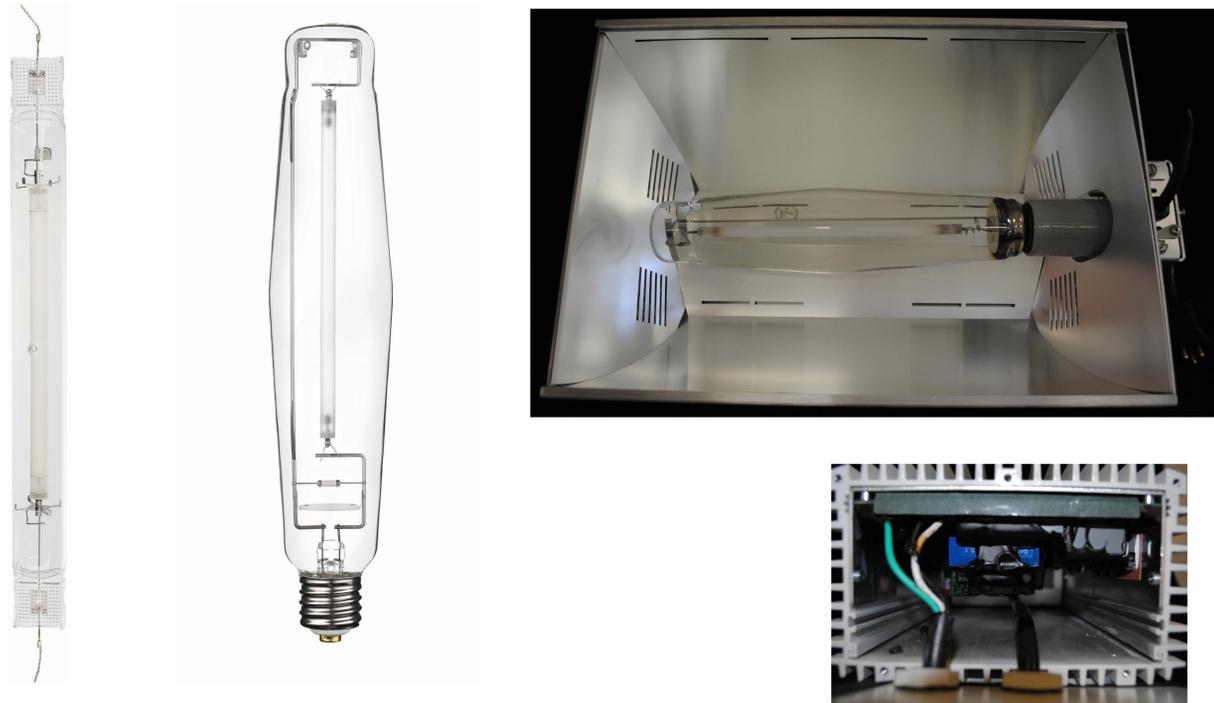


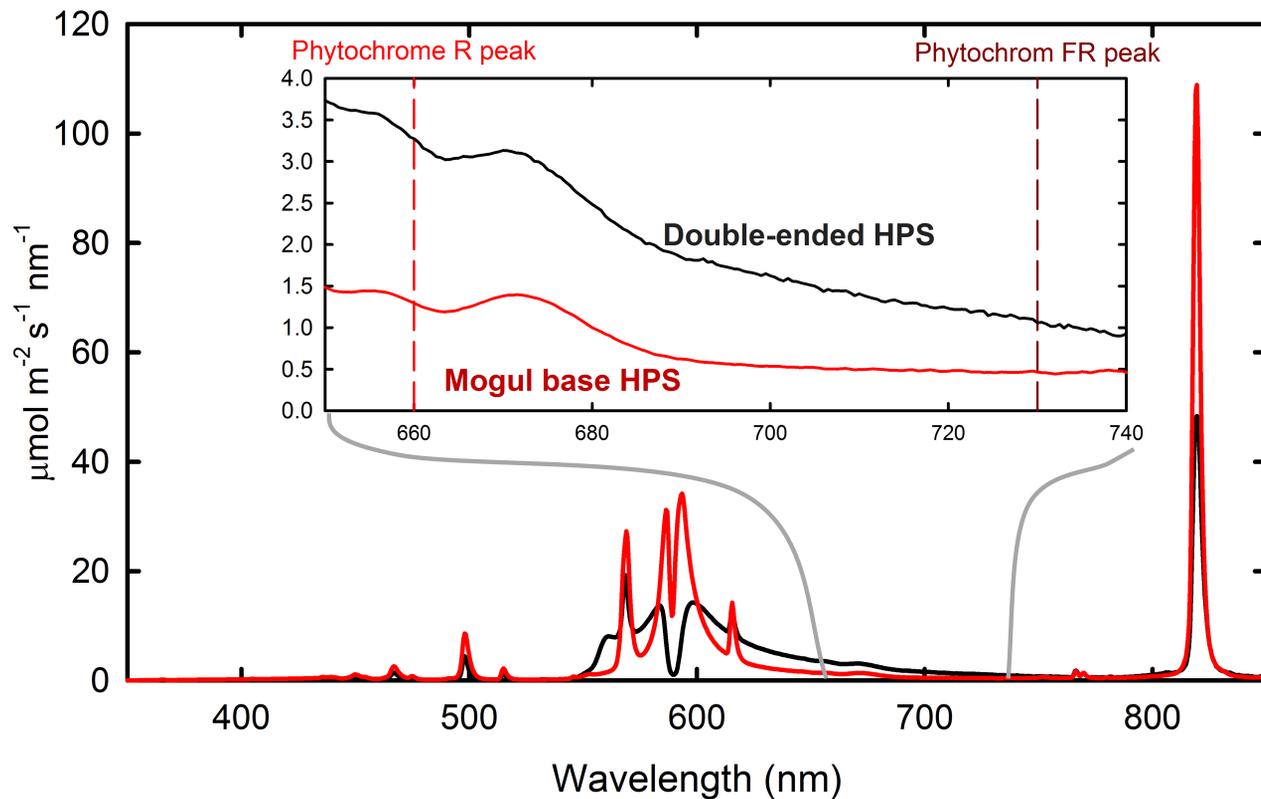
Advances in HPS technology: electronic ballasts, efficient luminaires, and double-ended lamps

