Ozone Danger to Trees

Trees in urban and suburban settings directly affect air quality by altering the urban atmospheric environment. Yet, while trees contribute to healthier air, they are also harmed by an unhealthy environment. Urban trees affect air quality in four major ways:

- Temperature reduction. Trees reduce energy consumption in summer by shading cars and buildings. A reduced air temperature due to the cooling effects of trees can improve air quality because the emissions of some pollutants and ozone-forming chemicals are temperature dependent.
- Removal of air pollutants. Trees remove air pollution through uptake by leaf stomata. Trees also remove pollution by intercepting airborne particles
- Emission of volatile organic compounds. Because VOC emissions are temperature dependent and trees generally lower air temperatures, increased tree cover can lower overall VOC emissions, lowering ozone levels in urban areas.
- Energy effects on buildings. Trees reduce building energy use by lowering temperatures and shading buildings during the summer, and blocking winds in winter.

“Humans aren’t the only ones to be affected by recent ozone alerts in various parts of the country,” says Tchukki Andersen, staff arborist with the Tree Care Industry Association. “Many of the most commonly planted trees in the nation’s urban forest also suffer during high levels of ozone pollution.”

Ozone is the result of a chemical reaction that converts car exhaust into ozone in the presence of light. The regions that have the highest automobile traffic and sunshine are the most at risk. Even areas without congested traffic may suffer, since ozone is transportable over long distances. The pollutant acts as an oxidant that disrupts the chemical pathways in a plant’s photosynthetic powerhouse, the chloroplast. In response, the tree manufactures antioxidants like vitamin E and C. This process may offer relief from low levels of ozone, yet are no match for repeated exposure to toxic levels.

Ozone injury looks different on different species. On the leaves of poplar and black cherry, the homeowner may see brownish lesions on a leaf that appears water-soaked. On ash and hickory, however, the lesions are white. On other species, damage appears as a purple stippling all over the leaf. Evergreens appear to have burnt needle tips.

“At present, the best thing homeowners can do to protect trees from ozone injury is to keep them in an overall healthy state,” stresses Andersen. “This includes protecting trees from wounding, and keeping them well watered and judiciously fertilized.”

Below is a list of sensitive and tolerant species:

Sensitive:	**Tolerant:**
yellow poplar	hemlock
white ash	eastern and Colorado blue spruce
hickory	yew
black cherry	rhododendron
flowering dogwoods	azalea
eastern white pine	oak
sassafras	most maples
aspen	balsam fir
	London plane

What to do

A professional arborist can examine your trees to find the source of the problem. A professional arborist can also recommend treatments, including thinning dense woods, planting new trees, correcting soil deficiencies, increasing water and nutrients, or pest management. Homeowners can contact the Tree Care Industry Association (TCIA), a public and professional resource on trees and arboriculture that was establish in 1938. It has more than 2,000 member companies who recognize stringent safety and performance standards, and are required to carry liability insurance. TCIA also has an Accreditation program that requires companies to meet industry standards and qualifications, including ANSI A300 pruning standards. An easy way to find a professional tree care service provider in your area is to use TCIA’s “Locate a member company program.” You can use this service by calling 1-800-733-2622 or by doing a ZIP code search at: www.treecaretips.org.

Editors: If you would like additional information or digital photos, please contact editor@tcia.org.