Less asphalt gives way to stronger trees in urban areas, finds study

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Horse chestnut trees growing in environments with a high and low degree of paving. Credit: Janina Konarska

Trees planted in urban areas can provide shade and contribute to a lower air temperature. For these services to be optimal, it is important to let asphalt give way to trees, according to research from the University of Gothenburg.

The role of trees in the urban climate is an issue that has grown in importance in the wake of climate change, where average temperatures

are expected to rise. Trees provide shade and lower the air temperature. To get most benefits from your trees, you need to give them the right conditions.

"Our research shows that an important factor is how much of the area around the tree is paved," says Janina Konarska, researcher at the University of Gothenburg and lead author of the study in the journal *Landscape and Urban Planning.*

Bigger trees with less asphalt

Therefore, the researchers believe that it is a good idea to at least give the trees some extra grass around the trunk.

"We found in our study that 20–30-year-old trees surrounded by grass were on average 2.6 meters taller and the crown was 1.3 meters wider than nearby trees growing with paving close to the trunk. The trees also had a crown that was 61% denser and provided twice as much cooling," says Janina Konarska.

The researchers studied the impact of the surface cover around the trunk on pin oak, horse chestnut and common lime at several sites in Gothenburg and Mölndal. The assessment was based on various parameters, including crown density, tree growth and the amount of water released by the leaves, known as transpiration. All these determine the tree's impact on the microclimate.

The density of the crown and the size of the tree determine the shading effect, and releasing water vapor from the leaves in the transpiration process acts as air conditioning that cools the air.

"In addition, the air above an asphalt surface will be warmer than the air above grass or soil. A hardened surface also prevents rainwater from

reaching the roots, which impacts the growth of the tree," says Janina Konarska.

Invest in good soil

There were differences in how much the different tree species were affected by not getting water to the roots. Horse chestnut is least affected by hardened surfaces, but on the other hand it performs worse than pin oak and common lime when conditions are better.

The researchers' conclusion is that while the choice of trees planted is very important, the cooling effect of the trees may be more dependent on how close to the trunk the hardened surface starts.

Planting trees is expensive, and it takes time for a new tree to grow to the desired size. In urban areas, it can often be difficult to provide an optimal growing environment for trees.

"You have to do the best you can when planting trees in urban areas. If it is difficult to create open spaces around the trees, it is a good idea to invest in better soil and preferably to water the tree. It is important that we take care of the trees, they are valuable in many ways," says Lasse Tarvainen, an environmental scientist at the University of Gothenburg.

More information: Janina Konarska et al, Surface paving more important than species in determining the physiology, growth and cooling effects of urban trees, *Landscape and Urban Planning* (2023). DOI: 10.1016/j.landurbplan.2023.104872

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