

**Growth Characteristics, Enzyme Activity and Production of Secondary Metabolites from  
Selected Novel *Streptomyces* Isolates from Kenyan Soils**

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## ABSTRACT

There is growing interest in evaluating the potential usefulness of enzymes in various industrial processes such as waste management, detergent manufacturing and food processing. This has led to the need in having knowledge of the spatial and temporal variation of the organisms producing the different enzymes and factors affecting enzyme activity. Besides this, multiple drug resistance has recently been on increase especially on antibiotics and chemotherapeutic drugs leading to the need in discovering more drugs to counteract these effects. The high toxicity usually associated with cancer chemotherapy drugs and their undesirable side effects increase the demand for novel antitumor drugs active against untreatable tumors, with fewer side effects and/or with greater therapeutic efficiency. Due to these challenges, scientists have expounded search for solutions to include even the prokaryotes and especially the Actinobacteria which are widely distributed in a variety of natural and man-made environments.

This study was geared towards screening for production of protease, esterase, amylase and lipase enzymes as well as secondary metabolites from selected novel *Streptomyces* species from Kenyan soils that could be of benefit to mankind and the environment. Four *Streptomyces* isolates from Chyulu National Park (Chy 4-10, Chy 15-10, Chy 15-5 and Chy 2-3) and one from Ruma National Park (Ruj 7-1) were studied. Morphological, physiochemical and biochemical characterization of the isolates was carried out. All the isolates produced amylase, lipase, protease and esterase enzymes apart from isolate Chy 4-10 that did not produce esterase enzyme as indicated by the enzymatic index. The isolates also showed a range of antagonistic activity against *Staphylococcus aureus* (NCTC 10788) and *Escherichia coli* (NCTC 10418). The isolates grew well at pH 6, 7, 9 and temperatures of 27.5 °C, 30 °C, and 32.5 °C. They preferentially utilized glucose and xylose and also required sodium chloride (0 g/l – 17.5 g/l) for growth.

Antimicrobial products were also extracted and analyzed using Gas Chromatography - Mass Spectrophotometer (GC-MS). 0.54 g/l, 0.62 g/l, 0.41 g/l, 0.3 g/l and 0.14 g/l were yields of the crude secondary metabolites extracted from the isolates. The crude secondary metabolites had different levels of activity against *Staphylococcus aureus* (NCTC 10788) and *Escherichia coli* (NCTC 10418) test organism. Further characterization of the crude secondary metabolites was carried out to detect the chemical compounds present. Chemical compounds ranging from amides, amines, acids, pyrrolizidines, butenolides, alcohols and hydrocarbons were detected. These results confirmed that the isolates were capable of producing extracellular enzymes and secondary metabolites that would have potential for industrial applications.