Soil Incorporation of a Superabsorbent Polymer with or without Organic Matter Improves Drought Tolerance Properties of Rice Varieties (*Oryza sativa* L.)

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Superabsorbent polymer (SAP) application can be used as a sustainable soil amendment method for relieving drought impacts on crops. Combining SAPs and organic matter (compost; COM) may boost soil available water, thereby dehydration tolerance (DT) capacity of rice. Therefore, this study was conducted under microcosmos conditions in two experiments to: (E1) explore the effects of SAPs on DT strategies of Bg 314 (a designated DT rice variety) and Bg 352 (a general cultivar) and (E2) examine the cumulative impact of both SAP (50 kgha-1) and COM (COM: Soil=1.5:2.5) on the drought adaptations of Bg 314. In both experiments, similar drought cycles were imposed (i.e.70-40% field capacity; FC) while control plants were kept above FC. Continuous growth measurements and two sets of morpho-physiological measurements including photosynthetic gas exchange (GE), chlorophyll fluorescence (CF), electrolyte leakage (EL), relative water content (RWC) and, chlorophyll content (Chl), were taken between maximum tillering and panicle initiation (M1) and, between grain filling and maturity (M2). Yield, thousand-grain weight (TGW), plant dry weight (PDW), water-use efficiency (WUE), soil moisture content (SMC), and root dry weight at two depths (RDWt; 0-40 cm, RDWd; 40-75 cm) were recorded at harvest. In both experiments, the SAP effect was significant (p<0.05). However, the SAP effect was not significant for CF, Chl, PDW, growth, and yield or TGW in both experiments (p>0.05). The current results demonstrate that SAP stimulates rice DT and combining SAP with organic matter improves DT, WUE, and GE in rice under drought conditions.

Keywords: Dehydration tolerance, Drought, Organic matter, Superabsorbent polymer, Water use efficiency