

Effect of Elevated Carbon Dioxide and Elevated Ozone on Plant Growth and Yield of Maize (*Zea mays* L)

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ABSTRACT

A field experiment was carried out under the free air and elevated CO₂ and O₃ (FAOCE) condition with two (HQPM-1 and PMH-1) maize cultivars at the research farm of the Indian Agricultural Research Institute, New Delhi, India, during July-October of 2016 and 2017 seasons. The crops were grown under two levels of atmospheric CO₂ and O₃ conditions. Results showed that crop growth parameters viz., chlorophyll content, leaf area index and photosynthetic rate of HQPM-1 and PMH-1 increased significantly under the elevated CO₂ (EC) treatment. However, increased level of tropospheric O₃ reduced them significantly. The elevated atmospheric CO₂ condition improved the averaged (2016 & 2017) grain yield of HQPM-1 and PMH-1 significantly (p<0.5) in both the crop cultivars over the ambient condition. However, elevated O₃ exposure treatment decreased yield of HQPM-1 and PMH-1 significantly (p<0.05) over the ambient. The grain yield of HQPM-1 and PMH-1 maize cultivars also improved under the interactive treatment of elevated CO₂ and O₃ as compared to the ambient condition. Protein, potassium and phosphorus contents of maize grains reduced under the elevated carbon dioxide but carbohydrate and amylose increased as compared to the ambient treatment condition as well. The elevated O₃ treatment condition improved the protein, P and K contents of grains of HQPM-1 and PMH-1 significantly as compared to ambient. Concentration of carbohydrates in grains of both crop cultivars responded negatively under elevated O₃ condition as compared to the ambient. Nevertheless, no significant effect was noticed on carbohydrate concentrations of grains of both crop cultivars under the interactive treatment (ECO) condition as compared to the ambient.