
ABSTRACT

The present study was designed to investigate the bacterial production of vanillin exploring local natural sources like sewage and soil from industrial areas. The main objective was to screen the local bacterial strains for vanillin production and using these bacteria to enhance vanillin production in modified conditions. A total of 412 bacterial strains were isolated from 47 soil and 13 sewage samples collected from different industrial regions of the Punjab (Lahore, Faisalabad, Gujranwala and Kasur). After primary screening 279 bacterial strains showed vanillin production and 133 strains were non producers. Quantitative analysis of vanillin production was measured as absorbance by standard curve at 434nm using spectrophotometer. Total fifteen bacterial strains produced significant ($p < 0.001$) amount of vanillin ranging from 1-10g/L and identified by ribotyping as *Pseudomonas fluorescens* A3, *Enterococcus faecium* A4, *Alcaligene faecalis* A7, *Bacillus subtilis* A10, *Enterococcus lactis* B1, *Bacillus cereus* B8, *Pseudomonas aeruginosa* B20, *Bacillus pumilus* D3, *Escherachia coli* D7, *Enterobacter hormaechei* E9, *Bacillus cereus* M2, *Weissella paramesenteroides* N3, *Pseudomonas aeruginosa* N9, *Aerococcus viridans* H8 and *Escherachia coli* S7. Among these fifteen strains five bacterial strains *Enterococcus faecium* A4, *Alcaligene faecalis* A7, *Enterobacter hormaechei* E9, *Aerococcus viridans* H8 and *Weissella paramesenteroides* N3 were novel producing moderate amount of vanillin ranging from 4.9-8.8g/L. The selected strains were further explored for enhanced production of vanillin and were grown in different fermentation media under optimized growth conditions. Different fermentation media were based upon clove oil, rice bran waste, wheat bran and modified isoeugenol (FM5, FM21, FM22, FM23, FM24, FM30, FM31, FM32, FM34, FM35, FM36, FM37). Isoeugenol based modified medium FM36 (cost 131.5 rupees/L) containing 1% isoeugenol and 2.5g/L soya bean meal produced highest amount of vanillin ranging from

17.3g/L-18.5g/L by two selected bacterial strains A10 *Bacillus subtilis* (KT962919) and B20 *P. aeruginosa* (KT962920) respectively. Rice bran based medium FM32 (cost 49.7 rupees/L) containing 60g rice bran waste produced minimum 4.3g/L vanillin by S7 *E. coli* (KT962918). In conclusion current study indicated a significant amount of vanillin production in different modified fermentation media which are low cost, easily available and natural. A commercial production of vanillin using native bacterial isolates needs to be further explored in Pakistan. Bioconversion of vanillin using natural sources will be environment/consumer friendly along with cost effective and easily available. Pakistan a developing country spending quite a large amount 780 million rupees for the import of chemically synthesized vanillin (150,000 Kg) every year. There is a dire need to explore local sources for the bio production of vanillin.