DOI Number: 10.37506/v14/i1/2020/ijfmt/192932

Removing Methods of Ultracide Residues in Imported Apple Peels in Iraqi Local Markets

Sedik A.K. Al-Hiyaly[1]; Saba Riad Khudhaier [2]; Jazzer, A, J. Al-Temmemi[3] and Ahmed S.A. Al-Tae[1]

[1]Environmental Research Center, University of Technology, Baghdad- IRAQ, [2]Department of Biology, College of Science, Mustansiriya University, Baghdad, Iraq, [3]Al-Karkh University of Science, Baghdad- IRAQ

Abstract

The resides of ultracide insecticide used in controlling apple insets may have public health problems. This work was designed to find much effective method that capable of removing as much as possible of such residues from imported apple peels available in local markets. Imported apple samples were collected during winter 2018 from different local markets and divided into four subsamples as physical treatments where the first was left unwashed apple, the second was washed by tap water, the third was washed with saline solution and finally apple sample washed by tap water with acetic acid. Apple peels of all examined samples were left to dry in an oven at 85° C for 24 h and then powdered. 2.5 g from each sample was received 12.5 ml distil water to estimate the insecticide residues by using gas chromatography. It has been found that unwashed apple peels had the highest ultracide insecticide level followed by that which washed by tap water while the peels washed by saline water was obviously free from the insecticide residues.

Key words: *Ultracide residues, apple peels, tap water, saline water, acidic water.*

Introduction

Crop plants may severely suffer from many diseases that are induced by different kinds of organisms such as viruses, fungous, herbs, insects, rodents and other organisms. Such crop diseases would cause significant reduction and economic losses. From early ages, farmers have tried to prevent such diseases and improve crop growth by using other biological species that can control plant pathogens [1-3].

In modern agriculture, biocides in general and pesticides in particular are very efficient materials to control crop diseases and enhancing agricultural production and therefore it is used worldwide. However, such insecticides particularly those contain phosphorous and intensively used with vegetables and fruits are concerned the most toxic material that may cause severe health problems to infants and teenagers [4-6].

The randomly use of various insecticides by farmers without scientific and official surveillance in terms of trade name, type and recommended doses suggested by producing companies may lead to real public health troubles since most of these insecticides are very toxic for both the health and the environment [7,8] where such disaster related to the fungicide was occurred in Iraq during seventeenth of last century with wheat grains treated with organ mercury [9].

Organophosphorus compounds are very toxic (LD50-25) especially ultracidine pesticide which affects cholinesterase due to increasing exposure and causes reducing of the enzyme level in the blood resulting in syndromes of muscarinic, nicotinic and central nervous system damage [10,11].

The application of such compounds as agricultural insecticides being very effective in protecting various edible plant crops from different insect species [12,13] where such edible plants have large surface area capable of taking significant quantities of these insecticides [14] such as peach, apple, cherry, ground berries, grape, spinach, potato, lattice and other vegetables.

Most of these oregano phosphorene insecticides such as parathion, malathion, dipterex and ultracide may form significant public health and environmental threats where several studies have reported the inhibition of choline enzyme at higher doses [15,16].

However, handling and removing such pesticide residues was received much attention being very

significant public phenomena [17-21] which needs to be investigated thoroughly and to find a proper removing method that should be accessible particularly at every home.

This work was designed to find accusable way to remove the residues of ultracide insecticide from imported apple where apple samples were collected from local markets and subjected to lab tests.

Material and Method

Imported apple samples were collected from local markets during winter 2018 and these samples were divided into four subsamples and subjected residues removing test where the first sample was left unwashed while the second was washed thoroughly by only tap water. The third sample was washed by diluted saline water at concentration of 1% for one minute and the forth sample was by acidic water which was tap water mixed with acetic acid at concentration of 1%. However, each treatment was replicated three times.

All apple samples after being treated as explained above were peeled and the peels placed in electric oven at 85 C° for few minutes then moved out and left to cool under room temperature. Dried peel apple samples were grinded by electric grinder and 2.5 g from each peel powder was placed in 250 volumetric flasks and received 12.5 ml distil water (1:5) and shacked for 30 min. Ultracidine pesticide residues was isolated by using chromatography/Mass Spectrometry-GC/MS following the method of previous study [22].

Results and Discussion

All obtained results were presented for unwashed, tap water, saline water and acetic acid water washed respectively of examined apple samples (Figures of analysis not shown).

