



Great Places

Green Spaces

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Key topics: Beat the Heat- Using trees cool your House.

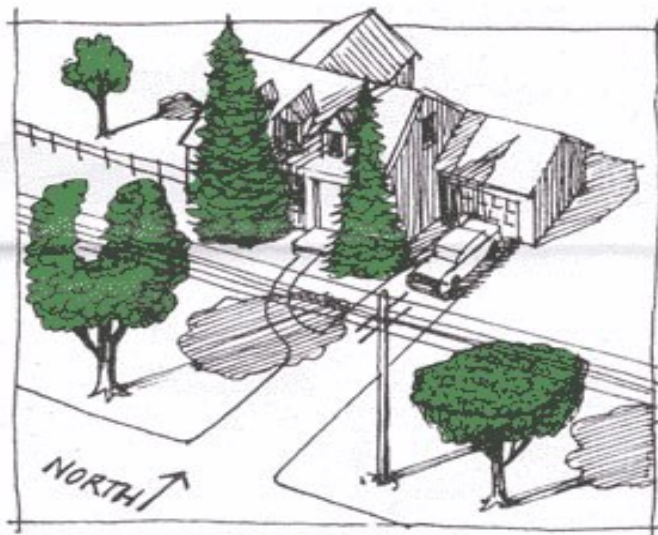
By Joshua Larson

Beat the Heat- Using trees to cool your house.

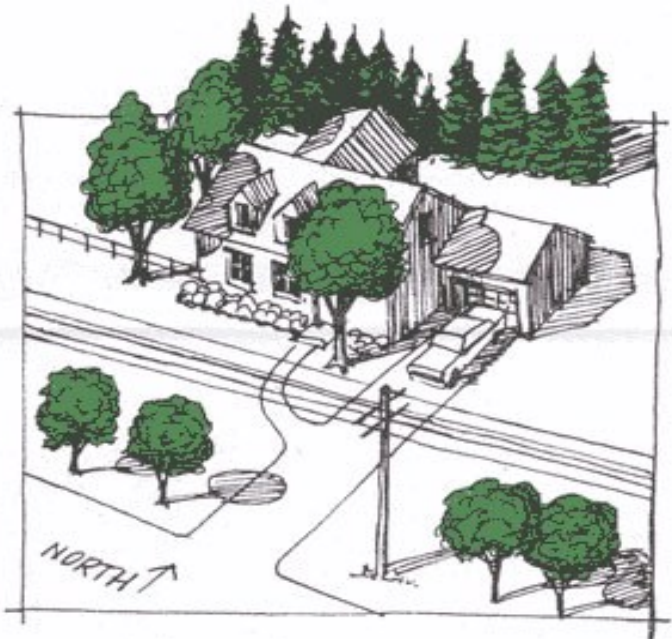
Trees can provide many benefits to you and can effect your life in many ways. They provide wood for your home and food for your table. One of the less commonly appreciated traits that trees have is that they provide a cool and shady place for humans and other animals alike to get a break from the heat. When on a family trip to a park most families will unconsciously choose to set up in the shade of a tree knowing it will keep them cool and comfortable. This sense does not always translate to understanding the value trees can provide benefits to your home. When planted in appropriate locations, trees can provide significant and valuable shade for your home.

Some Facts and Figures

- Suburban areas with large trees can be up to 6 degrees cooler than areas without trees.
- Studies have found a reduction in home cooling energy usage up to 18% on average and in some situations they found a 47% reduction.
- Shade from trees on buildings has been shown to reduce temperatures on walls and roofs 20 - 45 degrees fahrenheit when compared to unshaded sections.
- A large oak tree can transpire 40,000 gallons of water per year. Every gallon transpired can take energy, also known as heat, away from the immediate area.



Wrong Planting large trees under utility lines often means mutilated trees. Large evergreens close to the house on the south block warming winter sunlight.



Right Short flowering trees don't clash with overhead utility lines. Large deciduous trees on the southeast, southwest, and west provide cooling shade in summer, and don't obstruct the low winter sun. An evergreen windbreak on the north blocks cold winter winds.

"Blessed are those who plant trees under whose shade they will never sit"



How trees cool homes

Direct shade

The most direct way a tree can cool a home is by blocking the sun from directly hitting the surface of the building and going in through the windows. By placing a large tree or shrubs between the sun and those surfaces you can prevent the energy from the sun from imparting as much heat to the building. This is especially true for homes with older windows and under insulated walls and roofs. Providing shade over your home can reduce temperatures on and in your home between 10—20 degrees Fahrenheit.

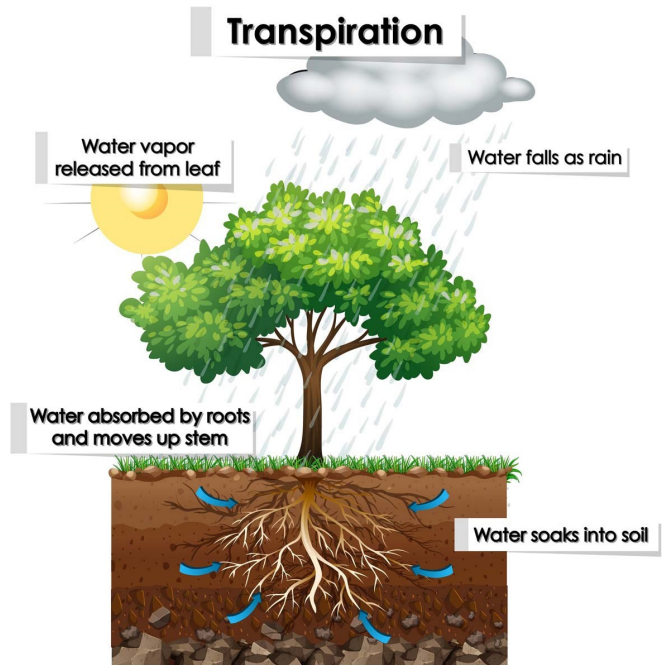
Evapotranspiration/Microclimate effects

The second and perhaps less well known way trees can cool homes is through the process of evapotranspiration.

