

Sensitivity of sycamore seedlings (*Platanus occidentalis*) to ozone in Great  
Smoky Mountains National Park: Data from 1989

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**Abstract**

Sycamore (*Platanus occidentalis* L.) seedlings were exposed in 1989 to ozone in open-top chambers at Uplands Field Research Laboratory, Great Smoky Mountains National Park (GRSM). Seedlings were raised from seed collected in GRSM and exposed for a total of 68 days to one of five treatments: charcoal-filtered (CF), 1.0x, 1.5x, and 2.0x, and non-chambered plots. Height and diameter, along with biomass accumulation, were measured for each seedling, as well as measures of foliar injury. Exposure response curves were developed for significantly affected biomass parameters, and foliar symptoms were analyzed using Chi-square analyses. Open grown seedlings had slightly larger diameters than those grown in the 1.0x treatment, but no other measured parameters differed between open grown and chambered seedlings. Among chambered plants, exposure to ozone linearly reduced leaf, root, and total dry weights. Ozone also induced premature loss of lower main stem leaves, even though total leaf count was not affected by ozone exposure. This suggests compensatory leaf production by seedlings in the higher ozone treatments. Regression analyses show that dry weights for root, leaf and total biomass decreased by 12%, 10%, and 9%, respectively, from CF to 1.0x, and 31%, 26%, and 23%, respectively, from CF to 2.0x. By the end of the season, there were no significant effects of ozone on either height or diameter. Ozone-induced foliar stipple increased as ozone exposure increased, with significantly higher amounts in the 1.5x and 2.0x treatments. Older leaves were generally more injured than younger ones. Stipple was also unusually high in the CF treatment, possibly caused by agents other than ozone. The results show that there is large plant-to-plant variation in growth responses, but that ambient levels of ozone may be reducing growth by up to 9% per year. Further research on the genetics of resistance to ozone in this species is warranted.

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**Notes to readers**

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