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Soil-based screening method for iron toxicity tolerance in rice

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Abstract

This experiment was conducted to find out the suitability of soil-based screening method for iron toxicity tolerance in rice varieties. According to the Fe content of soils, more than 300 ppm Fe content of soils is considered as hot spot soils and below than this level considered as normal soils. Two set of pots were filled with normal soil (Fe=208 ppm) and hot spot soils (Fe=848 ppm) which were taken from two locations of the research field at RRRDC, Bombuwela. These two types of soils were externally treated with different concentrations of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ to induce Fe^{+2} levels in soil. Seven rice varieties which are known and unknown to iron toxicity tolerance (Bw 267/3, Bw 364 and Bw 372 as tolerant, Bw 272-6b as susceptible and Bg 366, Bg 359 and Ld 408 as unknown) were screened. For each rice variety, five Fe stress levels (0 mg Fe^{+2} /Kg of soil, 100 mg Fe^{+2} /Kg of soil, 300 mg Fe^{+2} /Kg of soil, 500 mg Fe^{+2} /Kg of soil and 1000 mg Fe^{+2} /Kg of soil) were induced by using $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ after four weeks of planting. Leaf bronzing scale (LBS) was recorded according to the scale of Standard Evaluation System for Rice (IRRI, 2002) at six weeks after planting. Mean values of leaf bronzing scale (LBS) was subjected to the Chi Square Test. Results showed that LBS was not significantly different among the two soil types, but significantly different among the induced Fe^{+2} levels in the soil and among the rice varieties used. Rice variety Bw 272-6b and Bg 359 showed LBS higher than 5 in 500 mg Fe^{+2} /Kg of soil induced treatment. However, 1000 mg Fe^{+2} /Kg of soil treatment showed that LBS above 7 in both tolerant and susceptible rice varieties screened and that level is not suitable for screening. Paddy soils treats upto 500 mg Fe^{+2} /Kg of soil by using $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ can be used to screen the tolerance level of rice varieties successfully. Results showed that Bw 267-3, Bw 364, Bw 372, Bg 366 and Ld 408 tolerant to iron toxicity and Bw 272-6b and Bg 359 susceptible to iron toxicity.

Key words: Hot spot soil, Iron toxicity, Leaf bronzing scale, Susceptible, Tolerance,

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