It has been found that the residues of ultracidine insecticide in apple peels of unwashed sample had highest sharp peak by the value of 87.376 among other treatments. Also, there is another peak with a value of 62.621 due to reactions of unknown materials.

The residues of organophosphorin compounds in apple peels may be accumulated in human body up to lethal dose causing severe damage of various tissues and organs and also affect cell divisions [18].

In case of apple sampled washed by tap water, it was found the ultracidine insecticide residues were less than those left unwashed and had two peaks where the first peak was highest sharp peak was 12.23 while the second peak was 86.77

Again, the residues of such phosphoric compounds may be accumulated up to the lethal dose having severe effects as explained previously. the ultracidine insecticide residues in apple peel after being washed by saline water.

Apparently, there was no insecticide residues in the apple samples washed by saline water but there was a small peak due to unknown material reaction. However, it seems that saline water has totally destroyed all toxic phosphorene compounds.

Finally, the ultracidine insecticide residues were again totally removed from apple sample washed by acidic water (acetic acid and tap water)

The obtained results suggest that the better effective methods of removing any quantity of residues of the ultracidine insecticide are washing such apples by using either saline water or acidic water that are available at all homes.

Several previous works examining similar pesticide residues removing methods were carried out worldwide. Previous work [23] has used dissolved ozone to get rid of four pesticides from vegetable which were methyl-parathion, parathion, diazinon and cypermethrin and found that low level (1.4 mg/l) of dissolved ozone was capable to oxidize up to 90% of all these pesticides except parathion within 5 minutes. Similar method (dissolved ozone) was followed by a work [24] carried on by using low concentration of dissolved ozone to remove four residues of four pesticide species and recorded a removing rate up to 99% within 30 minutes but it has reported that such removing rate was affected by temperature, concentration of applied ozone gas and preparing dissolved ozone concentration. In another study [25], five species of solutions were applied to remove blended organophosphorus pesticide residues from chines cabbage such as glycyrrhiza-mung bean, garlic juice, sods-salt, tap water and washed rice water and reported that soda-salt solution was the best removing solution while washed rice water showed very poor effects. Another study [26] has examined the impacts of using four washing methods (tap and ozone waters, ultrasonic cleaning and boiling) on 16 pesticide residues

from raw strawberries and found that within less than 5 minutes, boiling technique had the highest removing rate followed by ultrasonic cleaning and ozonized water while tap water had the lowest removing rate which were 92.9 %, 91.2%, 75.1% and 68.1% respectively.

Apparently, it seems that several solutions can be used to remove pesticide residues from fresh fruits and vegetables where some of them such as ozonated, saline and acidic waters are capable of removing rate up to 90%. Nevertheless, such ability may be affected by certain variable such temperature, solution concentration and pesticide residues quantity as suggested by previous study [24]. So, the current results are supported by those of other works mentioned above but it necessary to examine other variables particularly temperature that may have significant effect on these methods used in this study.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

Conflict of Interest: The authors declare that they have no conflict of interest.

