

## Potassium deficiency in Rice Production

### Importance

- Potassium (K) is utilized in movement of water and nutrients (carbohydrates and proteins) during photosynthesis
- Potassium deficiency in rice production is caused by use of high rates of nitrogen and phosphorus fertilizers with low potassium fertilization
- Under direct seeding, the deficiency is common during early stages of growth, when plant population is high and the root system is shallow
- Potassium deficiency is caused by crop removal with no replenishment by fertilization or crop residue incorporation

### Prevalence

- Coarse-textured soils with low cation exchange capacity and small potassium reserves existing in Homabay, Migori, Embu, Siaya, Busia, Kilifi and Kwale counties in Kenya
- Lowland clay soils with high K-fixation (Vertisols) prevalent in Mwea, Ahero, Bura irrigation schemes
- Lowlands with high cation imbalance (high Ca and Mg in relation to K) as in Mwea Irrigation Scheme in Kenya

### Deficiency Symptoms

- Dark green plants with yellowish brown margins and tips
- Stunted plants with small leaves, short and thin stems.
- Dark brown necrotic (dead) spots appearing at leaf tips on older leaves.
- Patchy damage patterns appear in zones of severe deficiency on the farm
- Increased lodging incidences



Fig 1. Yellowish brown leaf margins (Dobermann and Fairhurst, (2000)

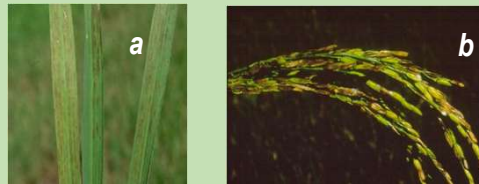


Fig 2. K-deficiency on leaves (a), K- deficiency in rice panicle (b), (Haifa-group.com/rice-fertilizer)



Fig 3. Deficiency symptoms in a rice field (Haifa-group.com/rice-fertilizer)

### Effects of excessive application

- Similar to excess P, application of excess K fertilizers may result in lowering of grain iron (Fe) content in rice (Binay *et al.*, 2012)

### Management Strategies

- Analyze soils (at least in every three years) and plant tissue (whenever symptoms are noticed) to establish required K application rates
- Apply potassium based fertilizers based on soil test reports
- Increase potassium uptake by deep tillage
- Apply farm yard manure to balance potassium taken up by the crop
- Incorporate rice straw on the farm. In case of burning, spread evenly the straw on the farm then burn
- Judiciously apply N and P fertilizers and correct any micronutrient deficiencies

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