LIGHT INTERCEPTION AND CANOPY COVERAGE OF LETTUCE AND RADISH GROWN UNDER DIFFERENT WAVELENGTHS OF RED LIGHT-EMITTING DIODES (LEDs)

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Light-emitting diodes (LEDs) represent an innovative artificial lighting source with several appealing features specific for supporting plants, whether on space-based transit vehicles or planetary life support systems. Appropriate combinations of red and blue LEDs have great potential for use as a light source to drive photosynthesis due to the ability to tailor irradiance output near the peak absorption regions of chlorophyll. This paper describes the importance of far-red radiation and blue light associated with narrow-spectrum LED light emission. In instances where radish and lettuce were grown under lighting sources in which the ratio of blue light (400-500 nm) relative to far-red light (700-800 nm) was low, there was a distinct leaf stretching or broadening response. This photomorphogenic response sanctioned those canopies as a whole to reach earlier critical leaf area indexes (LAI) as opposed to plants grown under lighting regimes with higher blue:far-red ratios. In many instances, the salad crops grown under LEDs were just as productive as crops grown under broad-spectrum light, largely as a consequence of more efficient light interception during early growth.