

Abstract

This paper describes the use of horseradish peroxidase (HRP) based biosensor for novel detection of glyphosate herbicide. The biosensor was prepared by electrochemically depositing poly(2,5-dimethoxyaniline) (PDMA) doped with poly(4-styrenesulfonic acid) (PSS) onto the surface of a gold electrode followed by electrostatic attachment of the enzyme HRP onto the PDMA-PSS composite film. Fourier transform infrared (FTIR) and UV–Vis spectrometry inferred that HRP was not denatured during its immobilization on PDMA-PSS composite film. The biosensing principle was based on the determination of the cathodic responses of the immobilized HRP to H_2O_2 , before and after incubation in glyphosate standard solutions. Glyphosate inhibited the activity of HRP causing a decrease in its response to H_2O_2 . The determination of glyphosate was achieved in the range of 0.25–14.0 $\mu\text{g L}^{-1}$ with a detection limit of 1.70 $\mu\text{g L}^{-1}$. The apparent Michaelis–Menten constant (calculated for the HRP/PDMA-PSS biosensor in the presence and absence of glyphosate) was found to be 7.73 μM and 7.95 μM respectively.