Algal Sensitivity to Herbicides Measured by Pulse Amplitude Modulated (PAM) Fluorometry and $H^{14}CO_3$ Uptake

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Pulse amplitude modulated (PAM) fluorescence measurements and ^{14}C uptake measurements were made on four algal species to determine the effect of herbicides on photosynthesis. Mono cultures of Anabena cylindrica, Synedra acuz, Scenedesmus acutus, Cryptomonas ovata were analyzed for maximum production rates (P^B_{max}), the slope of productivity vs. irradiance functions (α), and quantum efficiency (ϕ_{II}). Effects of atrazine and diuron concentrations at 0, 2, 8, 32, 128, 512, 2048, and 20480 µg/L were measured on each culture to determine concentrations of initial effect (IE) to production and effect concentrations, resulting in a 10% (EC10) and 50% (EC50) reduction in quantum efficiency. IE concentrations that affected production were 0 - 8 µg/L diuron and >128 µg/L atrazine. EC10 values ranged between 3.3 - 38.7 µg/L atrazine and 1.0 - 8.9 µg/L diuron, whereas EC50 values were >25.2 µg/L atrazine and 3.6 – 142.5 µg/L diuron. Results of this study suggest that the PAM method is more sensitive than the primary production method. Diuron proved to be a more potent inhibitor of photosynthesis than atrazine, and sensitivity to either herbicide was species dependent.