

Giulia Carriero⁽¹⁾, Yasutomo Hoshika⁽¹⁾, Silvano Fares⁽²⁾, Sara Pignattelli⁽¹⁾, Moreno Lazzara⁽¹⁾, Alessio Giovannelli⁽³⁾, Giovanni Emiliani⁽³⁾, Laura Traversi⁽³⁾, Cecilia Brunetti⁽¹⁾, Elena Paoletti⁽¹⁾

Long-term effect of ethylenediurea (EDU) on poplar clones under ambient ozone

Effects of ethylenediurea (EDU) after six years of exposure to ambient ozone (O₃) were examined in an O₃ sensitive poplar clone (*Populus maximoviczii* Henry x *berolinensis* Dippel). Every week over the growing season (annual average AOT40 was 23 ± 6 ppm h), trees were irrigated with either 450 ppm EDU, that is well known to protect plants from O₃ damage, or water (WAT). Sap flow, radial growth, plant phenological stage, visible foliar O₃ injury, BVOC emission, plant height, stem diameter, biomass allocation to below and above ground, wood traits, leaf area and mycorrhizal infection were determined. Results show that EDU accelerated bud development and delayed early leaf senescence induced by O₃. EDU had a protective effects on O₃ visible injury because typical dark brown stipples were found more on leaves of WAT trees than of EDU trees. To assess the onset of O₃ visible injury, we calculated three O₃ indices: AOT40, POD0 and the ratio of stomatal O₃ uptake to net photosynthesis. The best metric to explain O₃ visible injury onset was stomatal O₃ uptake per net photosynthesis. An assessment carried out after three years showed that EDU increased leaves, roots and branches while after six years EDU increased coarse roots only and enhanced stem diameter but only up to 2.5 m. EDU beneficially affected the community of mycorrhizal fungi by increasing number of ectomycorrhizal types and total number of fine roots compared to the plants treated with water. In addition, the prolonged treatment with EDU did not induce a significant change in wood traits along the stem but decreased the water storage inside the stem, therefore the sap flow was higher in WAT plants. Total BVOC emission, significantly decreased in damaged leaves at the end of the growing season but EDU treatment had no effect on BVOC emission.

Parole chiave: Climate change, Ozone, EDU protection, Visible foliar ozone injury, BVOC emission, Biomass, Mycorrhizal fungi, Growth

Indirizzo Autori: (1) Institute for Sustainable Plant Protection, National Research Council of Italy, Sesto Fiorentino (Fi), Italy; (2) Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria, Roma, Italy; (3) Istituto per la Valorizzazione del Legno e delle Specie Arboree, Consiglio Nazionale delle Ricerche, Sesto Fiorentino (Fi), Italy

Corresponding Author: Giulia Carriero (carriero@ipp.cnr.it)