DETERMINATION OF DIZANION PESTICIDE RESIDUE IN TOMATO AND CUCUMBER INTRODUCED IN KERMANSHAH MARKET BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (2015)

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Abstract

Dizanion considered as a chemical pesticide due to its wide range of effectiveness by many agricultural producer. But in the case of non-compliance with the retention period, the existence of pesticide residue in products greatly endangered the consumer’s health. For conducting this study, 45 cucumber and 45 tomato sample took from the grocery market of Kermanshah. The samples transferred to the laboratory by using the ultrasound assisted solvent extraction combined with dispersive liquid-liquid microextraction followed by high performance liquid chromatography (HPLC) and evaluated for the dizanion pesticide residue. The frequency of the cucumber samples with dizanion level of more than MRL in three sampling region of A, B and D were 2(22.2%), 1(11.1%) and 2(22.2%) respectively, while in other region it was less than MRL. Also the frequency of tomato samples with dizanion level of more than MRL in three sampling region of E and D were 1(11.1%) and 3(33.3%) respectively. While in other places it was less than the acceptable limit. According to the main hazard of toxin on humans health and due to the fact that the dizanion level in some samples were more than the limit, it is essential that supervisions take necessary measures for monitoring the pesticide residue level (such as dizanion) before entering the agricultural product into the market.

Keywords: Pesticide- Dizanion- cucumber-tomato- Kermanshah
Introduction

Healthy food and healthy agricultural products on public health, certainly is very effective (1, 2). Pesticides not only remains on the products surface but also penetrate the fruits, vegetables and even grains tissue. Although washing the fruits or peeling them could be effective in reducing the primary pesticide contamination but removing the toxic effect of them from the internal tissue of fruits is almost impossible. Most of the agricultural crops which have been exposed to the pesticide after spraying, enter the market after a short time and contain some level of pesticide residue (3- 5). Excessive use of pesticide in agricultural products cause the pesticide residue and this considered as a serious danger for human health and environmental contamination. Therefore the consumers directly consumed the foods which have high level of pesticide.

The World Health Organization (WHO) present a Maximum Residue Limit (MRL) for the pesticide residue as a criterion. This criterion expressed as a toxin concentration based on the mg/kg in fresh vegetable and fruits weight and the products which their toxin concentration are higher than this level would be unusable (5, 6). Iran is among the countries which have the high consume of toxins per capita.

The published statistics about consumption of various toxin in Iran (2006) showed that from total consumption of toxins 25000 ton, 44%, 37%, 18% and 2% of them were related to herbicide, insecticide, fungicide and acaricide respectively. In line with this, almost from the 8000 consumed compound in the world, 211 chemical composition with different formulation and application were registered by the supervisory board (5). Based on the above context, evaluating the pesticide residue in agricultural product which enter the market have a great importance and the aim of this study is to evaluate the pesticide residues in some food staffs which marketed, in order to take some measure in some cases and improve the current situation by agricultural part and other related organization if the pesticide residue is higher than the standard (5, 8). Dizanion have sold by commercial name of Aflatox, Bazodin, AG500, Dazel, Gardenotox, Knoksot.

Its pure chemical material (100% dizanion) is an odorless oily substance. Its composition which have been used in agriculture, include 85% to 90% of dizanion which is dark brown substance. Based on the available information about the toxin consumption, from 1987 to 1997 the total annually domestic consumption of dizanion was over 13 million pound and the main part of this toxin consumption (9) was in domestic uses (39%), pasture (19%), pesticide (11%) and agricultural uses (31%). Based on the recent researches, the jat and vegetables with thin skins have the higher risk of
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contamination for accumulation of pesticide residues. Therefore the aim of this study is to evaluate the dizanion residue level in two types of consumed jats (cucumber and tomato) which enter the Kermanshah market in 2014.

**Material and Methods**

For conducting this study, first 5 fruit market of 5 region in Kermanshah were selected ( Dolat-Abad- Azadi square-Farhangian- Vakil-Agha ansMaskan markets). The selection of the mentioned region almost covered all the city. From each region three shops were selected and from each three shops one cucumber and one tomato were sampling. Therefore, a total of 30 separate samples were taken and according to the three time repeating tests for detecting the evaluated toxins, a total of 90 samples were tested (45 cucumber and 45 tomatoes). After preparing all the necessary tools, the samples transformed to the laboratory under a special circumstance. In the laboratory by using ultrasound assisted solvent extraction combined with dispersive liquid-liquid microextraction followed by high performance liquid chromatography (HPLC) (2014), the pesticide residue level of dizanion in samples were evaluated (10-13). In the results part of the study, for the observance of ethic, the sampling region were named by letters A to E.

