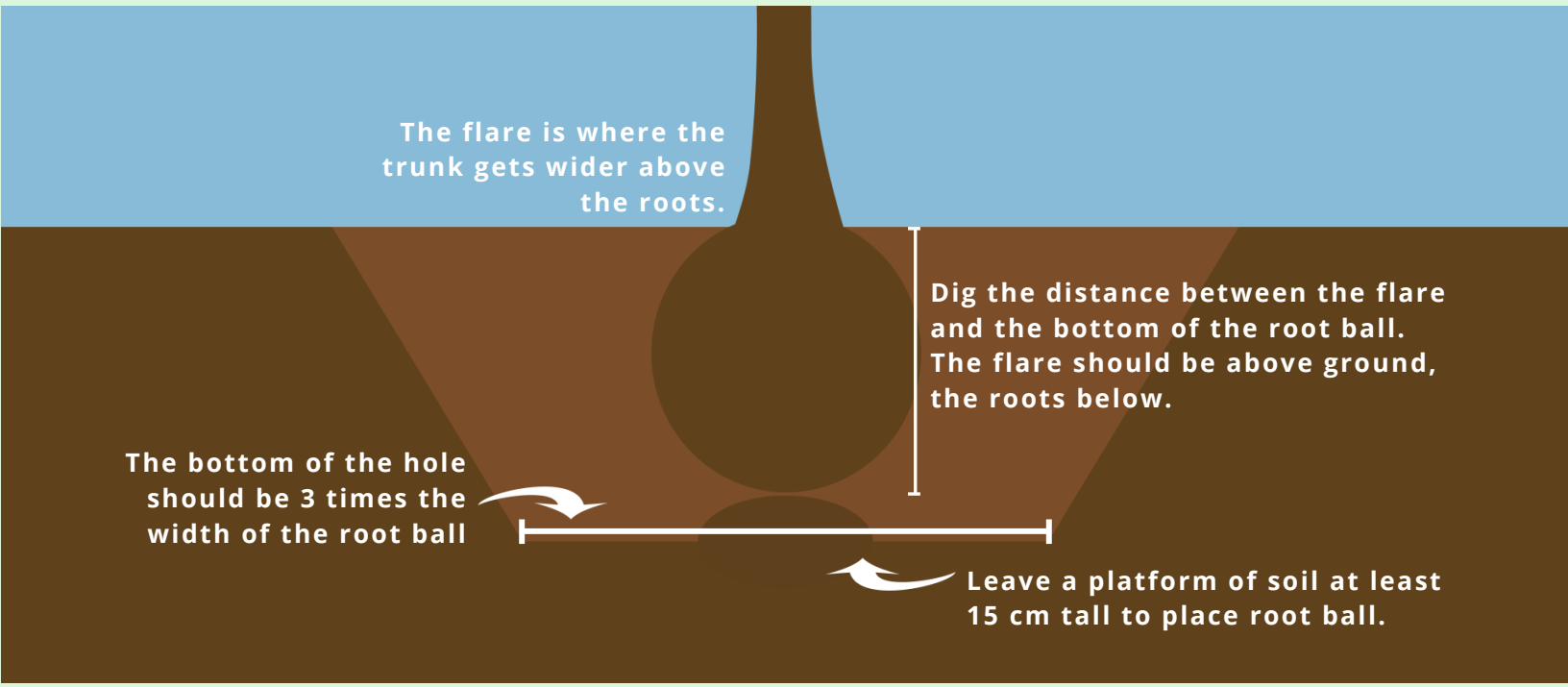
The bark of the London Planetree is multicolored and peels in patterns.



Planting a Tree

Trees need to be planted with care, particularly those wider than a few centimeters.

Use these directions and dimensions to increase the likelihood that the tree will survive:



REMEMBER

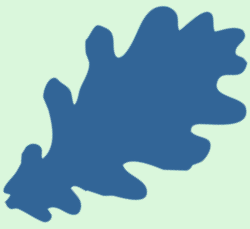
1. Don't carry or move a tree by the stem or branches; move it by the root ball.
2. Trees should be planted in the spring and must be watered at least twice a week when becoming established.
3. Do not bury the flare of the tree — where the tree is wider just above the root. Also do not place mulch touching the trunk.

Tree planting information adapted from Urban Horticulture Institute at Cornell University, which is directed by Nina Bassuk. More UHI resources can be found at https://blogs.cornell.edu/urbanhort/

Species Specifics

These are the six trees recommended in previous sections. All of these trees are already commonly grown in Novi Sad. They were chosen because they have helpful characteristics and because they span a range of different conditions. They also provide different benefits.

