

ABSTRACT

The present study deals with *in situ* biotransformation of synthetic glutamate to γ -aminobutyric acid by an auxotrophic *Lactobacillus lactis* in polysorbate-mediated thermoaerobic process. Physical mutagenesis was induced by using UV-light. Different L-tryptophan conc. (0.005%-0.03%, w/v), different exposure time (5-30 min) and different distance (5-30 cm) on wild-type ISL-7 were investigated. Total of 34 mutant strains were selected and screened for their GABA activity. Out of these, only one mutant strain (UV-L-cys-3) produced 137.70 ± 6.88 mM GABA which was remarkably higher than wild-type ISL-7 (24.36 ± 1.22 mM). Submerged fermentation was carried out using monosodium glutamate (MSG) as a substrate. The wild-type and selected mutant strain were optimized for various parameters. The optimal fermentation medium (glucose 10%, MSG 1.5% and yeast extract 1.25%, w/v) and bioconversion process (pH 7.2, temp 30°C and time 45 min) produced 214.36 ± 10.71 mM GABA by ISL-7. Similarly, optimal fermentation medium (glucose 4%, MSG 1% and yeast extract 1%, w/v) and bioconversion process (pH 7.2, temp 30°C and time 45 min) produced 344.36 ± 10.33 mM GABA by UV-L-cys-3. Further, the effect of some reaction mediator and growth stimulators (L-ascorbic acid, methanol and polysorbate) was examined on GABA activity. The most notable finding was with the addition of methanol and polysorbate, they significantly enhanced GABA activity up to 260.36 ± 13.01 and 450.03 ± 22.50 mM by ISL-7 and UV-L-cys-3, respectively. However, the addition of L-ascorbic acid declined the GABA activity. Moreover, mutant strain UV-L-cys-3 significantly showed 1.73-fold higher GABA activity as compared to wild type ISL-7, which is highly significant (HS, $p \leq 0.05$). It was concluded that mutant strain having higher GABA production, could be an attraction for scale-up studies.