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Efforts continue to expand and improve facilities for research and teaching in controlled environment plant production. A growing facility for demonstrating the opportunities to produce crops in enclosed controlled environments is in the process of being established on campus. Reliance on artificial lighting creates challenges for crop production in these types of controlled environments and in greenhouses at high latitudes. High pressure sodium lamps (HPS) are often chosen as the main source for these situations. Compared to natural light, the proportion farred (FR) wavelengths is limited in HPS irradiance. For proper morphological plant development and flowering, the importance of FR in the spectral energy distribution is well known.

Seedlings of *Rudbeckia hirta* 'Toto', a dwarf cultivar suitable as a container or bedding plant, were transplanted one month after seeding. Three weeks later an experiment to determine the significance of FR for development was initiated. At this time, the plants had 7 to 8 leaves and were 3 to 4 cm in height. At 15°C, plants were grown in environments with exclusively HPS, exclusively incandescent irradiance (INC), or natural light with no supplemental lighting in a greenhouse covered with a polycarbonate material. Day length was 16 hours for HPS and INC. The natural day length increased from 12 hours and 58 minutes at the start of the experiment to 19 hours and 44 minutes by termination in May. The light integral for HPS and INC treatments averaged 8.5 $mol \cdot day^{-1}m^{-2}$. Since flowering has been correlated to the elongation of the stem in some plants, the growth regulator ProGibb (gibberellic acid, GA, Abbott Laboratories, North Chicago) was used at 1.9 mg active ingredient per plant to promote stem elongation. Height at flowering was, as expected, greater for plants treated with GA although not significantly different from the plants under INC. Natural light produced the shortest averaging 23 cm and HPS with GA the tallest plants (43 cm). The first observed open flower occurred 96 to 109 days from seeding. GA significantly decreased flowering time at HPS and natural light, but did not affect flowering time under INC. All plants treated with GA flowered at a similar time (96 to 97 days). The number of flower buds per plant was equal under natural and INC. GA treatment had no effect at HPS, significantly decreased at natural light, and at INC increased the flower bud number from 6 to 32.

Effects of the spectral energy distribution on flowering of pansy 'Accord Clear Blue' and 'Accord Clear Yellow' were similar to the results observed in *R. hirta*. There was no significant difference in flowering time between pansy grown under INC and natural light averaging 61 days from seeding for 'Yellow' and 66 days for 'Blue'. HPS delayed flowering with 22 days in 'Yellow' and 26 days in 'Blue'. The number of nodes below the first flower was 5 for 'Yellow' grown at natural or INC and 7 for 'Blue'. Under HPS, nodes below the first developed flower increased to 7 in 'Yellow' and 12 in 'Blue'.

To study spectral energy distributions with various proportions of red (R) and FR wavelengths, HPS combined with INC may be used. *R. hirta* 'Toto' grown at a mixture of HPS and INC resulting in R/FR of approximately 0.9, flowered 95 days from seeding. In the same experiment, *R. hirta* under HPS (R/FR ≈ 2.2) flowered 13 days later and at INC (R/FR ≈ 0.75) 5 days earlier than in the 0.9 R/FR environment. Adding FR to HPS in controlled environment crop production is expected to improve overall growth and rate of development.

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