



Pre-harvest Interval and Pesticide Contamination in Different Vegetables collected from Local Market of Vavuniya, Sri Lanka

Sharaniya S.* and Loganathan P.

Department of Bio-Science, Faculty of Applied Science Vavuniya Campus, University of Jaffna, Sri Lanka
sarani300@gmail.com

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Abstract

Pesticides are designed to kill the pest and also it's harmful to human. Synthetic pesticides not only pollute the environment but also persist in vegetables and passed through the food chain. The objective of this study was to identify the pesticide residues by smell and appearance in different vegetables in Vavuniya local market, Sri Lanka. Ninety vegetable samples were randomly taken from Vavuniya local market and pesticide residue was analyzed by smell and their appearance. The collected data were analyzed using the descriptive statistics in SPSS (Statistical Package for Social Sciences). All farmers are depended on pesticides to control the pest. Eighty-five percentage of the sample vegetables contain high amount of pesticide residue which was identified by smell and appearance. Around 60% of the farmers harvested their products within one week from the pesticide application and 36% of the farmers harvested after one week and around 4% of them harvested after two weeks from pesticide spraying. This survey is recommended to carry out awareness programs about indiscriminate use of pesticides and residual effects to farmers and consumers by government and other relevant institutions.

Keywords: Appearance, Farmers, Pesticide contamination, Smell, Vegetables.

Introduction

The synthetic pesticides are playing an important role in present day farming because pesticides are helped to improve the crop yield and reduce crop losses and also indiscriminate use of pesticides has caused health impacts to human and their environment. Synthetic pesticides not only pollute the environment such as water, air and soil but also persist in the vegetables and passed through the food chain and finally affect the human being. Particularly Sri Lanka is a developing country; in here agriculture is income generating sector. Vavuniya district is one of the agricultural districts, farmers are heavily depended on synthetic pesticide to control the crop losses and improve yields. The over dosage of pesticide usage and harvesting the vegetables before complete the pre-harvest interval also contribute to exposure of pesticide¹ and high residue levels in vegetables, fruits and environment. The pesticide residues are harmful to human health (acute or chronic) and their environment. In this study area, farmers did not follow the correct pre-harvest interval to harvest vegetables and they had not clear knowledge about residual effect of pesticides. Therefore, this study was designed to identify the pesticide contamination in different vegetables by smell and appearance.

Materials and Methods

Description of Study area: The research was carried out in Vavuniya district. The Vavuniya District is in the Northern part of Sri Lanka and categorized under the dry zone of Sri Lanka. The climatological conditions are suitable for cultivation such as

the mean temperature is 28°C area and annual rainfall is 1400mm. The study area targeted mainly for vegetable growing farmers and around 30,912 farm families are engaged in agricultural activities in Vavuniya district.

Data Collection and Analysis: 120 vegetable farmers were randomly selected and primary data was collected through questionnaire survey. Ninety vegetable samples (Table-1) were randomly taken and pesticide residues were identified by smell and appearance. The collected data was analyzed using the Statistical software SPSS, version 16.

Table-1
Selected vegetables to identify the pesticide contamination

Common Name	Scientific Name	No. of sample
Egg plant	<i>Solanum melongena</i>	10
Pumpkin	<i>Cucurbita maxima</i>	10
Cabbage	<i>Brassica oleracea</i>	10
Cauliflower	<i>Brassica oleracea</i>	10
Bitter gourd	<i>Momordica charantia</i>	10
Okra	<i>Abelmoschus esculantus</i>	10
Bean	<i>Phaseolus vulgaris</i>	08
Lettuce	<i>Lactuca sativa</i>	12
Chilli	<i>Capsicum annum</i>	10

Results and Discussion

Population dynamics of Study area: The majority of the farmers were males (96%) and remaining were females. The respondents of the study population were 21 to 75 years of age and around 38% of younger farmers have been involving in vegetable cultivation. According to the survey, around 69% of the farmers had knowledge in medium level of education (Grade 6 to Advanced level).

Table-2
Pre harvest interval (PHI) of vegetables harvested in Vavuniya district

PHI	% of respondent
Same day	2.0
Following day	3.0
After 3-5 days	55.0
After a week	36.0
After two weeks	4.0

According to the EPA (Environmental Protection Agency) has recommended that, farmers should allow 1-3 weeks period to reduce the residual effects of pesticides before harvesting the crop and it's depending on the type of pesticides (Admire for Pumpkin 21 days and Diazinon for Cabbage 21 days). The research finding revealed that, 2% of farmers harvested the product same day of the pesticide application, 3% of them following day and 55% of the farmers who had harvest the products after 3-4 days interval. Altogether around 60% of the farmers who had harvested the product within seven days from the application of pesticides (Table-2). But 36% of the farmers harvested after one week and around 4% of them harvested after two weeks. According to the result, farmers didn't consider about residual effect of pesticides and their health impacts and they considered only their income. Because they did not have clear knowledge about pesticide residual effect. Past research findings also indicated in Sri Lanka, 8% of farmers applied pesticides prior to marketing² and exposure of pesticides occurs mainly through eating food and drinking water contaminated with pesticides³. It has serious environmental impacts to the aquatic organisms and wildlife and health impacts to humans⁴.

