

Trees and Air Quality

Bay Area Air Quality Management District

We understand that individuals and government agencies that select tree species for planting need to consider many different factors including size, shape, growth rate, water needs, root structure, life span, leaf/seed drop, and more. Tree planting has many positive effects upon air quality, but it is important to select tree species that have the most air quality beneficial characteristics. We hope that your agency will consider the following characteristics when choosing tree species for your jurisdiction:

- All trees enhance deposition of particulate matter and gaseous air pollutants like ozone and nitric oxide.
- Trees provide shade and cooling through evapotranspiration. Local cooling from trees reduces the need for air conditioning which helps reduce nitrogen oxide from power plants. Urban-scale cooling also helps to reduce evaporative emissions from cars, trees and other sources.
- Trees also absorb carbon dioxide, a significant greenhouse gas.
- Some trees release irritating pollens which can be an air quality nuisance as well as a public health issue.
- As part of their normal growth and survival processes, many trees emit small quantities of precursor organic compounds that contribute to the formation of harmful ground-level ozone. There is great variation in emissions rates among species, great variation in response to ambient temperature changes, and some variation in the chemical structure and photochemical reactivity of the emitted compounds. The following lists reflect recent research by the Environmental Protection Agency on biogenic emission estimates for a variety of tree species:

Low Ozone Precursor Emitters (*Air Quality Beneficial*):

- Acacia
- Cedar
- Magnolia
- Maple
- Birch
- Fruit Trees (e.g. orange, apple, cherry, and persimmon)

High Ozone Precursor Emitters (*Harmful to Air Quality*):

- Eucalyptus
- Liquidamber
- Oak
- Australian Pine
- Aspen
- Spruce

On-line Resources on Trees and Air Quality:

California Polytechnic State University, San Luis Obispo's Urban Forest Ecosystems Institute provides a useful on-line tree selection website called "SelecTree." Many tree characteristics, including the biogenic emissions for 232 different tree species, can be searched using this web-based tool.

Please visit <http://selecttree.cagr.calpoly.edu> for more information.

The U.S. Forest Service's Center for Urban Forest Research at UC Davis is an excellent resource for research and reports on urban forests, including extensive research on the relationship between urban forestry and climate change. The website also contains a "Tree Carbon Calculator".

Please visit <http://www.fs.fed.us/psw/programs/cufr/> for more information

The California Air Resources Board provides a helpful website on "Trees and Air Quality." The website contains information and links to other on-line resources organized by various air quality aspects of trees and plants such as cooling properties, pollutant removal, biogenic emissions, biogenic allergens, and general tree selection.

Please visit <http://www.arb.ca.gov/research/ecosys/tree-aq/tree-aq.htm> for more information.

If you have any questions or would like further information about the Bay Area Air Quality Management District, please contact:

Dave Burch
Principal Environmental Planner
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109
Tel: (415) 749-4641
Email: dburch@baaqmd.gov