

LIGHT WAVELENGTH'S EFFECT ON EARLY STAGE GARDEN BEAN DEVELOPMENT. Aaron C. Ziegler, aaronziegler21@gmail.com, 9541 Bluewing Terrace, Cincinnati OH 45241. (Seven Hills High School)

The energy efficiency of light-emitting diodes (LEDs) makes them attractive for indoor plant lighting. However, LEDs do not create broad-spectrum lighting efficiently. Additionally, LEDs' effect on garden-beans (*Phaseolus vulgaris*) is not well known. The purpose of this study is to find light colors of specific wavelengths to grow plants under indoor conditions. The hypotheses were that each of the chosen light-colors purple, red and green would promote early bean growth better than natural sunlight as measured by both qualitative and quantitative data. Four garden-bean plants grew under each of the red, green, purple LED lights (Phillips, 8watt), and natural sunlight for 16 days after planting the seeds in soil. Average plant height after 16 days under purple, red, green and natural light were 354 mm, 298 mm, 311 mm, and 359 mm, respectively. The average leaf width for plants under purple, red, green, and natural lights were 41 mm, 47 mm, 57 mm, and 36 mm, respectively. Bonferroni adjusted T-tests found statistical differences for height and leaf width between the plants under the green light and the plants under the purple and natural lights ($p = .004, .006, .001$ and 0.000). Qualitative observations, based upon visual inspections, of leaf health, maturity, and root development revealed the plants under red light were the healthiest, nearest to fruition and had the healthiest roots, followed by those under green light. The findings of this study suggest certain narrow-spectrum light can perform better than broad-spectrum light on early garden bean growth.

