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Effect of integrated fertilizer use on the yield, energetics and economics of sugarcane production under acid Typic Hapludand

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Sound management of soil nutrients is necessary in improving the productivity and efficiency of sugarcane monoculture under acid uplands. Fertilizer is an inevitable input which when properly calibrated can provide essential nutrients to meet crop demands. Inorganic, organic and biofertilizers have advantages and limitations, thus it is imperative to frame out strategy for a judicious combination of these nutrient sources. The purpose of this study is to optimize the use of inorganic fertilizer, sugar mill wastes and microbial inoculant in sugarcane production under acid soil. Field experiment using Phil 2004-1011 sugarcane was established in Typic Hapludand. Twelve treatments were employed including no fertilization, with full fertilization using inorganic fertilizer, and with full fertilization + lime. The recommended N rate (RRN) was reduced to 75, 50 and 25% with subsequent application of mudpress to satisfy the full N recommendation. Bagasse ash and microbial inoculant were likewise used to supplement the nutrient sources. Reducing the recommended N rate with subsequent application of mudpress, bagasse ash and microbial inoculant produced the highest cane yield. Reducing RRN up to 50% with application of mudpress at 12.7 t ha⁻¹, with or without bagasse ash and microbial improved sugar yield comparable to lime application. The use of 25% RRN from inorganic fertilizer + 75% RRN from mudpress + bagasse ash + microbial inoculant had the highest energy efficiency and cane yield per joule. Application of 50% RRN from inorganic fertilizer + 50% RRN from mudpress + bagasse ash + microbial inoculant generated the most sugar per energy unit. Better return on investment and benefit cost ratio was obtained from the application of 50% RRN from inorganic fertilizer: 50% RRN from mudpress. In conclusion, the combined use of inorganic, organic and biofertilizers can improve cane and sugar yield and enhance energy efficiency. Integrated use of inorganic and organic fertilizers can increase economic efficiency.

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