Transpiration is the process of plants exhaling water through their stomata, which is a cellular structure allowing plants to exchange gasses.

Evapotranspiration is the process in which water is moved from the land to the atmosphere . It is a combination of evaporation and transpiration.

It takes energy to evaporate water either from the ground or as transpiration through plants and that energy, instead of getting converted to heat when it hits a surface, is instead used to evaporate the water. That water then carries that energy away into the sky with the water vapor and the process keeps the area surrounding the tree cooler and more comfortable as a result.



Generally, the more trees you have around your home the stronger the cooling effect from transpiration will be, though this does eventually have its limitations.

Where to Plant

Assuming you have the space for it around your home the three places you want plant large trees in order of importance are,

1. West (most important)
2. South
3. East (least important)

The west side is by far the most important side to have shade on your house due to the sun angle and it being the hottest part of the day. You can possibly get away with smaller trees in this location since you are trying to catch sun impacting your walls more than your roof.

“Don’t cut trees if you want a cool breeze”



Where to plant and what types of trees

Where to plant cont.

Planting trees on the south side of your home has its pro's and cons. While you want to maximize shade in the summer, you also want to maximize the amount of sun that can hit your house in the winter. This can usually be accomplished by having tall trees with few lower branches. The goal is to shade your roof when the sun is high in the sky but allow lower angled winter sun the ability to hit your house and southern facing windows.

While studies have found there is some benefit to have shade trees on the east side of your house it is generally considered not to be a large effect and you should focus on the western and south sides if you can. If you want to plant shade trees here, then shorter trees would probably be called for here to catch the lower angle morning sun.

Size and Types of Tree

The size of the tree you can plant is determined by a couple of things, the location you want to put it in and the space that is available at that location. As was previously stated you get the most effect from tree shade on the west and south sides of your house. That being said, planting trees in those areas is not always a possibility or preferred option. A potential solution to that is to try and plant a larger growing tree with a spreading canopy as close as you can to southwest corner to try and cover both sides with one tree. There are many strategies to maximize the effectiveness of trees on your property even if they are not the easy options.

How much room is needed?

The space you have to plant is critical. It is a common mistake to plant trees in too small of spaces and while they may survive, they will grow poorly and not be as effective of a cooling mechanism. A rule of thumb to apply here is for a large shade tree (40+ feet tall) you will want at least a 10x10 foot space (or equivalent) with 3 feet of good soil. This however is only a minimum and you want as much space as you can give. You should also stay 10—15 ft from house foundations or sidewalks/roads where possible to minimize root interactions with those areas.

Deciduous vs conifer

It is not uncommon for people to associate trees best suited for shade as deciduous leafy trees. While there is some merit to that pre-conceived notion, consider the use of conifers if your summer heating load is much higher than the beneficial heat you might get from winter sun hitting your home and windows. You might get more benefit from blocking all the sun if you live in an area that has long hot summers and mild short winters. Another case where this is true is tall commercial buildings with brick, concrete or metal siding and few windows. If there are only a couple of windows, the winter sun has very little impact on interior heating but leaving those big walls to bake in long hot summer days can transfer a lot of heat through the walls when you want it the least.

Both types of trees have their own benefits and drawbacks, the point is that you should receive specific recommendations to your own unique situation.

"He who plants a tree, plants a hope....— Lucy Larcom"



Forest Health Update

South Dakota Forest Health Workshop

The Forest Health team of the South Dakota Division of Resource Conservation and Forestry has an ongoing educational opportunity for those interested in learning about “all things trees.” Hosted by South Dakota’s forest health specialist, Dr. John Ball, this recurring virtual workshop covers timely topics specifically related to trees in our South Dakota region. These Zoom workshops are recorded and those videos are available for viewing on the SD DANR YouTube page on the Forest Health Workshop playlist (<https://www.youtube.com/playlist?list=PLgSQC9y8dwL3tHYz1C5AN4taSQXE45iYr>). Previous topics covered include tree species selection, 2023 emerald ash borer update, pine engraver beetles, and more. If you are interested in joining an email list for notifications for future workshops, please contact Dr. John Ball (John.Ball@sdstate.edu).

Sources:

https://www.epa.gov/sites/default/files/2017-05/documents/reducing_urban_heat_islands_ch_2.pdf

<https://www.energy.gov/energysaver/landscaping-shade#:~:text=Trees%2C%20shrubs%2C%20and%20groundcover%20plants,your%20home's%20walls%20and%20windows.>

Sources cont.:

<https://www.ncufc.org/How-to-Plant-a.php>

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“The creation of a thousand forests is in one acorn-Ralph Waldo Emerson”