4th. Global Conference on Agriculture
Vienna, Austria
21 - 23 June 2024

Dry Mass Production of Maize Under Irrigation Levels Using Cashew Gum Hydrogel

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Abstract

Hydrogels represent a strategy to improve water management in response to increasing food demands. While commercial polyacrylamide (PAM)-based hydrogels have dominated the market, cashew gum has emerged as a promising material in the context of sustainable agriculture. The objective was to evaluate the dry mass (DM) of maize under water deficit using cashew gum-based and polyacrylamide hydrogels. An experiment was carried out in a greenhouse using a completely randomized design in 2x4x4 factorial scheme with 3 repetitions. Treatments consisted of two types of hydrogels: cashew gum-based hydrogel with 5% K_2HPO_4 (H1) and Hydroplan – EB commercial hydrogel (H2); four hydrogel inputs: 0, 60, 120, and 240 mg pot^{-1}, corresponding to 7.5, 15, 30, and 60 kg ha^{-1}; and four irrigation levels: 0, 25, 50, and 100% of water storage capacity. DM was determined by oven drying the plants harvested 70 days after germination. DM was influenced by types x inputs x irrigation interaction. H1 showed the highest mean (60.85 g pot^{-1} and 49.35 g pot^{-1}) under irrigation levels of 25% and 100% and inputs of 60 mg pot^{-1} and 120 mg pot^{-1}, respectively, when compared to H2. H2 showed higher mean DM, 51.74 g pot^{-1} and 74.76 g pot^{-1}, when compared to H1 at 100% irrigation level and at inputs of 240 mg and 60 mg pot^{-1}, respectively. Using cashew gum hydrogel is equivalent to commercial hydrogel for improving DM at 75% and 50% water deficit. Cashew gum is a sustainable alternative for growing maize under water deficit.

Keywords: irrigation, polysaccharides, sustainability, water deficit, *Zea mays*