Trees and Temps

During April, our thoughts turn to planting trees as Arbor Day events roll out across the state. When deciding where and what to plant, you might want to consider how to maximize the cooling benefits of trees. This is especially important in urbanized areas where the combined contributions of manmade materials, such as buildings and pavement, building density, and human activities contribute to the urban heat island effect.

How do trees help? Trees help cool our urban areas through evapotranspiration and shading. Evapotranspiration includes two processes: 1) evaporation of water from tree surfaces and 2) transpiration, or the movement of water within the tree from the roots to its release through the leaves. The conversion of liquid water to vapor cools the air. Shading reduces the amount of sunlight that reaches the ground and lowers the temperature of surfaces that absorb heat. Studies show that in summer, the tree canopy can block up to 90% of the sun's energy compared to areas with no tree cover. This reduction helps to keep our buildings and pavements cooler.

Why is this important? In a comparison of suburban neighborhoods, those with trees were up to 6 degrees cooler than new neighborhoods without trees. A study by Auburn University researchers showed that 17% shading on your home decreases summer cooling bills by $10 per month. Maximum benefits are seen when trees are planted on the west side of buildings. Lower energy demands decrease carbon emissions from power plants and energy production costs. It is good for your wallet and good for the environment.

Another consideration is reduction of pavement temperatures which is important in protecting the health of our waterways. In the summer, pavement surfaces can reach 150 degrees depending on the material. When rainwater strikes paved surfaces, it runs off. The heat is transferred to the runoff which flows to our streams and contributes to thermal pollution. According to the EPA, in highly urbanized areas such runoff can increase stream temperatures as much as 8 degrees in an hour. Rapid and prolonged increases in ambient water temperature causes stress in aquatic species, decreasing species diversity and the ecological integrity of receiving waters.

What you can do: Remember right tree, right place. Plant strategically in locations that will shade your windows and roof. Deciduous trees planted on the west side of your home will provide the most benefit in reducing cooling demands while allowing thermal heating in the winter. Also look for opportunities to shade your driveway, sidewalk, or other paved areas. When making your tree selection, consider canopy height and spread at maturity, space needs for the roots, and the tree's sun, moisture, and soil requirements to help your tree reach its maximum potential. While shade on the roof from trees is a good thing, trees touching the roof may result in damage, especially to asphalt shingles. Also ensure that tree health is maintained and choose slower growing species that have stronger branches so that trees or limbs subject to breakage do not become hazards to your home.

Suggested Social Media Text: Still thinking about planting a tree for Earth Day or Arbor Day? Consider a location that will maximize your energy savings and help decrease thermal pollution to our streams, then select the right tree for that location.

Suggested client resources:

From the Ground UP – How to Plant a Tree
https://news.ca.uky.edu/audio/ground-how-plant-tree-audio

Trees for Energy Conservation – National Cooperative Extension website
https://trees-energy-conservation.extension.org/

Tree Care: The Planting Hole
https://ufi.ca.uky.edu/treetalk/tree-planting-hole

Planting Container-Grown Trees and Shrubs in Your Landscape (HO-114)
http://www2.ca.uky.edu/agcomm/pubs/HO/HO114/HO114.pdf

Additional Resources on Tree Care can be accessed via this webpage link: https://tree-health.ca.uky.edu/tree-care

For Agents - References and Resources:

USFS Pacific Northwest Research Station – Urban Forestry and Energy – webpage provides link to several articles and studies on the topic.
https://www.fs.fed.us/psw/topics/urban_forestry/research/energy.shtml

EPA Website: *Learn about Heat Islands* https://www.epa.gov/heatislands/learn-about-heat-islands

EPA presentation: *Beating the Heat from Urban Runoff – Don Waye, US EPA – Nonpoint Source Control Branch, October 27, 2005.*
https://www.epa.gov/sites/production/files/2014-07/documents/wayehotrunoff.pdf

Thermal Pollution – link to several articles on the subject – access to full article through UK Libraries https://www.sciencedirect.com/topics/earth-and-planetary-sciences/thermal-pollution

EPA website. U.S. Environmental Protection Agency. 2008. "Trees and Vegetation." In: *Reducing Urban Heat Islands: Compendium of Strategies. Draft.*
https://www.epa.gov/sites/production/files/2017-05/documents/reducing_urban_heat_islands_ch_2.pdf