ENRICHMENT OF ACTINOBACTERIA PHYLUM IN PALM OIL MILL EFFLUENT DIGESTED (POMED) BASED ON BIOCHEMICAL FERTILIZER

FINAL PROJECT

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ABSTRACT

The increasing global demand for ecologically sound agricultural practices indicates a need for sustainable alternatives to conventional chemical fertilizers. In this study, we develop effective biochemical fertilizers, by enhancing the growth of Actinobacteria in Palm Oil Mill Effluent Digested (POMED) compost. Actinobacteria were isolated on Starch Casein Agar (SCA), enriched in Tryptic Soy Broth (TSB), and characterized by staining. Actinobacteria can efficiently degrade complex organic compounds, increasing soil fertility. The growth of Actinobacteria was considered across 5 different NPK formulations: F0 (0-0-0), F1 (5-5-5), F2 (12-12-17), F3 (15-15-15), and F4 (12-6-22). Counts of Colony Forming Units (CFU), and pH before and after enrichment were measures used to determine how effective the enrichment was, and pH increased from 6.3-7.3 - 7.2-7.9 following the enrichment indicating enhanced microbial metabolic activity. All treatments had positive bacterial growth as CFU measurements increased together. F1 exhibited the most CFU level with 820 × 10^8 CFU/g, while F3 showed the highest growth rate, increasing six times from 7.8 to 47 × 10^8 CFU/g. It can be interpreted that microbial growth is influenced significantly by nutrient availability and balance in the NPK composition. In concluding the study, we confirmed that targeted enrichment enhances Actinobacteria viability in POMED-based fertilizers - a benefit for fertilizer effectiveness as well as eco-friendly agricultural practices and sustainable waste use.

Keywords: Actinobacteria, Biochemical Fertilizer, NPK, POMED, Sustainable Agriculture