

## ABSTRACT

The present study deals with production and characterization of  $\beta$ -carotene from *Fusarium oxysporum* using surface culture fermentation. The nutraceutical benefits of Soya bean, rice polish, wheat bran, and potato peel powder in combination with nitrogenous sources were examined using a variety of yeast extract concentrations, medium conditions and *Fusarium oxysporum* under surface culture fermentation technique. A cost-effective media source for the growth of  $\beta$ -carotene was chosen after testing an optimal aqueous medium with 10g/7ml of each powder. The media was then adjusted to get the greatest growth. Various salts like NaCl, ammonium phosphate, ammonium nitrate, urea, peptone, and yeast extract are nitrogenous sources. At various pH and temperature levels,  $MgSO_4$ ,  $ZnSO_4$ , and  $FeSO_4$  were administered. The greatest growth of *Fusarium oxysporum* and beta-carotene was seen in 10g of potato peel with 0.4 g yeast extract, 0.6 g  $MgSO_4$  salt, at 25 °C temperature and pH of 5.6. The amount of  $\beta$ -carotene was calculated by correlating the standard curve from the standard solutions obtained using the spectrophotometry technique with the curve from the solutions taken from the fungal strain's cell mass. By using TLC, best comparison was noted with mobile phase C ( Ethyl acetate: Menthol: Water(80:15:5)), and Rf values of standard, supernatant and mycelia extract were 0.853, 0.433 and 0.260. It was established that the media made with potato peel powder contain the highest levels of  $\beta$ -carotene and can be administered for optimization using a variety of tools for subsequent use. According to the research, among other agricultural raw materials, potato peel could be used as a valuable addition to  $\beta$ -carotene production for the nutraceutical, culinary, and cosmetic industry.