

Influence Of Liming On The Yield, Nutrients Availability And Uptake Of Nutrients By Rice Varieties In A Soil Prone To Iron Toxicity

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ABSTRACT

A field experiment was conducted in the soil prone to iron toxicity during kharif (June-Sep.) with 12 rice varieties viz, TPS 1, ASD 16, ASD 18, ADT 36, ADT42, IR 50, IR 64, JJ 92, MGR 1, TKM 9, CO 37 and CO 41 to evaluate their performance in terms of nutrients uptake and yield for the application of lime (9.6 t/ha). The study revealed that, for the normal recommended doses of N, P and K, the performance of ASD 16 was good. Except IR 50 and ADT 36, the remaining varieties recorded more than 5 t/ha. The rice varieties showed a tune of 15.4 to 41.6 percent increase in grain yield when lime too was applied. It was also observed that the total uptake of major nutrients was inherently high in ASD 16, TPS 1 and CO 41 (less susceptible). However liming significantly increased the uptake of different macronutrients by all these varieties besides increased nutrients availability by mitigating Fe toxicity.

Key words: Rice varieties, Fe toxicity, liming, yield, nutrients availability and uptake.

INTRODUCTION

The toxicity of Fe occurs mainly in poorly drained inland valleys often with lateral seepage/or upwelling Fe containing water, acid sulphate soils, saline – acid soils, peat soils and other hydromorphic soil (Ottow *et al.*, 1983). It is multinutritional deficient syndrome associated with the reduction in the yield of crops. In rice the symptoms of Fe toxicity will occur in about 50-55 days after transplanting Singh and Singh, (1998). It is characterized by a reddish brown mottling (bronzing) or in some cultivars, orange or yellowing symptoms spreading downwards from the tip of the older leaves followed by drying of leaves. Roots are scanty, coarse and often dark brown due to coating of ferric oxide Ponnamperuma *et al.*, (1981); Jegsujinda and Partick, (1993). There are varietal differences in the tolerance of rice to Fe toxicity. Therefore study the soil was carried out in situations of normal fertilization and also with liming.

MATERIALS AND METHODS

A field experiment with twelve rice varieties viz., TPS 1, ASD 16, ASD 18, ADT 36, ADT 42, IR 50, IR 64, JJ 92, MGR 1, TKM 9, CO 37 and CO 41 was conducted in Fe toxic Aquic Hapludalf of the high rainfall zone of Tamil Nadu during kharif season. The soil characteristics are as follows: sand clay loam in texture, having pH 4.7, organic C 1.23% exchangeable H 1.92 cmol (p+)/kg, exchangeable Al 0.28 cmol (p+) kg, exchangeable Fe

224 mg/kg., reducible Fe 304 mg/kg., H₂O soluble Fe 55.1 mg/kg., active Fe₂O₃ 0.40% DTPA-Fe 311 mg/kg, available KmnO₄-N 228 kg/ha, available Bray's – P 10.3 kg/ha, available NHOAc – K 170 Kg/ha and cation exchange capacity of 15.2 cmol (p+)/kg. The experiment was carried out in a randomized block design with three replications. The treatments included the normal recommended doses of N, P and K application (125:50:50 kg/ha) alone and also with lime required to bring pH to 7.0 (9.6 t/ha). lime (60 mesh sieve) was applied basally by broadcast and mixed with soil upto 15 cm depth in the respective plots one month before planting. Nitrogen was applied in four equal splits as urea by broadcast at basal, tillering (17th day after transplanting), active tillering (34th day) and panicle initiation (51th day) stages. Phosphorus was applied basally as mussoorie rock phosphate. Potash was applied in three equal splits as muriate of potash, half basally and quarter at tillering and remaining at panicle initiation stage. At harvest they grain and straw yield were recorded. The post harvest soil samples collected were analysed for the different constituents using standard procedures. Based on the content of nutrients and dry matter yield of grain and straw, the uptake of nutrients was computed.

RESULTS AND DISCUSSION

Yield :

Among the rice varieties ASD 16 performed well by

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