



NASA Air Quality Applied Sciences Team

Earth Science Serving Air Quality Management Needs



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Ozone Gardens Taking Root in Colorado

New ozone gardens show effects of pollution on plant life in Boulder, Colorado

BOULDER – Ozone gardens at the University of Colorado-Boulder’s Museum of Natural History and the National Center for Atmospheric Research (NCAR) Mesa Laboratory are illustrating the harmful effects of air pollution on human and plant health.

Scientists at CU-Boulder and NCAR are growing plants that develop brown and black spots on their leaves when exposed to harmful air pollution. The two Colorado ozone gardens add to a growing national network of similar projects led by members of NASA’s Air Quality Applied Sciences Team (AQAST). Visits to the gardens are free and open to the public.

“Many air pollutants are not visible to the naked eye,” said Kateryna Lapina, a post-doctoral researcher at CU-Boulder who founded the gardens along with post-doctoral scientist Danica Lombardozzi of NCAR. “The leaf injury developed by these plants by the end of the summer will tell us how unhealthy the air we breathe in Boulder can be and how ozone affects living systems.”

The ozone gardens feature particular varieties of milkweed, snap bean, potato and coneflower, which are natural bio-indicators capable of detecting the presence and frequency of high ozone concentrations. As pollution levels increase so, too, does the severity of damage exhibited on the plants’ leaves.

“Ozone concentrations peak in summer, when sunlight is more abundant and intense and stagnant meteorological conditions characterized by clear skies and high temperatures make pollution worse,” Lapina said, noting that ground-level ozone in the Denver metro area and Front Range region has exceeded U.S. Environmental Protection Agency (EPA) standards since 2007.

These harmful levels can result in respiratory problems, particularly in children and elderly residents. They also can threaten food supplies as crops become damaged and their yields are reduced. Evidence of ozone damage was recently detected on plants in Rocky Mountain National Park, and the National Park Service is one of several agencies that generously provided plants for the Boulder ozone gardens.

Students at the CU-Boulder garden and monitoring equipment at the NCAR garden will take ozone measurements on several occasions throughout the summer. Plans are in development for interactive educational activities at the gardens including public workshops for students and teachers. The researchers hope the gardens will encourage changes in behavior to reduce emissions from vehicles, gasoline vapors and chemical solvents, which lead to ozone production.

“By seeing the damage that ozone causes on plants, we hope the gardens raise awareness about the harmful effects of ozone on both people and plants,” said Lombardozi. “If enough people make small changes, like using electric rather than gasoline-powered lawnmowers, it might make a big difference to the quality of the air we breathe every day.”

The Boulder ozone gardens follow the successful model developed by ACAST member and Saint Louis University professor Jack Fishman. Fishman launched the first ozone garden in 2012 and two additional sites began conducting research and educational programs in 2013. ACAST director Daniel Jacob also launched an ozone garden at Harvard University in May 2013.

Read more about the research at CU-Boulder [here](#)

Read about the Saint Louis ozone gardens [here](#)

Read about other ozone gardens [here](#)

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NASA Air Quality Applied Sciences Team, a nationwide collaborative research team, serves the needs of air quality managers in the United States by analyzing a variety of NASA satellite data, models and suborbital platforms on the ground. Created in 2011 by NASA's Applied Sciences Program, ACAST is made up of 19 of the top minds in all fields of air quality science and strives to inform air quality managers and provide high-quality resources for the press and public. Contact Dr. Tracey Holloway in her office at (617)-495-1794 or go to www.aqast.org or www.aqast-media.org.