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Plant Growth Promoting or Inhibiting Effect of Mycorrhizal Fungi Applied with Sugarcane Ashes to Cuban Soils

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Abstract

In Cuba, sugar cane ash is produced in enormous quantities as a residue of the sugar industry. A lack of research prevents the adequate use of cane ash as soil fertiliser. In order to determine the effect of the application of sugar cane ash alone or accompanied with mycorrhizal fungi a field study and a pot experiment were carried out with two different soils (Cambisol and Ferralsol) and maize as indicator plant. The soil PK concentrations (extraction with H_2SO_4 0.1 N) were suboptimal. The sugar cane ash had a nutrient concentration of 0.45 % P and 2.11 % K. The mycorrhizal fungi (*Rhizoglomus irregulare* and *Glomus cubense* strains) were applied as commercial product EcoMic®. In the Cambisol the best result was obtained with an ash application of 10 t ha^{-1} followed by the chemical NPK fertilisation. The application of the mycorrhiza product together with 10 t ha^{-1} ash did not have any positive effect on the plant growth and in tendency even reduced biomass yields were measured. This can be explained by the high nutrient supply with the ash, which might have counterbalanced possible benefits of the mycorrhiza product while the symbioses with the fungi cost the plants carbohydrates. In the pot experiment with the Ferralsol, however, a remarkable yield effect of the mycorrhizal product was obtained when combined with a moderate quantity of ash corresponding to 5 t ha^{-1}. The maize biomass in this treatment was almost similar to that in the treatment with 10 t ha^{-1}ash alone and significantly higher than the biomass after application of 5 t ash per ha alone. The results showed a clear fertiliser effect of sugar cane ashes in both soils while the effect of the mycorrhizal product was divers, depending on soil characteristics and amount of ash supply.

Keywords: Biomass ash, fertiliser, mycorrhiza, sustainable agriculture

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