



## Instantaneous Carboxylation Efficiency in Maize Grown Under Water Deficit Using Cashew Gum Hydrogel

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### ABSTRACT

Hydrogels are hydrocolloids with water-absorbent properties and can be a strategy in agriculture to enhance water management. Our objective was to determine the carboxylation efficiency of maize submitted to water deficit using cashew gum and polyacrylamide hydrogels. A greenhouse trial was carried out using a completely randomized design in 2x4x4 factorial scheme with 3 replicates. Two types of hydrogels: cashew gum with 5% K<sub>2</sub>HPO<sub>4</sub> (H1) and Hydroplan – EB commercial hydrogel (H2); four hydrogel inputs: 0, 60, 120, and 240 mg pot<sup>-1</sup>, equivalent to 7.5, 15, 30, and 60 kg ha<sup>-1</sup>; and four irrigation levels: 0, 25, 50, and 100% of water storage capacity were assessed. At 30 days after germination, photosynthesis ( $A$ ,  $\mu\text{mol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$ ), internal CO<sub>2</sub> concentration ( $C_i$ ,  $\mu\text{mol CO}_2 \text{ mol}^{-1}$ ), transpiration ( $E$ ,  $\text{mmol H}_2\text{O m}^{-2} \text{ s}^{-1}$ ), stomatal conductance ( $g_s$ ,  $\text{mol H}_2\text{O m}^{-2} \text{ s}^{-1}$ ) were measured using portable photosynthesis equipment (Infrared Gas Analyzer - IRGA). Instantaneous carboxylation efficiency (ICE) [ $(\mu\text{mol m}^{-2} \text{ s}^{-1}) (\mu\text{mol mol}^{-1})^{-1}$ ] was quantified by  $A/C_i$  ratio. ICE is influenced by the hydrogel types x irrigation levels interaction, but no hydrogel types x hydrogel inputs x irrigation levels interaction was found. H1 showed higher ICE means ( $0.13 \mu\text{mol m}^{-2} \text{ s}^{-1} / (\mu\text{mol mol}^{-1})^{-1}$ ), but did not differ from H2 ( $0.12 \mu\text{mol m}^{-2} \text{ s}^{-1} / (\mu\text{mol mol}^{-1})^{-1}$ ) at 50% irrigation, respectively. H2 showed lower ICE means,  $0.09 \mu\text{mol m}^{-2} \text{ s}^{-1} / (\mu\text{mol mol}^{-1})^{-1}$ , but did not differ from H1, with  $0.11 \mu\text{mol m}^{-2} \text{ s}^{-1} / (\mu\text{mol mol}^{-1})^{-1}$  at 100% irrigation, respectively.

**Keywords:** *Anacardium occidentale*, irrigation, physiology, sustainability, *Zea mays*