By Erik Runkle

The Double-Ended HPS Lamp

The high-pressure sodium (HPS) lamp is the most popular lamp type to deliver high-intensity, supplemental lighting in greenhouse crop production. The traditional HPS lamp has an electromagnetic ballast, but newer models have electronic ballasts that are typically smaller, quieter and 10 to 15 percent more energy efficient. In addition, electronic ballasts run cooler and are substantially lighter, and light emitted from bulbs degrades at a slower rate than with magnetic ballasts.

Until recently, HPS lamps only came in "single-ended" types, meaning the lamp screws into a single socket. Recently, Philips developed and marketed double-ended HPS lamps for greenhouse applications. These bulbs attach to the fixture at both ends, hence the name. What's notable about these lamps is that, based on data from lighting companies and confirmed at Utah State University, they are 25 to 30 percent more efficient than single-ended HPS lamps.

Double-ended HPS lamps are available in a wide range of input voltages including 120, 208, 240, 277, 347 and 400 volts and typically come as 1,000-watt fixtures. Lower-wattage fixtures (e.g., 750 watts) are being developed and are becoming available. Double-ended HPS lamp fixtures with electronic ballasts are more expensive to purchase, and the bulbs are also more expensive when they need to be replaced, but their substantially greater energy efficiency has a positive return on investment within a few months in many applications

When delivering moderate intensities of light, high-output fixtures such as 1,000-watt HPS lamps should only be used when they can be hung high (at least 8 feet) above the crop. When hung closer to the crop, light uniformity decreases, creating bright, hot spots below the lamps and dimmer, cooler spots between lamps. When creating a lighting plan, in my opinion, light uniformity is just as important as light intensity. If light intensity is not uniform, growth responses become variable, which leads to different watering needs. This can be especially problematic in young plant production. Consult with a reputable greenhouse lighting manufacturer to discuss lighting options and layout based on your greenhouse dimensions and desired lighting intensity.

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I'm often asked how much supplemental lighting is needed. The answer of course is situational, depending primarily on the location and crops grown. Generally speaking though, greenhouse growers of ornamentals and young plants should strive to deliver 50 to 75 $\mu mol \cdot m^{-2} \cdot s^{-1}$ of supplemental lighting. Young plant growers in the darkest regions (the upper Midwest and Pacific Northwest) should aim for the upper end of this range. Growers of vegetables and cut flowers typically deliver twice this intensity, since the harvestable output increases with light, especially when the air can be enriched with carbon dioxide. For more information on greenhouse lighting, visit the MSU floriculture webpage flor.hrt.msu.edu/lighting. g

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