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Potassium: Principal Constraint to Maize Production in *Imperata*-infested Fields at Central Sulawesi, Indonesia

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Abstract

On tropical soils that are generally acidic and of low fertility, the low-input annual crop cultivation tends to collapse because of *Imperata* weed infestation. Once infested with Imperata, the farmers may only have one or two harvests (e.g. maize) before the weeds completely cover the land. Formerly cultivated fields are fallowed and eventually abandoned when cultivation no longer provides economic returns.

A study was conducted in 2003 / 2004 in a rainforest margin in Central Sulawesi prone to *Imperata* infestation to identify the underlying factor constraining maize production. Maize was planted in fields with different levels of *Imperata* infestation. Before maize cropping, *Imperata* was controlled by shallow or deep hoeing or herbicide application. Maize was grown with and without fertiliser application (NPKS).

Fertiliser application significantly enhanced maize growth in all fields as well as improved the maize grain yield production for 2 cropping periods, particularly in highly-*Imperata* infested field (4.0 t ha^{-1} against 0.1 t ha^{-1}) but also in medium-infested field (8.8 t ha^{-1} against 3.0 t ha^{-1}), and low-infested field (6.3 t ha^{-1} against 2.4 t ha^{-1}). Without any fertility inputs, maize grain production in highly-*Imperata* infested field was severely impeded, but with fertiliser application gave the highest stover yield (10.9 t ha^{-1}).

A detailed analysis of maize nutrient accumulation revealed that K was the key constraining nutrient. In the high-infested field, K levels in the stover tissue were very low, the primary cause for the poor grain development in the highly- *Imperata* infested field. The stover source strength of K was apparently unable to meet the sink demand for grain production. Although many reports state that farmers abandon the field when they can no longer cope with the *Imperata* as the cropping period proceeds, it could be that poor grain production that is discouraging farmers in cultivating such fields. Fertilising the fields early in the infestation process might be a suitable measure to counter *Imperata*.

Keywords: Fertiliser application, Imperata, maize, Nutrient constraints, Potassium, Soil fertility, Tropical soils, Upland agriculture, Weed control

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