



Research article

## Improvement of thermophilic $\alpha$ -amylase productivity through UV mutagenesis and *AmyE* gene amplification and sequencing

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### Abstract

Induction of mutation with UV was used to improve  $\alpha$ -amylase enzyme production by *Bacillus licheniformis* MK90, an Egyptian isolate. One hundred eighty mutants were isolated after UV treatment for 3, 5, 7 and 10 min. Three mutants (UV-5-M3, UV-3-M17, and UV-5-M121) were higher  $\alpha$ -amylase producers than parental strain and mutant UV-5-M121 was the highest producer one with 150.8% of WT productivity. Parental  $\alpha$ -amylase has molecular weight equal 64 kDa while it was 65 kDa with UV-5-mutant 121 and 61 kDa with UV-5-mutant 3 through SDS-PAGE analysis. SDS-PAGE showed a high variance between the two mutants and WT, mutant UV-M3 showed 15 bands, UV-M121 showed 17 bands, while WT showed 18 bands. The best two producer mutants UV-5-m121 and UV-5-m3 proved its maximum production after 72h of fermentation at temperature 55 and 65°C with pH 7 and 8. Starch at 1.5% was the best concentration for the most mutants to reach their maximum productivity after 72h of fermentation. *AmyE* gene was amplified, and sequenced. It was 1539 bps in the three sequences. Mutant UV-5-m1 21 contains the lowest nucleotide substitution sites; it reached 5 only. While mutant UV-5-m3 contains seven substitutions compared with the parental sequence.