APPLICATION OF RAPID BIOASSAY OF PESTICIDE RESIDUES ON FRUITS AND VEGETABLES AS A COMPLEMENT TO CONVENTIONAL CHEMICAL ANALYSIS TECHNIQUES

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Abstract

In the last three years (2005-2007), the amount of insecticides used in different crops represented a quarter of the total weight of pesticides imported, mainly organophosphates and carbamates, inhibitors of acetylcholinesterase (AChE). Since 2006, The Laboratory of Pesticides Residues in Vegetables and Fruits from Ministry of Agriculture (MIDA) has implemented two new methods in order to establish National Monitoring of Pesticides Residues in Vegetables and Fruits, being the first method as a complement to the second method. [1] Rapid bioassay based on acetylcholinesterase inhibition AChE for detection of organophosphates and carbamates. The samples with values above 45 % of inhibition of cholinesterase are considered high risk to health of consumers. [2] By QuEChERS multiresidues methods are analyzed the samples showing more than 45 % inhibition of the AChE. The quantification was done by gas chromatography coupled with NPD detector for the organophosphates and by HPLC with post column derivatisation for the carbamates.

During the years 2007-2008, we analyzed 2229 samples of different plants, 709 in the first year and 1520 in the second year. Results of samples analyzed 11 and 42 samples, respectively, shown results above 45% inhibition. The total percentage incidence of plants positive for the presence of residues was very low and did not exceed 3%, however, is no less dangerous to public health and the environment. Most plant contaminated is caused by organophosphate pesticides. In both years, the celery crop is the most contaminated in our country with 11.4%, followed by cucumber (5.7%), pepper (5.1%), table tomatoes (3.2%) and apple export with 11.1%. During 2008, 17 samples considered as contaminated, according to the technique of rapid bioassays were analyzed and quantified by QuEChERS method, in 16 of them confirmed the presence of residues. Pesticides were detected mainly: Chlorpyrifos and Ethoprophos. This shows 94% correspondence between bioassay technique and conventional chemical analysis. Is the first time, Panama has a tool that properly used and ensure a higher quality of fruits and vegetables to consumption.

We conclude that the detection of organophosphate and carbamate residues in vegetables by rapid bioassay technique is high, supported by 94% of cases by QuEChERS method. Most food contamination is caused by organophosphates.

[1] E.Y. Cheng and C.H. Kao, Rapid Bioassay for Pesticide Residues (RBPR) on Fruits and Vegetables, **1995**.[2] P.Aysal, A. Ambrus, S. J.Lehotay and A. Cannavan, , J. Environm.Science and Health Part B, **2007** *42, 481-490.*