

The morphology, physiology and biochemical changes in *Oryza sativa* planted under cyclic water stress with different potassium input

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Four levels of potassium rates (Control, 80 kg K₂O/ha, 120 kg K₂O/ha and 160 kg K₂O/ha) and two types of potassium (KCl and K₂SO₄) were exposed to rice to investigate the influence of potassium fertilization in minimizing the impact of cyclic water stress in rice production. It was observed that panicle dry weight/hill, root dry weight, rice yield, Catalase activity, proline, malondialdehyde and harvest index were influenced by potassium rates. The leaf numbers, total tillers and 1000-grain weight, was influenced by potassium types. Interaction effects (potassium rate x potassium type) was observed in shoot dry weight, leaf area, total spikelet/ panicle, net assimilation rate, transpiration rate and instantaneous water use efficiency. It was found as fertilization rates increased from 80<120<160 kg K₂O/ha, the production of proline was increased. The increases of proline production was simultaneously enhanced the production of Catalase and malondialdehyde (MDA). Proline have a significant positive relationship with Catalase ($r^2 = 0.891$; $p \leq 0.05$) and malondialdehyde ($r^2 = 0.912$; $p \leq 0.05$). As the potassium rate increased from 80>120>160 kg K₂O /ha the transpiration rate was observed to be increased in both MOP and K₂SO₄. The result suggested that high potassium rates would reduce water stress effects by having high transpiration rate. The study has showed that application of potassium fertilizer would minimize the effects on rice growth and physiology under cyclic water stress condition.

Keywords: Cyclic water stress, potassium, physiology, biochemical changes