Carbon Dioxide Exchange in Maize and Soybeans

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The gross primary productivity (GPP), and ecosystem respiration (R_{eco}) of carbon dioxide was examined in irrigated maize and irrigated soybean fields grown in eastern Nebraska. In both fields, seasonal changes in GPP (during clear skies) closely followed a hyperbolic relationship with green LAI during the vegetative and early reproductive growth stages. The nighttime R_{eco} displayed an exponential relationship with air temperature with Q_{10} between 1.5 and 2.0 for a given range of green LAI. For constant air temperatures during the season, the nighttime R_{eco} also showed a strong influence of the green LAI for both crops. The GPP of the maize ecosystem, integrated over the growing season, was substantially larger (1715 g C m^{-2}) as compared to that of the soybean canopy (980 g C m^{-2}) even though peak green LAI was comparable. The seasonally integrated ecosystem respiration however, was more comparable (about 1120 and 855 g C m^{-2} in the maize and soybean, respectively).

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