

THE EFFECT OF DIFFERENT RATES OF INDUSTRIAL WASTE (BIOFUEL ASH) ON CULTIVATED MAIZE IN ACIDIC SOIL

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In recent years, the rapid increase in fertilizer prices has raised growing concerns in the agricultural sector [1]. As economic pressure intensifies, it becomes essential to seek alternative, environmentally friendly, and sustainable solutions that can reduce the reliance on conventional fertilizers. One promising approach is the use of ash, as it contains a range of nutrients (Ca, K, P, S) required for plant growth [2]. Ash with low pollution levels should be used in agriculture and in the restoration of degraded land, rather than disposed of in landfills where its valuable properties would be lost [3].

The objective of this study was to evaluate the effect of different biofuel ash rates on the macroelement and microelement composition of soil and on the chemical and morphological properties of maize shoots and roots. The experiment was conducted in climate chambers. There were five variants: 0%, 1.25%, 2.5%, 5%, and 10% ash in the soil. All variants were fertilized with ammonium nitrate at a rate of 170 kg ha⁻¹. Samples were taken after 22 and 42 days. Root and shoot lengths were measured. During the experiment, physicochemical analyses were conducted on fertilization products, soil, and plants. Biofuel ash contains essential nutrients, notably high levels of Ca, K, P, and Mg. Increasing the application rate of biofuel ash significantly raises the levels of Ca, K, and P in both soil and plants, while changes in Mg and other elements remain minimal. Importantly, no heavy metals (such as As, Cd, Cr, Ni, and Pb) were detected in either the soil or the plants. The study determined optimal usage rates of 1.25% to 2.5%. Mentioned rates enhance nutrient availability and improve plant nutrition. However, applying biofuel ash at the highest rate of 10% is detrimental due to the excessively high pH.

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