INNOVATIONS IN GROW LIGHTING

STUDIES SHOW THAT PLASMA LIGHTING HAS GREAT POTENTIAL IN PRODUCING HIGH-QUALITY PLANTS AT A LOWER OPERATING COST.

By Chris Pieser

Innovations in grow lighting are paramount to the current and future success of controlled environmental agriculture (CEA) and greenhouse supplemental lighting. No single grow light is good for every single application; the term we use for this disparity is "application driven."

To offer an example: single-point light sources like plasma, metal halide and high pressure sodium are excellent for overhead grow lighting applications but not well suited for vertical farming. We would also advocate that full-spectrum light nutrition is the holy grail of all grow lighting innovations and should be carefully considered when making your supplemental lighting decisions.

Defining Full-Spectrum Light Nutrition

So, what exactly is full-spectrum light nutrition and why is it important to growers? Well, in the beginning there was only Mother Nature and natural sunlight. Then man discovered that plants only use a specific blend of colors found in natural sunlight designated as photosynthetically active radiation (PAR). Let's use an analogy; if you equated the PAR spectrum to human nutrition, which of these spectra would be optimum for human nutrition (see Figures 1a, 1b and 1c)?

If you chose plasma, then you would receive the optimum nutritional spectrum for healthy human growth, just as it would be the optimum lighting spectrum for healthy plant growth.

So what exactly is plasma grow lighting? Simply stated it is a process very similar to how the sun generates light, energized gasses forming a plasma state. Plasma light is achieved without a filament which allows the spectrum and power output to last longer than traditional light sources And here's the kicker — there are no lamp changes! Not only is energy consumption reduced

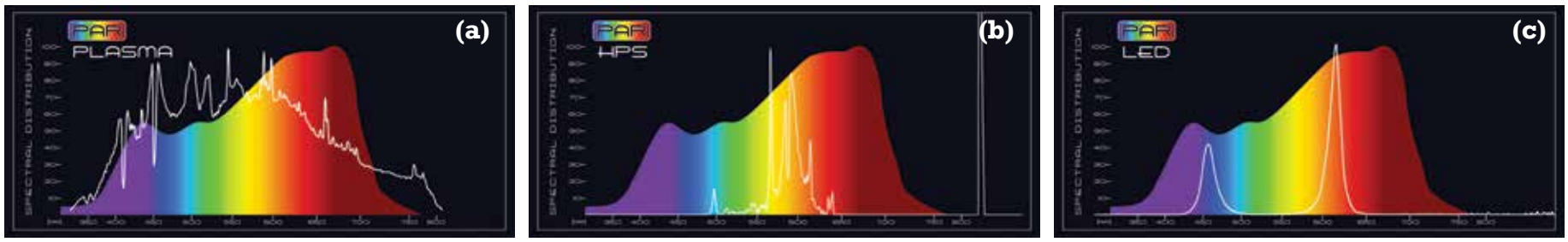

Figure 1. Spectral comparisons of plasma (a), HPS (b) and LED light (c).

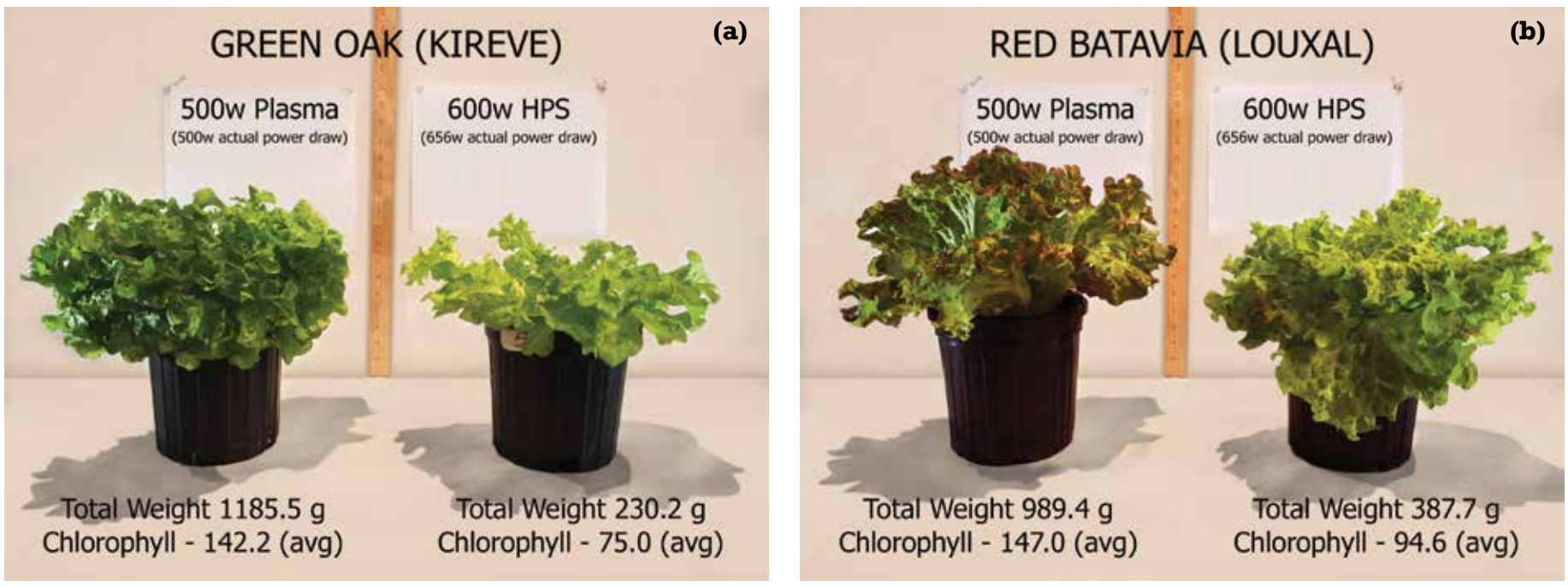

Figure 2. Growth comparison of green oak (a) and red batavia (b) lettuce grown under 500W plasma lighting and 600W HPS lighting.

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(compared to 600W HIDs), annual operating costs for lamp replacements is also reduced.

Comparing Light

Chameleon Plasma Grow Lighting conducted independent studies using lettuce under plasma and HPS lights. Figures 2a and 2b show the growth comparison between 500W plasma and 600W HPS lights.

Environment. We maintained the grow room climate at 75° F, 45 percent relative humidity with CO2 levels at 500-750 ppm. Vertical airflow was 100 cfm with almost all of airborne volatile organic compounds totally eliminated.

Final results. The plasma lettuce samples had an average of 111 percent more fresh weight than the HPS-grown lettuce with a 34 percent chlorophyll increase (expressed as SPAD value) for 23 percent less power and heat. Plasma lettuce also had increased color pigmentation and produced a crisper, more flavorful product.

Conclusions. Watt-for-watt, plasma is capable of outperforming legacy grow lighting for less operating costs. It provides an organic spectrum similar to natural sunlight, producing aesthetically appealing plants with high percentages of chlorophyll (and cannabinoids) allowing growers to offer better local products year-round. g

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