



Plasma-activated water (PAW) from a customized power system: generation, analysis, and plant growth enhancement

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Research into plasma-activated water (PAW) is vital due to its unique physicochemical features and potential applications in biomedicine, food safety, and agriculture. PAW which contains reactive oxygen and nitrogen species has emerged as a promising technique for sustainable agriculture. In this study, a customized power system was used to generate PAW from a gliding arc discharge (GAD) plasma source. The generation process was optimized by adjusting critical electrical and environmental characteristics. Basic parameters of the generated plasma were characterized by estimating electron excitation temperature, electron density and rotational vibrational temperature. To evaluate the reactive species in the PAW, comprehensive physicochemical tests were carried out, including pH,

oxidation-reduction potential (ORP), electrical conductivity, temperature, turbidity, specific gravity and concentration of nitrate, nitrite, and hydrogen peroxide. The effectiveness of the generated PAW was determined by its effect on seed germination and early plant (Red cherry pepper) growth. The results show the customized GAD systems able to produce non-thermal plasma and that has ability to alter the physicochemical properties of water forming PAW. PAW produced by the customized system greatly improves plant development, showing its potential as an eco-friendly growth stimulant.