Seed germination and seedling performance of rice grown in municipal wastewater

ABSTRACT

The use of municipal wastewater for watering purposes is an essential way to utilize it nutrients. Laboratory experiment was conducted in a complete randomized design using sand medium with municipal wastewater and MR219 rice seed with the aim to assess the suitability of municipal wastewater (treated and untreated) at different concentrations (0, 2.5, 5, 10, 25, 50 and 100%) on seed germination and seedling performance. Significant ($p<0.05$) difference was observed between untreated and treated municipal wastewater for seedling length (SL), root volume (RV), seedling vigour index (SVI) and root:shoot ratio (R:S) while no different was observed between untreated and treated municipal wastewater for germination percentage (GP) and seedling phytotoxicity. The municipal wastewaters had stimulatory effect on the rice seeds at lower wastewater concentrations (<25%) while inhibitory effect was observed at higher wastewater concentrations (>50%). The concentrations of N, P, K, Ca, Mg, Zn, Fe, Cu and Mn were high in untreated municipal wastewater compare to treated municipal wastewater. Seeds imbibed with untreated municipal wastewater have high seed germination and seedling performance compare to treated municipal wastewater. Inhibitory effect on chlorophyll content was observed at >50% concentration of both untreated and treated municipal wastewater while promoting effects were observed at lower (<25%) concentration. Positive and significant correlation was indicated between parameters of rice seed germination and seedlings performance. Municipal wastewater of <50% concentration could be recommended as a good source of water and nutrients for rice seed germination without affecting seedling performance.

Keyword: Municipal wastewater; Seed germination; Seedling performance; Oryza sativa; Nutrient uptake; Chlorophyll content