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# Pesticide Consumption in Greenhouses; a Case Study of Kashan Region

## ARTICLE INFO

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## ABSTRACT

**Aims** In regard to increasing greenhouse area in Iran followed by increased use of pesticides and contaminated crops, this study aimed to determine the frequency and types of consumed pesticides in Kashan region, Iran, greenhouses.

**Instrument & Methods** In this descriptive study in 2011-2012, samples was entered by census method. At the first step, a list of greenhouses was obtained from agricultural organization, 39 active greenhouses were detected, thereafter the questionnaires have been completed in detail by direct interview; obtained data were analyzed in SPSS 23 by descriptive statistics.

**Findings** 87.1% of greenhouses used chemical methods for controlling pest and diseases of products and 43.5% used non-chemical methods. The most frequent used chemical pesticides were Deltamethrin (37.9%) and Permethrin (28.3%) as pyrethroid insecticides, Diazinon (23.1%) as an organophosphate insecticide and Carbendazim (23.2%) as a fungicides.

**Conclusion** 87.1% of the greenhouses' owners of Kashan region, Iran, use chemical pesticide for pest control.

**Keywords** Pest control; Toxicity; Agriculture; Insecticide; Fungicide

## CITATION LINKS

- [1] Haemato-biochemical and immuno-pathophysiological effects of chronic toxicity with synthetic pyrethroid, organophosphate and chlorinated pesticides in broiler chicks
- [2] Public health impact of pesticides used in agriculture
- [3] A survey on the application and storage conditions of pesticides in Kashan, Iran, 2012
- [4] The review of pesticide hazards with emphasis on insecticide resistance in arthropods of health risk importance
- [5] Environmental Toxicology. Kashan: Takderakht Publication; 2010
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- [8] Insecticide residues in vegetable crops grown in Kothapalli watershed Andra Pradesh, India: A Case Study
- [9] Epidemiology of poisonings in Shahid Beheshti Hospital in Kashan, Iran
- [10] Detrmination of organophosphorus pesticides (diazinon and chlorpyrifos) in water resources in Barzok, Kashan
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- [19] The evaluation of multiple sclerosis dispersal in iran and its association with urbanization, life style and industry
- [20] Acute pesticide poisoning among aggricutral workers in the United State
- [21] The effect of pesticides on farmers' health
- [22] Occupational pesticide intoxications among farmers in Bolivia: A cross-sectional study

## Introduction

Pesticides including organophosphates, chlorinated groups, pyrethroids and carbamats are synthetic or natural compounds which have been used to control or eliminate pests [1]. Based on definition of the U.S. Environmental Agency (EPA) pesticides are substances or mixture of substances which are used to prevent, destroy, repel, or reduce any pests. Another definition of pesticide is: any physical, chemical or biological substance that can destroy a plant or animal pests [2]. These materials can be sprayed on the product in every phase of cultivation. Excessive use of pesticides lead to human poisoning and can affect the environment and other organisms and may also cause pest resistance [3,4]. Due to increase in population and subsequent consumption of goods, farmers have increased their productions; it was followed by increase in pesticide use [5,6].

Annual pesticides consumption in agriculture reaches to 3 billion liters in the world, while this is 27 million liters in Iran, from which, 50% penetrates in soil, water and other resources, as well as the body of living creatures [7, 8]. Pesticide poisoning in developing countries are influenced by lack of monitoring and enforcement systems and also limitations on access to information systems [9]. In most countries, especially developing countries, pesticide poisoning is considered as the second cause of death after infectious diseases [10,11].

The World Health Organization (WHO) estimates that in developing countries, 3 million farmers are suffering of severe pesticides poisoning, of these, 18,000 people die; likewise 21% of the food chain is contaminated by pesticides [8]. Previous researches have shown that pesticides cause miscarriage, congenital malformations, mental retardation, detrimental effects on reproductive organs, interfering hormonal functions, and cardiovascular disorders. It also causes parkinson disease and cancer as well as asthma [3, 12, 13]. It is noteworthy that the toxicity of pesticides in developing countries is 13 times higher than developed countries. 85% of produced pesticides in developed countries are used in developing countries [14]. Between 1996 to 2003, greenhouses' growth was about 200 %

accompanied by more than 3 times increase in their productions. Based on a statistic study in 2003, of approximately 4085 acres in Iran, 1799 acres belonged to greenhouses and 2286 to open space [15].

Due to increasing area of greenhouses in Iran and increase in use of pesticides and risk of contamination of agricultural product, this investigation aimed to determine the frequency and types of pesticides used in greenhouses of Kashan region, Iran.

