



## ABSTRACT

The thermostable pectin methylesterase (TS-PME) was extracted and partially characterized from non-irradiated and  $\gamma$ -irradiated lemon peels through different methods and optimization of conditions. The extraction of the enzyme from non-irradiated lemon peels showed maximum activity, when the extraction was carried out with 1 M Tris-base containing 0.8 M NaCl followed by 5 min magnetic stirring and 5 min of incubation temperature. After optimizing the conditions, the enzyme was extracted from  $\gamma$ -irradiated lemon peels, irradiated at different doses (50-300 krad). The enzyme extracted from 150 krad irradiated lemon peels showed more activity as compared to other doses. The maximum enzyme activity of  $62.31 \pm 3.74$  U/ml ( $\gamma$ -irradiated peels) and  $41.20 \pm 2.47$  U/ml (non-irradiated peels) was observed at pH 10, 50°C incubation temperature, 2.5 mM CaCl<sub>2</sub> and -4°C storage temperature i.e., 1.51 fold higher than the non-irradiated peels. The enzyme was partially purified with 30-60 % ammonium sulfate followed by dialysis, resulted in 3 fold purification in case of  $\gamma$ -irradiated while 1.67 fold purification for non-irradiated peels. The molecular weight of the enzyme was found to be 35 kDa. Texture analysis was also carried out that showed almost a slight difference in the texture of non-irradiated and  $\gamma$ -irradiation peels before and after enzyme extraction. Furthermore, the enzyme preparation was used for the clarification of fresh apple juice. The % T<sub>650nm</sub> indicated a correlation between the enzyme from non-irradiated and  $\gamma$ -irradiated peels for the clarification of the fresh apple juice. The results in terms of maximum TS-PME activity with thermophilic behavior are highly significant (HS,  $p \leq 0.05$ ) indicating a viable bioprocessing strategy. It was further concluded that the extraction of the enzyme from  $\gamma$ -irradiated not only exhibited more activity but maximum juice clarification as well, and thus bears the potential to be used in food industry.