

PROJECT TITLE

The effect of tropospheric ozone and nutrient availability on Glycine max and Triticum aestivum.

CONSORTIUM

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SUMMARY OF THE REPORT

This experiment studied the combined effect that four different ozone regimes (20 ppb, 40 ppb, 60 ppb and 80 ppb) and two nitrogen levels (100 kg ha⁻¹ and 200 kg ha⁻¹) have on three cultivars (one traditional/tolerant, one modern/tolerant and one modern/resistant) of wheat (*Triticum aestivum* L.), under simulated Mediterranean climate conditions typical for wheat-growing zones in Spain.

The experiment took place at the ExpoSCREEN in the Helmholtz Zentrum Muenchen (HMGU) from January 9th to March 30th. It included measurements of ozone damage, plant size and biomass, along with photosynthetic activity, Chlorophyll, Flavonoid, Anthocyanin and Nitrogen Balance Indexes of levels, and sampling for biomarkers and isotopes. In addition to access to the chambers, where the ozone treatment and climatic conditions were defined, I was given access to a photostation in which pictures of complete plants were taken for total leaf coverage measurements, which are currently being checked at the HMGU, the laboratories, the greenhouse, and the monitoring and irrigation systems. I was also provided with gas-exchange equipment (gfs-3000, Walz, Germany) and an optical sensor for assessing polyphenols and chlorophyll non-invasively (Dualox, Force-A, France).

Overall the experiment took place over 10 weeks with an additional week for harvesting. The nitrogen treatment was divided into 4 applications, as to not overbear the plants, which were done every 2/3 weeks while the ozone treatment was kept constant. A climate program was set up for the entire experiment in which the simulation of the natural growing period was sped up by simulating the hourly average changes in the climate parameters of one week based on the average real (i.e. field) conditions for two weeks. Damage, photosynthetic, and size measurements were taken every 2 weeks after the flag leaf was visible, and sampling was done in week 8 and at final harvest in week 11. Pictures of plants were taken at the end of the experiment, which were then subsequently harvested, cut up and scanned for total leaf coverage. Moreover, leaf samples were taken, immediately frozen in liquid nitrogen, and stored at -80 °C in week 8, and soil samples, as well as root and plant samples were taken at harvest for biochemical analysis, which were stored at -80 °C, and samples for isotope analysis were dried at 55 °C for at least 48h.