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Think in Other Terms



ISOLATION OF CITRIC ACID PRODUCING
ASPERGILLUS NIGER STRAINS FROM SELECTED
ZIMBABWEAN SOURCES

By

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ABSTRACT

Citric acid is one of the major ingredients in food, beverages, pharmaceutical preparations and detergents. Fungal fermentation with *Aspergillus niger* has long been used as one of the best methods for producing citric acid compared to chemical processes. In Zimbabwe *Aspergillus niger* strains have not been isolated and used to produce citric acid. Twenty one (21) isolates of *Aspergillus niger* were obtained from soil, rotting fruits, rotting vegetables and rotten wood logs from four randomly selected places in Zimbabwe. The isolates were grown separately in Sabouraud dextrose agar enriched with D mannitol and Potato dextrose agar with added citric acid with their growth characteristics monitored and it was found out that 61.90% of the isolates maintained their growth patterns in both media after incubation for 24 hours at 25°C. Other parameters like the conidial head diameters, final pH in modified Czapek broth and molasses fermentation media with added supplements and mycelia dry weights were measured and statistical analysis carried out using SPSS package. It was found out that there was a negative linear relationship between citric acid production and final pH with correlation coefficient($r = -0.890$), mycelia dry weight and citric acid concentration with correlation coefficient($r = -0.472$) and between average conidial head diameters and citric acid concentration with correlation coefficient($r = -0.179$). The isolates were screened for citric acid production by carrying out ten day fermentation with final concentration of citric acid assayed using high performance liquid chromatography (HPLC). Three best citric acid producing isolates at screening stage coded An4, An2.7 and An2.9 were used to investigate optimum molasses concentration and the influence of iron and zinc balance on citric acid production. It was found out that almost all the *A. niger* isolates from different sources have the ability to produce citric acid though the levels differ to varying degrees. Though the isolates produced citric acid to differing degrees there was statistical evidence using a t test at 5% level of significance that the isolates were not significantly different in their ability to produce citric acid. The optimum molasses concentration was found to be close to 195 g/L according to the design of the experiment. Iron concentration was found to have greater influence on citric acid production compared to zinc. Isolate An2.7 produced the highest citric acid concentration of 65.83 g/L at an iron concentration of 3.7178×10^{-3} g/L and zinc concentration of 2.73×10^{-4} g/L compared to isolates An4 and An2.9 which had maximum citric acid concentrations of 42.64 g/L and 45.10 g/L at the same concentrations of iron and zinc as isolate An2.7.