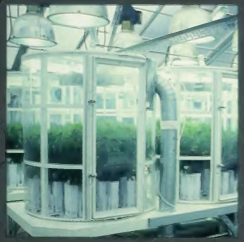








CENTER FOR FOREST ENVIRONMENTAL STUDIES

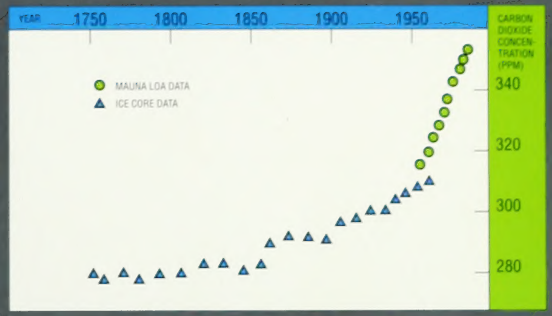
The Forest Service has been studying the effects of environmental stress including air pollutants on forest trees for more than 30 years. This information is necessary both to understand how forest ecosystems function and to develop appropriate management strategies to deal with possible impacts. More recently, the agency has been made responsible for protecting wildernesses and other Forest Service lands from the effects of air pollutants and other environmental stresses. In order to do this the agency must know the sensitivity of the components of these ecosystems and how to detect damage if it occurs. To meet these responsibilities and to assist other land managers, the Forest Service built the Center for Forest Environmental Studies near Macon, Georgia.

◀ *Plants that show symptoms of ozone injury have been found on some national forests.*

Air pollution has resulted in changes in species composition and in the loss of sensitive individual plants in some forested areas. ▶

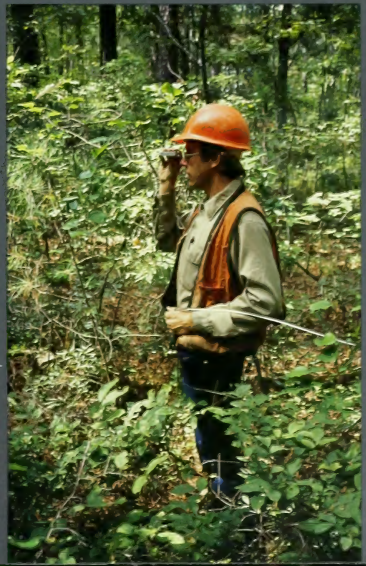
◀ *Determining the tolerance of specific types of urban trees to various environmental stresses would assist urban foresters in choosing the best tree for a particular spot.*

▲ *Wildernesses managed by the Forest Service are national treasures that must be protected from air pollutants.*



▲ *The effect of global increases in atmospheric CO_2 on forest growth and composition still needs to be determined.*

The cause of decreases in growth that have been discovered in some forested areas still needs to be determined. ▶



The mission of the center is to provide a state-of-the-art facility to increase the understanding of how vegetation and other forest resources are affected by anthropogenic emissions and changing environmental stress, and to make recommendations for forest management under these stresses. The Forest Service has designated the center as a national facility and directed it to fulfill research, development and application functions relating to plant stress for all portions of the agency, as well as for the larger forestry community.

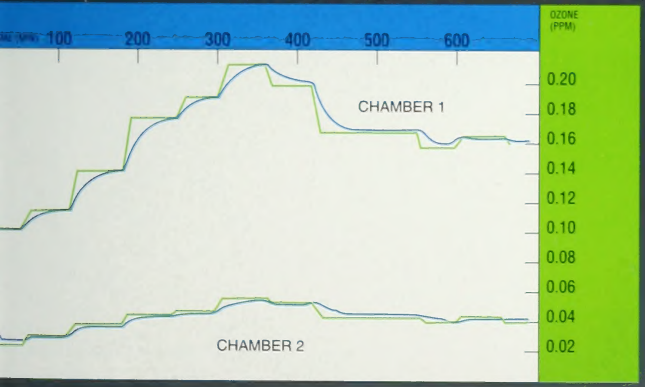
▲ *The physical plant consists of a 7000 sq. ft. greenhouse and a 2000 sq. ft. headhouse.*

◀ *Temperatures inside the greenhouse are controlled with air conditioners, and the air is continuously filtered to remove ozone and particulates.*

Twenty Continuously Stirred Tank Reactors (CSTRs) with temperature and relative humidity controls are located in full sunlight.

Large numbers of plants can be grown under uniform environmental conditions.

Computer controls for the CSTRs keep actual concentrations of ozone (——) close to target concentrations (——) and allow independent fumigations in separate chambers.



Rain simulation equipment can be used to test the effects of acidic precipitation.

Research projects at the center are generally conducted in cooperation with the staffs of the various Forest Service Research Stations, other government agencies, and universities. Scientists from other facilities are encouraged to consult with the center staff and to consider using the equipment at the facility when designing experiments.

Developmental projects at the center often involve modifying techniques first tested during research studies to fulfill a more applied function. These activities can include adapting procedures to conduct tests on large numbers of plants or standardizing procedures so they can be replicated over time.

Applied projects at the center will usually consist of offering services that apply the tests that have been developed to practicing land managers. These services would be made available not only to the National Forest System, but also to State foresters and private industry.

It is important to maintain a link between studies conducted at the center and studies conducted under field conditions.

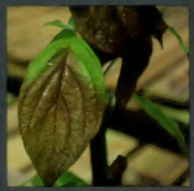
Repeated measurements of height and diameter make it possible to evaluate growth and biomass increment under different environmental conditions.

Photosynthesis and respiration are critical processes that readily respond to stress conditions. Integration of this information with the growth response provides important insights to the potential health of forest species under changing environmental conditions.

Evaluating plants for potential use as bioindicators of air pollutants or other components of global change provides information essential for a successful forest health monitoring program.

▲ *Maintaining a state-of-the-art facility requires that new equipment be developed and that old equipment be modified on a continual basis.*

Changing water relations are a good measure of plant response to stress. ▶



◀ *Indirect effects of air-borne pollutants such as interactions between acid rain and diseases of forest trees can be important.*

The Center for Forest Environmental Studies was built by the USDA Forest Service with funds from the Southern Commercial Forest Research Cooperative of the National Acid Precipitation Assessment Program. The Center operates through the cooperative efforts of the Forest Service's Southern Region, Southeastern Forest Experiment Station, and the Georgia Forestry Commission.

United States Department of Agriculture Forest Service Southern Region

Forestry Report R8-FR-13
November 1991

CENTER FOR FOREST ENVIRONMENTAL STUDIES

DIRECTIONS: The Center for Forest Environmental Studies is near Macon, Georgia, and is about 80 miles south of the Atlanta Hartsfield International Airport. Follow Interstate 75 to Macon and exit onto Interstate 16 East. Drive about 5 miles and leave Interstate 16 at Exit 5. Turn left at the light at the end of the exit ramp onto Ocmulgee East Boulevard. Drive 0.2 miles and turn right onto Joe Tamplin Industrial Boulevard. Drive about 2 miles being careful of abrupt left curve. Turn right at the first stop sign onto Riggins Mill Road. Drive 0.4 miles and turn right at the first drive after the USDA Forest Service sign. The Center is located about 100 yards from Riggins Mill Road.

MAILING ADDRESS:

USDA Forest Service
Center for Environmental Studies
Route 1, Box 182 A
Dry Branch, GA 31020
(912)744-0210