We prefer native trees, when possible. The London Planetree is a cultivated hybrid which has been established in Serbia for centuries. The Ginkgo is native to central China, is commonly planted in cities around the world, and has a low risk of escaping cultivation. The other four trees are native to the Balkans, and their Serbian common names are included along with their English and Latin names.

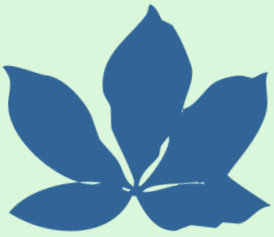


Quercus robur
Pedunculate Oak
Hrast lužnjak

Tilia tomentosa
Silver Linden
Srebrna lipa

***Populus nigra* 'Italica'**
Lombardy Poplar
Crna topola

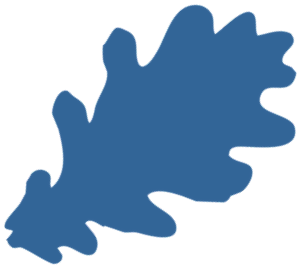
Platanus x acerifolia
London Planetree



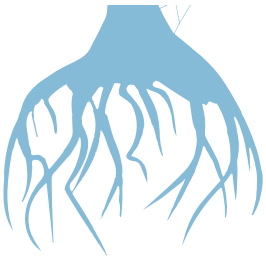
Aesculus hippocastanum
Common Horsechestnut
Divlji kesten

Ginkgo biloba
Gingko

Quercus robur
Pedunculate Oak

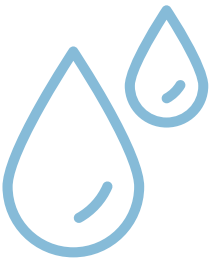


SOIL



Requires fertile soil, but not sensitive to soil pH. Higher organic matter is helpful for water and nutrient availability.

WATER

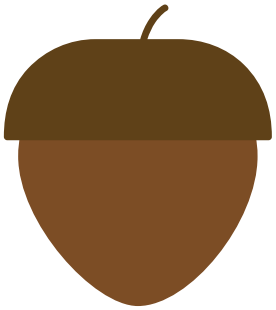


Prefers frequent water and moist, well-drained soil. Does not tolerate flooding.

SURROUNDINGS

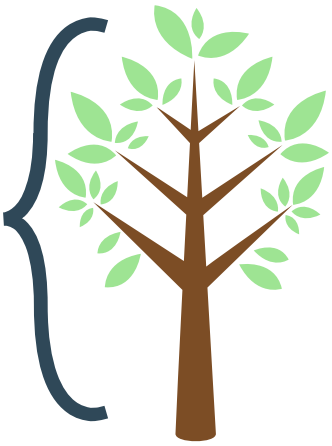
Needs lots of sun and space to grow. It will not survive in small or shaded surroundings.

SPECIAL CONSIDERATIONS



At about 20 years of age, this oak begins to produce and drop many acorns.

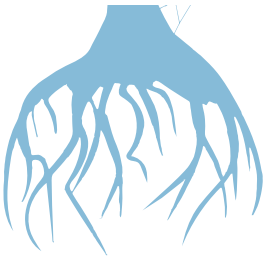
15-20 meters



Tilia tomentosa

Silver Linden

SOIL



Not sensitive to pH or soil type. Tolerates compacted soil.

WATER

Prefers continuously moist conditions, somewhat tolerant of drought.

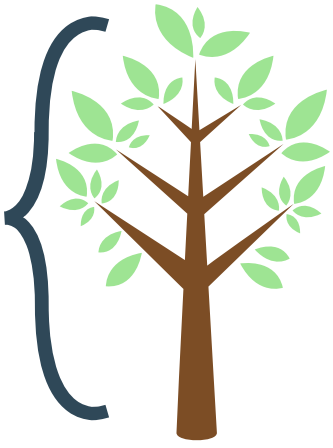
SURROUNDINGS

Can survive in medium to full sun. Tolerant of roadways, but needs at least 1 meter of space on all sides.

SPECIAL CONSIDERATIONS

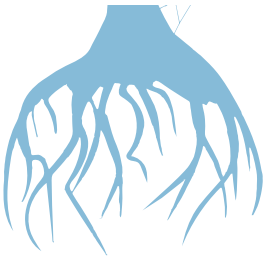
Medium growth rate, common and hardy street tree.

15-20 meters



Populus nigra 'Italica'
Lombardy Poplar

SOIL



Can grow in most soil conditions. Not sensitive to pH.

WATER

Tolerates flooding and drought, but well-drained soil is preferred.