April 2014

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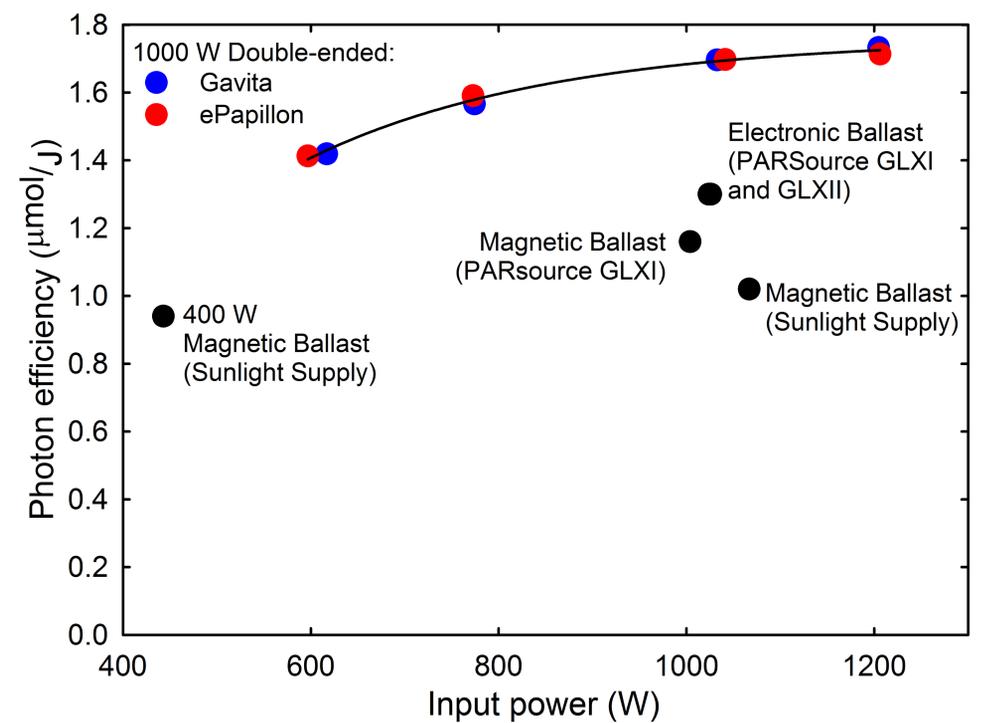
Spectral changes



	%UVA (320.5- 399.5)	%Violet/ Blue (400-475)	%Cyan/ Green (476-550)	%Green/ Yellow/ Red (551-700)	%Near Infrared (701-750)	YPF/PPF	PPE
Mogul-base	0.8	4.4	6.0	89.7	2.4	0.95	0.87
Double-ended	0.3	2.3	3.4	94.4	5.8	0.97	0.85
% change	-66%	-49%	-43%	5%	142%	1%	-2%

High pressure sodium (HPS) fixtures (lamp, luminaire and ballast) have improved substantially in the last few years.

	Mogul base (magnetic)	Mogul base (electronic)	Double-ended (electronic)
Photon Efficiency ($\mu\text{mol}/\text{J}$)	1.02-1.16	1.30	1.70



Variable wattage ballasts

Many fixtures now include the ability to adjust input power. These settings generally reduce efficiency, and may have impacts on lamp life.

