CROP PHYSIOLOGY LABORATORY

'Super Dwarf' Rice: PPF Studies

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Increasing photosynthetic photon flux (PPF) increases yield but decreases energy efficiency so the optimum PPF depends on the relative importance of energy, mass, and volume. We examined PPF levels of 600, 900, and 1800 µmol m^{-2} s^{-1} in a 12-h photoperiod (20 to 80 mol m^{-2} d^{-1}). We assumed a PPF compensation point of 200 µmol m^{-2} s^{-1}. Yield and yield efficiency were similar to PPF response data for wheat (Bugbee & Salisbury 1988 P Physiol. 88:869-878, Exploring the Limits of Crop Productivity) except that wheat can utilize continuous light so the PPF input and yield are doubled. Crops with vertical leaves (wheat & rice) can utilize PPF levels well above 1000 µmol m^{-2} s^{-1}. Crops with horizontal leaves (potatoes, soybeans & other dicots) light saturate much sooner than grasses.