Funding: Self-funding

References

1. Moriarty, F. Ecotoxicology. The study of pollutants in Ecosystems, 2nd ed. Academic press. 1988, London-UK.
2. William , P.C.; Mary, A.C. and Barbara, W.S. Environmental Science. A global Concern. 9th ed. McGraw Hill-Higher Education. 2007, New York. U.S.A.
3. Wendell, W.K. and Ming-vu, Li. Environmental Toxicology. Insecticide Biochemistry and Physiology, 1976: 669-713.
4. Ozkara, A.; Akyil, D. and Konuk, M. Pesticide, Environmental Pollution, and Health. In: Environmental Health Risk- Hazardous Factors to Living Species. 2016, DOI:10.5772/63094
5. Environmental Protection Agency. Integrated Risk Information System (IRIS). Summary on Methidathion (950-37-8) http://www.epa.gov/iris/. 2000, Peer Reviewed.
6. WHO; Environ Health Criteria 63: Oreganophosphorus pesticides Available from, as of July 3,2003: http://www.inchem.org/pages/ehc.html.
7. Aktar, M. W.; Sengupta, D. and Chowdhury, A. Impact of pesticides use in agriculture: their benefits and hazards. Interdiscip Toxicol, 2009, 2(1): 1-12.
8. Al-Shayaa, M. S. and AL-Sarar, A.S. To what extent farmers in kharj province are aware about safety aspects during applying pesticides in Agriculture. J. Agric. Sci. Mansoura Uni., 2007, 32(7):5783-5793.
9. Skerfying, S. B. and. Copplestone, J.F. Poisoning caused by the consumption of oregano-mercury dressed seed in Iraq. Bull World Health Organ. 1976, 54(1); 101-112.
10. Dong-Zong, H.; Hao-Jan, Y.; Yu-Fen, L.; Cheng-Li, L.; Shih-Yu, C.; Fung-Chang, S. and Sally C. W. T. The Long-Term Effects of Organophosphates Poisoning as a Risk Factor of CVDs: A Nationwide Population-Based Cohort Study. PLoS ONE. 2015, 10(9), doi:10.1371.
11. Rahimzadeh, M. R and. Moghadamia, A.A. Organophosphorus compounds poisoning. Journal of Babol. University of Medical Science. 2010, 12(1):71-85.
12. Rajhi D.H.A.S. EL Bakary and AL- Sarar, A.S. Toxicological and some biological effects of chronic exposure to sublethal doses of three insecticides on mail albino mice. 2nd int. conf. of pest control, 1999, Mansoura.
13. Wisman, E.L., Young, R.W. A residue and stability study of the insecticide Supracide in the laying hen. Poultry Science, 2000, 49(1):83-85.
14. Wilson, P. C. Survey of carbamate and Oreganophosphorus pesticide export from a South Florida(U.S.A) agricultural watershed: Implications of sampling frequency on ecological risk estimation. 2009, 25(11: 2847-2852.
15. Ruzicka, J.H.; Thomson, J. and Wheals, B.B. The gas chromatographic determination of organo-phosphorus pesticides Part 11. A comparative study of hydrolysis rates, Cornwall House, Stamford Street. London, S.E.1 Great Britain. 2010.
16. Dewan, R.S.; Mishra S.S.; Handa, S.K. and Beri, T.Y. Persistence of DDT, Γ- BHC and Carbaryl Residues on Bhindi, Abelmoschus Esculentus fruits. Indian J Ent. 1967, 29:225–230.
17. Cabras, A.; Garau, V.L.; Melis Pirisi, F.M.; Cabitza, F. and Pala, M. Pesticide residues in raisin processing. J Agric Food Chem. 1998, 46:2309–

2311.

18. Chavarri, M.J.; Herrera, A.and Arino, A. The decrease in pesticides in fruit and vegetables during commercial processing. Int J Food Sci Technol. 2005; 40:205–211.

19. Duhan A, Kumari B, Gulati R.. Effect of household processing on fenazaquin residues in okra fruits. Bull Env Cont Toxic. 2010, 84:217–220.

20. Baiwa, U and Sandhu, K. Effect of handling and processing residues in food- a review. Food Sci Technol J. 2014, 51(2): 201-220.

21. Lacassi, E. Sensitive and specific multiresidue methods for the determination of pesticides of various classes in clinical and forensic toxicology, Forensic Science International, 2001, 121(1): 126-133.

22. Kalcheva, V.P.; Dragoeva, A.P.; Kalchy, K. and Enchev, D. (2009). Cytotoxic and genotoxic effects of Br-containing oxaphosphole on Allium cepa L. root tip cells and mouse bone marrow cells. Genetics and Molecular Biology, 32(2): 389-393.

23. Wu, J.G.; Luan, T.G.; Lan, C.Y.; Lo, W.H. T.; Yuk, G. and Chan, G.Y.S. 2007. Removal of residual pesticides on vegetable using ozonated water. Food Control J, 2001,18(%), pp: 466-472.

24. Wu, J.G.; Luan, T.G.; Lan, C.Y.; Lo, W.H. and Chan, G.Y.S. Efficacy evolution of low-concentration of ozonzted water I removal residual of diazinon, parathion, methyl-parathion and cypermethrin on vegetables. Food Eng. J, 2007,79(3): 803-809.

25. Zhang, Y.; Li, X.; Lu, H.; Zang. Y.; Zhao, F.; Yu, Q.; Li, H. and Chean, J. Study on universal cleaning solution in removing blended pesticide residues in Chinese cabbage. Environmental Chemistry and Ecotoxicology J, 2013, 5(8):202-207.

26. Lozowicka, B.; Jankowska, M; Hrynko, I. and Kaczynski, P. Removal of 16 pesticide residues from strawberries by washing tap and ozone water, ultrasonic cleaning and boiling. Environmental Monitoring and Assessment J., 2016,188(51) doi: 10.1007/s10661-015-4850-6.