Enhanced Peroxidase Production by Raoultella Species

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Abstract : Given the high-utility of peroxidase, its production in large amount is of utmost importance. Over the years, actinomycetes have been the major peroxidase-producing bacteria. Consequently, other classes of bacteria with peroxidase production potentials are underexplored. This study, therefore, sought to enhance peroxidase production by a Raoultella species, a new ligninolytic proteobacteria strain, by determining the optimum culture conditions (initial pH, incubation temperature and agitation speed) for peroxidase production under submerged fermentation using the classical process of one variable at a time and supplementing the fermentation medium with some lignin model and inorganic nitrogen compounds. Subsequently, the time-course assay was carried out under optimized conditions. Then, some agricultural residues were valorized for peroxidase production under solid state fermentation. Peroxidase production was optimal at initial pH 5, incubation temperature of 35 °C and agitation speed of 150 rpm with guaiacol and ammonium chloride as the best inducer and nitrogen supplement respectively. Peroxidase production by the Raoultella species was optimal at 72 h with specific productivity of 16.48 ± 0.89 U mg^{-1}. A simultaneous production of a non-peroxide dependent extracellular enzyme which suggests probable laccase production was observed with specific productivity of 13.63 ± 0.45 U mg^{-1} while sawdust gave the best peroxidase yield under solid state fermentation. In conclusion, peroxidase production by the Raoultella species was increased by 3.40-fold.

Keywords : enzyme production, ligninolytic bacteria, peroxidase, proteobacteria
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