**Results**

According to the results, the recovery rate of Dizanion pesticide in cucumber and tomato were 75-85% respectively which based on the international acceptable norm it was between 70-120% and showed that the used method is valid in this range. The detection and quantitation limit of method based on the performed recovery were 0.03 and 0.03 mg/kg respectively. The frequency of cucumber samples with dizanion level of more than the MRL in three sampling region of A, B and D were 2(22.2%), 1(11.1%) and 2(22.2%) respectively. While in other region it was less than the MRL. Also the frequency of tomatoes with dizanion level of more than MRL in three sampling region of E and D were 1(11.1%) and 3(33.3%) respectively. While in other regions it was less than the acceptable limit (Figure1). The average Level of dizanion toxin in tomatoes and cucumber based on the sampling region have presented in Table 1.

**Table 1. Level of Dizanion in tow products (Tomato and Cucumber).**

<table>
<thead>
<tr>
<th>Products</th>
<th>MRL (mg/kg)</th>
<th>Number of samples</th>
<th>Sample Location</th>
<th>Sample Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomato (mg/kg)</td>
<td>0.05</td>
<td>45</td>
<td>BDL*</td>
<td>BDL</td>
</tr>
<tr>
<td>Cucumber (mg/kg)</td>
<td>0.05</td>
<td>45</td>
<td>0.12±0.45</td>
<td>0.03±0.15</td>
</tr>
</tbody>
</table>

*Below Detection limit
Figure 1: Frequency of samples with Dizanion level than MRL in two products (Tomato and Cucumber) based in Sample Location.

Discussion

The results revealed that the frequency of cucumber samples with dizanion level of more than MRL in three sampling region of A, B and D were 2(22.2%), 1(11.1%) and 2(22.2%) respectively. While in other region it was less than MRL. Also the frequency of tomatoes samples with dizanion level of more than MRL in three sampling region of E and D were 1(11.1%) and 3(33.3%) respectively. While in other region it was less than the MRL. High dizanion level in some samples particularly tomatoes of D region and cucumber of A and D region is a kind of warning for consumer’s health. The important fact in this regard is that, most of the agricultural product in major part of Iran entered the market without monitoring and evaluating the dangerous pollutant (particularly pesticide residue) and consumers are not aware of them. While most of the food stuffs (non-agricultural) such as dairy, meat, etc. have more monitoring and control for the pollutants level. Therefore it is essential to have proper monitoring and assessing on the agricultural products (particularly consumed vegetables) like other food stuffs. The main reasons of pesticide residue in agricultural products particularly jats and vegetables are: improper use of toxins and improper spraying, using the toxins more than its initial concentration, not spraying at the right time, not observing the interval time between spraying time and harvesting and preparing the pesticide from non-standard organization (14). The results of this study showed that dizanion pesticide residue level in various region of sampling were different and unpredictable. According to the fact that the producing place of the evaluated products are different, it seems that based on the climatic condition of each region and also the type of the farm management which have effect the physiologic and biologic properties of these products, the dizanion residue level in cucumbers and tomatoes is different (14-16). In Rezvani et al. study (2009) it was revealed that the dizanion pesticide residue level except cucumber which produce in Mashhad, the rest of the samples have the pesticide level of more than the acceptable limit. The Cucumber of Dezfool, Rafsanjan, Jiroft, Kerman and Shirvan have the pesticide limit of 6.1, 4.4,
4.2, 2.1 and 1.8 time more than the acceptable limit respectively but in cucumber of Mashhad the dizanion pesticide residue was 14% lower than acceptable limit. In addition to it the results of this study showed that the tomatoes of Shirvan city have the dizanion pesticide residue level of 1.1 time more than the acceptable limit while the tomatoes which produce in Mashhad have the pesticide residue of 14% lower than the acceptable limit (16). In addition to it, many other studies had been done in most part of the world which showed the various pesticide residue in consumed vegetables (14, 15, 17-19).

Conclusion

According to the environmental problems which caused by producing and consuming the industrial pesticides and also the issue of increasing cancers and other human’s dangerous disease which is due to the use of chemical pesticide, the pesticide residue in food staff particularly in developing countries should attract more attention. In these countries the government surveillances and notification for producers and consumers is usually less and food staffs often marketed with high level of pesticide residue. According to the importance of the hazards which are due to the pesticide residues in diets, particularly in vegetables which consumed in raw form and also the observance of consumer’s right, more research should have done in future in relation with various type of chemical toxins and evaluating the duration of Carens period and the effect of fruits and vegetable’s washing on reducing the chemical pesticide residue.

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