SURROUNDINGS

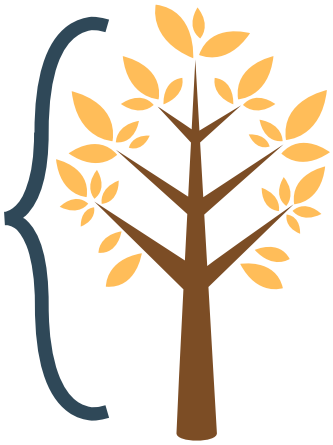
Requires full sun. Can be planted near roads. Very narrow, branches spread only 3-4 meters.
New trees may sprout from roots. Good wind block.

SPECIAL CONSIDERATIONS

Fast growing, but short lived because of weak branches.

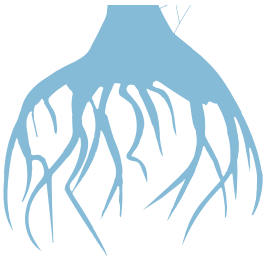
Vibrant orange autumn leaves.

12-18 meters tall



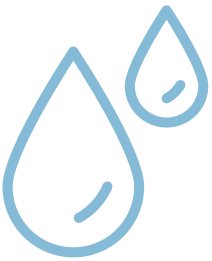
Platanus x acerifolia
London Planetree

SOIL



Can grow in most soil conditions. Suitable for soils with higher clay content, and adaptable to different pH.

WATER



Tolerant of occasional drought and more frequent flooding. Prefers moist soils.

SURROUNDINGS

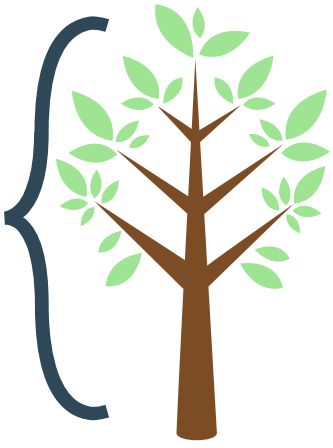
Thrives in full sun. Can be planted near roads. Drops a lot of leaves, twigs and seeds.

SPECIAL CONSIDERATIONS

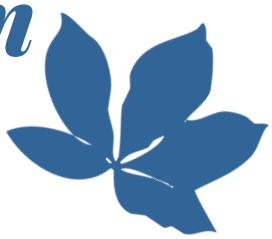
Attractive, peeling bark pattern.

Image via Wikimedia Commons.

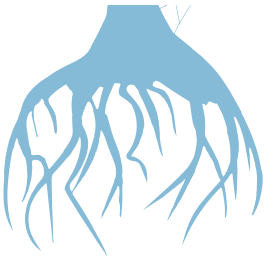
up to 20-30 meters tall



Aesculus hippocastanum
Common Horsechestnut

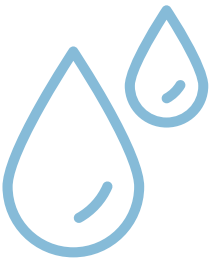


SOIL



Neutral to alkaline (high pH) soils are acceptable. Good drainage is necessary.

WATER



Consistent moisture, but not flooding. Not drought tolerant.

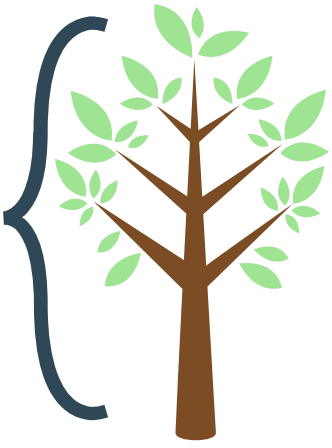
SURROUNDINGS

Lots of sun, little or no shade. Tolerant of road salt. Drops large nuts and flowers.

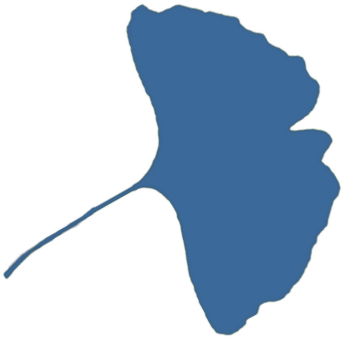
SPECIAL CONSIDERATIONS

More difficult to plant and maintain. Has showy leaves and flowers.

Some cultivars don't form nuts.

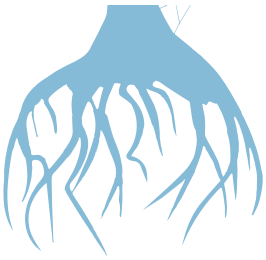


Ginkgo biloba
Gingko



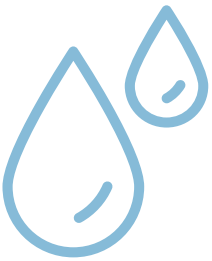
SOIL

Tolerant of most soil conditions, including acid and alkaline soils.



