



Abstract

Bacitracin is one of the important antibiotics used in different biomedical fields. When the bacitracin is precipitated with the zinc salt, it is converted into Zinc bacitracin. This form of bacitracin is commonly used in the poultry industry to minimize the disease incidence. This, ultimately, results in the low mortality rate in chickens. Thus, the current study was concerned with the synthesis of low cost and more effective bacitracin utilizing mutant strains of *Bacillus licheniformis* and *Bacillus subtilis* employing the technique of submerged fermentation. The mutant strains were developed from the parent strain of *Bacillus licheniformis* and *Bacillus subtilis* by exposure to the UV irradiation. The bacteria were exposed to the UV irradiation for various time periods ranging from 5-40 mints. These mutants were named as BLAA-5 – BLAA-40 and BSAA-5- BSAA-40. The mutant strain of *Bacillus licheniformis* that was exposed to UV- irradiation for 25 mints produced maximum bacitracin with significantly highest activity (142.81 IU/mg) against *Klebsiella pneumonia* but less activity against *Escherichia coli* (115.19 IU/mg). Zinc bacitracin produced from BSAA-25 also showed significantly highest activity against *Klebsiella pneumonia* (131.26 IU/mg) and *Escherichia coli* (120.25 IU/mg). Several fermentation conditions and culture were investigated to optimize the conditions for maximum Zn-bacitracin production. The fermentation media containing soybean meal substrate was most effective for the production of high activity (142.81 IU/mg) bacitracin. The maximum activity (135.05 IU/mg) of Zn-bacitracin was found at the pH=7 in the case of *Bacillus licheniformis*. While in the case of *Bacillus subtilis*, the maximum activity (135.41 IU/mg) was recorded at pH=8. Both *Bacillus licheniformis* and *Bacillus subtilis* synthesized maximum activity bacitracin i.e 144.6 IU/mg and 131.98 IU/mg respectively at 37°C. When the inoculum size 10% was inoculated in fermentation media for 48 h, Zn-bacitracin showed significantly maximum activity 160.15 IU/mg and 154.01 IU/mg produced by *Bacillus licheniformis* and *Bacillus subtilis* respectively. The fermentation period of 48 h was suitable for the production of significantly higher activity Zn-bacitracin i.e., 160.1 IU/mg and 154 IU/mg from *Bacillus licheniformis* and *Bacillus subtilis* respectively. Among all substrate,



Comparison between commercial and experimentally produced Zn-bacitracin showed that commercial bacitracin has low activity (63.2 IU/mg) as compared to experimental bacitracin. So, the optimum condition for bacitracin production is fermentation media containing soybean meal, 37°C, pH=7, inoculum 10 % and the fermentation period of 48 h. Hence, the synthesis of Zn- bacitracin increased by mutation and utilizing different substrate.