## Instrument & Methods

In this descriptive study, samples was entered by census method. Initially, a list of greenhouses was received from agricultural organization; among total of 53 greenhouses, 39 centers were active. By visiting the active greenhouses within 4 months from 2011 to 2012, questionnaires were completed.

Validity of the used questionaire was confirmed by engineering agriculture employed in the Kashan's agricultural organization. Study was approved by Kashan's agriculture organization. The questionnaire included information such as the education level of greenhouses' owners, selling location of pesticide, type of product, type of pest, type of plant disease, chemical and non-chemical methods of pests control, pesticide types and dose, timing of pesticide use within plant growth and the time of last pesticide spraying. Data were analyzed by SPSS 23 statistical software and. Descriptive statistics were utilized to analyze the data.

## Findings

%2.6 of greenhouses' owners had PhD, %25.6 bachelor, %10 associate degree, %7.7 diploma, and the rest were under diploma.

19 greenhouses (48.7%) used only the chemical method of pest control, 2 (5.1%) selected non-chemicals, 15 (38.4%) used both and 3 (7.7%) did not use any method. Totally, 34 greenhouses (87.1%) used chemical method for pest control, and 17 (43.6%) used non-chemical method.

The most frequent used chemical pesticides were Deltamethrin (37.9%) and Permethrin (28.3%) as pyrethroid insecticides, Diazinon (23.1%) as an organophosphate insecticide and Carbendazim (23.2%) as a fungicides. Among 34 greenhouses that chose chemical method for pest control, 16 cases used one

kind of pesticide, 16 greenhouses selected two kinds of pesticides, and 2 greenhouses used more than two kinds.

36 greenhouses were pest contaminated. Aphid was found in most of greenhouses (65.6%) and the least pest founded in cases were thrips (30.5%). In 30 out of 39 greenhouses some diseases were seen. 15 greenhouses had one kind of disease, 13 greenhouses two types of the diseases, and 2 greenhouses suffered from three types of diseases.

## Discussion

This study aimed to determine the frequency and types of pesticides used in greenhouses of Kashan, Iran. The results showed that 87.1% of greenhouse owners used chemical methods for pest control in Kashan.

The results showed that deltamethrin and permethrin that are insecticides belong to the pyrethroid group, and diazinon which belongs to the organophosphate group had the most applications. Pyrethroids have less toxicity to mammals. Pyrethroid toxicity in insects is approximately 2250-fold of mammals. Despite the long history of these pesticides and based on previous studies, less than 10 cases of fatal toxicity of pyrethroid pesticides have been reported in the United States [5].

Deltamethrin insecticide belongs to pyrethroid group and has dermal and gastrointestinal absorbance. The main advantage of deltamethrin is high impact on flies and thrips. Permethrin has also dermal and gastrointestinal absorbance; it has the repellent property. Spraying should be done once pests are detected. It is used for many insects such as leafminer pests. Diazinon is an organophosphate insecticide with dermal, gastrointestinal and respiratory absorption which is used for pests such as red-colored aphids or myzus persicae. Organophosphorous insecticides are widely used due to the high efficiency and low prices in comparison with other compounds. The maximum deaths due to pesticides belongs to the organophosphate pesticide [16, 17].

The results showed that most of greenhouse owners did not get their diploma degree. As previous studies declare, due to lack of familiarity with chemical toxins, harmful effects of pesticides and finally principles of

pest control, pesticide consumption is uncontrolled. As a result, it has left harmful effects to the environment, farmers and community health in addition to failure to achieve a desired result of pest control in long-term [18, 19].

Looking for experiences and expertise of agricultural experts can lead to reduce the amount of pesticides consumption in greenhouses followed by contamination reduction and health promotion. Surveillance and monitoring by agricultural experts can certainly help to improve current situation as well. Investigation showed that most greenhouse owners are not aware of the hazards of pesticides. Short-term training programs to the relevant authorities in respect of retention of pesticides in products, would increase their level of knowledge in this field. Organizing the educational sessions and workshops, providing educational pamphlets and brochures could be helpful as well. Monitoring of chemical products distribution is another solution to control excessive consumption of pesticides. The essential matter for prevention of poisoning is running certain rules regarding the use of pesticides in addition to keep force on farmers to obey the laws. Applying comprehensive strategy to reduce the excessive use of pesticides would make the integrated pest management [20-22].

## Conclusion

87.1% of greenhouse owners in Kashan use the chemical pesticides. Deltamethrin and Permethrin were the most frequently used pesticides.

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