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## Production of *Chlorella*-based liquid fertilizer from dairy wastewater to reduce synthetic fertilizer use

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### Abstract

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The purpose of this investigation was to assess the efficiency of using dairy wastewater-grown *Chlorella* sp. (C) as a liquid organic fertilizer (LOF) when used in combination with inorganic or organic fertilizer on finger millet (*Eleusine coracana* L.). The nitrogen (N), phosphorus (P) and potassium (K) content of the CLOF was  $1.00 \pm 0.04$ ,  $0.58 \pm 0.04$  and  $0.67 \pm 0.005$  percentage respectively. A greenhouse pot experiment was arranged with nine treatments and four replicates in CRD design. The treatments included T1 - control, T2- 100% inorganic fertilizer (IF), T3 - 75% IF + 25% CLOF, T4 - 50% IF + 50% CLOF, T5 - 25% IF + 75% CLOF, T6 - 100% Vermicompost (VC), T7 - 75% VC + 50% CLOF, T8 - 50% VC + 50% CLOF and T9 - 25% VC + 75% CLOF. T4 (50% IF + 50% CLOF) showed the highest values across most agronomic parameters, including: plant height ( $95.23 \pm 2.21$  cm), number of leaves ( $18 \pm 1$ ), leaf length ( $76.33 \pm 4.46$  cm), leaf width ( $1.80 \pm 0.10$  cm), flower number ( $13 \pm 1.00$ ), ear number ( $13 \pm 1.00$ ), tiller number ( $10.33 \pm 0.58$ ), finger number ( $52 \pm 5$ ), fresh grain weight ( $11.48 \pm 1.13$  g/plant), and dry grain weight ( $6.89 \pm 1.04$  g/plant) which was comparable to T2. Additionally, T8 and T3 showed comparable values in most growth parameters and yield as that of T2. Nutrient analysis of plant tissues confirmed that the use of CLOF improved the nutrient uptake. Although T2 had the highest N ( $4.62 \pm 0.40$  g/plant), it was not significantly different from that of T4 ( $3.92 \pm 0.30$  g/plant). T4 recorded the highest P ( $0.36 \pm 0.01$  g/plant) and K ( $5.24 \pm 0.19$  g/plant), also with no significant differences from T2, indicating balanced nutrient contribution from CLOF. This study highlights that CLOF, produced from recycled dairy wastewater, is a promising nutrient source that not only enhances crop performance but also reduces reliance on inorganic or bulk organic fertilizers.

**Keywords:** *Chlorella* sp., dairy wastewater, *Eleusine coracana*, liquid fertilizer.

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