Pesticide residue identification from local market vegetables: Ninety vegetables (Table-1) were randomly taken from Vavuniya local market and pesticide residue was analyzed by smell and their appearance.

According to the survey, 10% of samples contained very high pesticide residue and 75% of samples contained residue at high level while 15% of samples contained less or no residue because there was no any smell. Therefore according to the residual level, very high amount of pesticide residue vegetables could have been harvested following day of pesticide application and

high amount of pesticide residue vegetables could have been harvested within 3 to 5 days interval from pesticide application. But only 15% vegetables may be harvested after one week or two week. In this study area, around 60% of farmers harvested their products within one week from pesticide application. This result indicates that farmers did not consider about residual effect of pesticides and their health impacts and they considered only their profits. Because they did not have clear knowledge about pesticide residual effect and pre harvest interval.

Table-3
Identification of pesticide residue in vegetables

Amount of pesticide residue	%
Very high	10%
High	75%
Less or no	15%

Pesticide residues in vegetables were observed by their appearance. Based on the finding revealed that, pesticide free products showed that irregular shape, small size, more pest attract, no or less attractive outside and less attractive to eyes (Figure-1(b)). Pesticide applied products showed that regular shape or cylindrical shape, big size, less pest attack or no pest attract, attractive outside and more attractive to eyes (Figure-1(a)). So, according to the appearance and smell, consumers can buy pesticide free product. Consumer awareness is the only way to get rid of these problems. Therefore to minimize the hazards of pesticide residues, discard the outer leaves of leafy vegetables such as lettuce and cabbage. Very good looking vegetables (attractive outside) may not be good for health because those were contaminated with pesticide residue. While purchasing fruits and vegetables, consumers should not select those that are homogenously ripened and with bright colours. Pesticide residue can be minimized by soaking of vegetables in water for 1-2 hours and thoroughly wash before preparation of foods to remove residual pesticide and also avoid to purchase pesticide contaminated vegetables and fruits by observing appearance and smell of fruits and vegetables.

Research finding revealed that, 85% of vegetables (Table-3) contained with high amount of pesticide residue those were identified by smell and appearance. Also these vegetables could have been harvested within one week from pesticide application. Therefore, residual effect of pesticides may cause chronic diseases such as cancer, kidney disease and liver failure in this study area.

Comparison of artificial ripening tomato and naturally ripening tomato: There are many different methods to identify artificial ripening tomatoes and naturally ripening tomatoes. The naturally ripened tomatoes appeared that more reddish colour and around pedicel showed green colour while artificial ripened tomatoes appeared that more orange and little red colour and around the pedicel has seldom⁶.



Figure-1(a)
Pesticide contaminated brinjals (*Solanum melongena*)



Figure-2(b)
Pesticide free brinjals (*Solanum melongena*)



Figure-2(a)
Artificial ripened tomato



Figure-2(b)
Naturally ripened tomato

According to the Figure-2(a), artificial ripened tomatoes appeared more orange and little red colour, around the pedicel has dull greenish and it has little juice; those appearances were concluded that the tomato was not fresh that was ripened by artificial. Figure-2(b) showed that, naturally ripened tomatoes appeared that little orange and more reddish colour, around the pedicel green color, inside the fruit fully ripened and contained more juice. Based on the survey, the tomatoes colour and around the pedicel color could be used for identification of artificial ripening tomatoes and natural ripened tomatoes. If it had attractive outside may not be good for health.

Conclusion

The research survey investigated about pre harvest interval among vegetables farmers and pesticide contamination in different vegetables those were collected from local market in Vavuniya district. 85% of vegetables contained high amount of residual pesticide those were identified by smell and appearance. Around 60% of the farmers harvested their product within seven days from pesticide application. Artificial ripening tomatoes and natural mature tomatoes could be identified by the tomatoes outside, color and around the pedicel colour. The health impacts could be reduced if vegetables are soaked in water and washed well before cooking to remove pesticide residues. Pesticide residues can be observed by their smell and appearance. Therefore consumers are able to purchase pesticide free vegetables and fruits by observing appearance and smell.

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