

ABSTRACT

Vina Davita, 24020221140082. Citric Acid Production by *Aspergillus niger* Mutants Resulting from UV Mutagenesis with a Combination of Sucrose and Glycerol as Carbon Source. Under the guidance of Endang Kusdiyantini and Ahmad Wibisana.

Citric acid is a high commercial value organic acid produced through fermentation using *Aspergillus niger*. Its production can be increased through strain breeding and the use of alternative carbon sources. This study aims to determine the effect of the duration of UV mutagen exposure on *A. niger* and to determine the effect of the combination of sucrose and glycerol as carbon sources on citric acid cellular productivity. The study was conducted in two stages using a Completely Randomized Design (CRD), namely mutant selection based on the duration of UV exposure with data analysis using the Kruskal-Wallis test and optimization of carbon source combinations with ten combinations of sucrose and glycerol treatments, with data analysis using One-Way ANOVA and Tukey HSD. Mutagenesis was carried out by exposure to UV 254 nm for 5, 10, 15, and 20 minutes on isolate AN1, followed by selection based on the halo zone and fermentative test of mutant selection. Kruskal-Wallis test did not show significant differences between mutant and wild-type *A. niger* groups ($H = 1.309$; $df = 4$; $p = 0.860$), but AN1.UV15' was selected as a superior candidate based on the highest mean rank (7.00). AN1.UV15' was then tested on a medium with a combination of sucrose (100 g/L and 50 g/L) with glycerol (50 g/L; 70 g/L; 80 g/L; 90 g/L). The results of the One-Way ANOVA test showed significant differences between carbon source treatments ($p < 0.001$). Tukey HSD further test obtained that the treatment of 100 g/L sucrose without glycerol produced the highest citric acid cellular productivity and was not significantly different from the addition of 50 g/L and 70 g/L glycerol, while the treatment of 50 g/L sucrose produced lower productivity even though the addition of glycerol was able to increase citric acid production compared to the treatment without glycerol. This pattern indicates that the role of glycerol is influenced by the availability of sucrose as the main carbon source. This study concluded that the AN1.UV15' mutant with a carbon source of 100 g/L sucrose without glycerol is the optimal condition to produce the highest citric acid cellular productivity.

Keywords: Aspergillus niger; sucrose; glycerol; UV mutagenesis; carbon source; citric acid productivity