Application Of An Enzymatic Methodology For Pesticide Determination in Agricultural Soils

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Environmental studies have stimulated the development of quick and inexpensive analytical methods, while still maintaining result credibility. Enzymatic indicators have become an alternative for the broad range analysis of substances in substitution of traditional analytical methods (chromatographic methods coupled with spectrometric procedures). Analytical procedures have been developed for determining pesticides in water and vegetable samples, using free acetylcholinesterase (AChE) enzyme in solution. This study aimed to optimize the methodology of pesticide determination in agricultural soils by using the activity of free acetylcholinesterase. The determinations of pesticide levels were conducted by incubation with a semi-purified AChE extract, obtained from Winstar mice brains, according to Lima (1996). An aliquot of the raw extract was incubated with a suspension of AChE in phosphate buffer (pH=7.4). After this procedure, the kinetic behavior of the enzyme activity was determined in a microplate reader, and analyte quantification was conducted by interpolation of its activity in an inhibition curve. The optimization results of this method showed an 89% mean recovery of Methomyl. This routine was later applied to samples of agricultural soils, that indicate levels of 0.1 mg Kg^{-1} to 0.35 mg Kg^{-1} of total anticholinergic compounds, expressed in Methomyl equivalents. The elimination of a clean up step resulted in a quicker analysis, with less analyte losses. The kinetic determination in microplates demonstrated that this is a quicker procedure, attaining a sensibility corresponding to analyte levels in environmental matrices.

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