WATER

Tolerant of prolonged drought, but not tolerant of flooding.



SURROUNDINGS

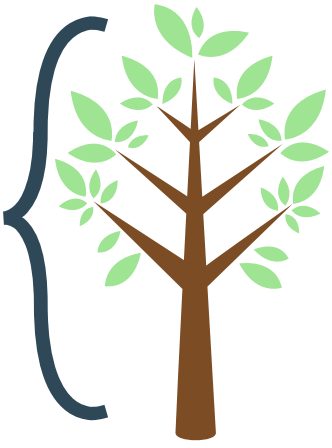
Needs full sun. Big tree at maturity, needs lots of room to grow or will be destructive to sidewalks.

SPECIAL CONSIDERATIONS

Male cultivars are planted because fruits dropping from female trees have strong smelling fruits.

Very few pests and diseases.

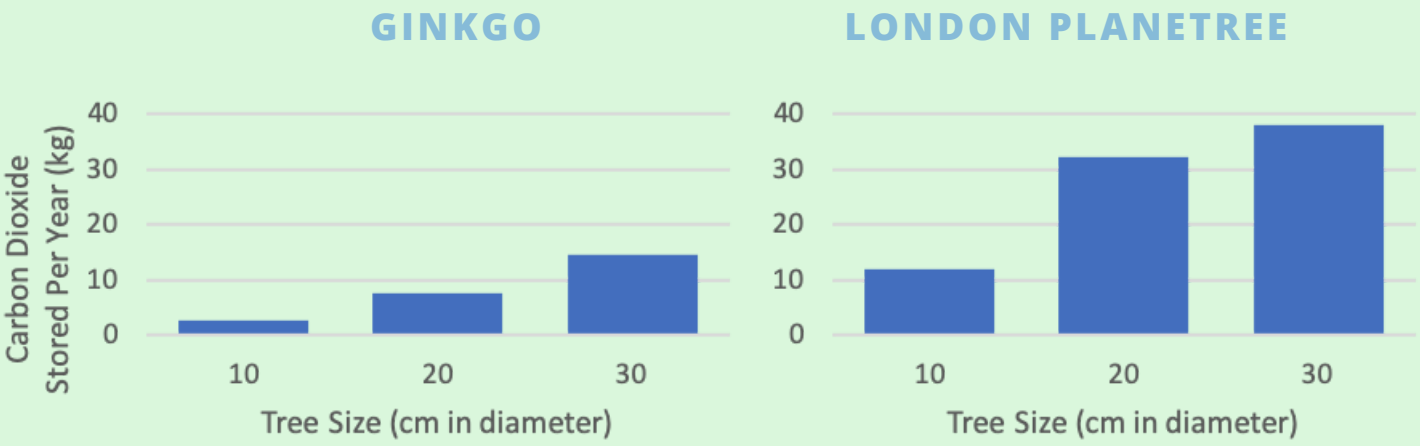
18-30 meters tall



Quantifying Benefits

Trees absorb carbon dioxide and transform it into wood. The wood then stores this carbon until the tree dies and decomposes.

Different tree species absorb different amounts of carbon. For example, London Planetree grows faster and thus initially stores more carbon dioxide per year than Ginkgo.



According to the World Bank, Serbia's carbon dioxide emissions were 5.283 metric tons per person, so it would take about 131 30-cm London Planetrees per person to absorb that much carbon dioxide per year.

Another outcome of planting a tree is avoiding hundreds of gallons of water runoff, reducing the damage of floods and prolonging moist growing conditions.

This guide was created by Katie Sims with contributions from Milica Milosev, editing from Marianne Krasny, and advice from Daniel Gbujie Chidubem. It was created to provide resources for volunteer tree planting groups in Serbia. If you would like to use it as a template to adapt to other locations and languages, please contact us at CivicEcology@Cornell.edu.

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www.CivicEcology.org | www.Team54Project.org

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Resources Consulted

For information on tree species:

- Trees and Plants List (2019), The Morton Arboretum. https://www.mortonarb.org/trees-plants
- Woody Plants Database (2019), Nina Bassuk, Peter Trowbridge. Urban Horticulture Institute at Cornell University. http://woodyplants.cals.cornell.edu/home
- Species Factsheets, (1994), Edward F. Gilman and Dennis G. Watson, U.S.F.S. Southern Group of State Foresters.

For background on soil:
SEPA Scottish Environment Protection Agency
https://www.sepa.org.uk/environment/land/soil/

For estimations of the carbon dioxide sequestered by trees, the iTree MyTree tool was used. https://www.mytree.itreetools.org