Production and Crystallization of Citric acid from Sour Orange (*Citrus aurantium*) Juice using *Aspergillus niger*

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ABSTRACT

Citric acid ($C_6H_8O_7$) is a weak organic tricarboxylic acid found naturally in citrus fruits. It is a natural preservative and is also used to add a tart (sour) taste to foods and soft drinks. Citric acid can be extracted from the citrus fruit juices by the fermentation of glucose with aid of *Aspergillus niger*. This study aimed to produce citric acid from the locally available underutilized sour orange juice (*Citrus aurantium)* using *A. niger* and to determine the percentage of citric acid crystals recovered from this juice. Initially sour orange juice (100 mL)was inoculated with spores from four days old slant cultures of *A. niger* with the inoculum concentration of 1.2×10^6 CFU per mL in the fermentation media composed of 2.0 g/L $CaCO_3$, 4.0 g/L KH_2PO_4, 10.0 g/L NH_4NO_3 and 1.0 g/L $MgSO_4\cdot7H_2O$. The media was incubated under aerated conditions at room temperature (30 ± 2 ^oC) for 4 days with agitation (100 rpm). A maximum of 25.92 g/L citric acid was developed under the tested conditions. The citric acid was recovered in the crystal form using calcium hydroxide and sulphuric acid. A maximum of 19.80 g/L citric acid crystals were recovered, which is 76.38% from the total availability. This study highlights the possibility for the production of citric acid from the sour orange juice. Pilot scale studies needed to be conducted for the commercial production.

Keywords: *Aspergillus niger*, citric acid, fermentation, sour orange juice