

Title Ethylene synthesis and sensitivity in crop plants
Author Joseph Romagnano, Bruce Bugbee, Gail Bingham, Raymond Wheeler and John Carman
Citation Thesis, Doctor of Philosophy (Agronomy), Utah State University. 2008.
Keywords Ethylene; Crop plants; Ethylene synthesis; Ethylene sensitivity; Advanced life support; Controlled environments

Abstract

The gaseous plant hormone ethylene is a small molecule that regulates developmental change. Research was conducted in three areas: sensitivity, synthesis, and alterations to synthesis. Vegetative pea plants were more sensitive than radish plants to atmospheric ethylene. Light intensity did not affect ethylene sensitivity. Ethylene synthesis rates were measured for unstressed cotton, corn, soybean, and tomato plants. The per-plant ethylene synthesis rate ranged from 0.1-80 pmol plant⁻¹ s⁻¹. However, when normalized to net photosynthetic rate, this range was 1-4 μmol of ethylene synthesis per mol of CO₂ uptake. Diurnal cycles in ethylene synthesis were present in all crops studied. These cycles were disrupted by drought stress and were attenuated when synthesis rates underwent large changes. Drought stress decreased synthesis in cotton. Flooded corn and soybean had increased synthesis. Blocked perception had no effect on ethylene synthesis or net photosynthetic rate in healthy unstressed plants.