The Effect of ZnO Nanoparticles on Arabidopsis Growth in Elevated CO2

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The increasing greenhouse gas emissions causing climate change have been observed to deplete the nutrient content of crops, which can impact global malnutrition. Zinc is one of the plant micronutrients most threatened by elevated atmospheric carbon dioxide (CO2). Zinc deficiency can yield harmful effects upon human health, such as stunting growth. Zinc oxide nanoparticles can increase plants' zinc concentrations, but their efficacy under climate change conditions has not been studied. The purpose of this project was to investigate zinc oxide nanoparticles as a potential solution to global zinc deficiency, which is predicted to worsen with climate change. Arabidopsis thaliana plants were grown in ambient and elevated CO2. Each trial contained five groups that were treated differently with a solution of zinc oxide nanoparticles: soaking seeds in 10 mg/L, 1.0 mg/L, 0.5 mg/L, or 0.0 mg/L, or applying 10 mg/L during growth. The height of each plant was recorded throughout to monitor growth rate, and after three weeks, the dry biomass was measured as a relative indicator of zinc content. In ambient CO2, the 1.0 mg/L treatment yielded the highest mean biomass; in elevated CO2, 1.0 mg/L and 10.0 mg/L during were equally effective. These were statistically significant compared to the control, 0.5 mg/L, and 10.0 mg/L. Zinc oxide nanoparticles may be a viable solution to combat zinc loss due to climate change. As plants are a vital source of zinc for humans around the globe, especially in low-resource areas, measures to stabilize micronutrients in plants must effectively withstand climate change.

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