

Efficacy of KNO₃, SiO₂ and SA priming for improving emergence, seedling growth and antioxidant enzymes of rice (*Oryza sativa*), under drought

ABSTRACT

Rice is an important staple crop produced and consumed worldwide. However, poor seed emergence is one of the main impediments to obtaining higher yield of rice especially in hot and dry ecosystems of the world that are ravaged by drought. Therefore, this study was carried out to evaluate the effects of potassium nitrate (KNO₃), salicylic acid (SA) and silicon dioxide (SiO₂) priming in improving emergence, seedling growth, biochemical attributes and antioxidant activities of FARO44 rice under drought conditions. Rice seedlings primed with 2.5% and 5% KNO₃, 3% and 3.5% SiO₂, and 1 mM and 2.5 mM SA were subjected to three drought levels of low, moderate and severe under the greenhouse. Seed emergence, seedling growth, biochemical attributes and antioxidant activities were thereafter evaluated. Seed priming experiments were laid in a completely randomized design with five replicates per treatment. The results found that rice seedlings responded differently to different priming treatments. However, all primed rice seedlings had significantly ($P \leq 0.05$) improved emergence percentage (72–92%), seedling growth, seedling vigor, seedling fresh and dry biomass and shorter emergence time compared with controls. Likewise, total soluble protein content, activities of catalase, ascorbate peroxidase and superoxide dismutase, carbohydrate, soluble sugar and total chlorophyll contents of rice seedlings were increased by more than two-folds by seed priming compared with control. Salicylic acid showed less effect in increasing emergence, seedling growth, antioxidant activities and biochemical attributes of rice. Thus, this study established that seed priming with KNO₃ (2.5% and 5%) and SiO₂ (3% and 3.5%) were more effective in improving emergence, seedling growth, biochemical attributes and antioxidant activities of FARO44. Thus, priming of FARO44 rice with this chemical is recommended for fast emergence, seedling growth and drought resistance in dry ecosystems.