

## PESTICIDE TOXIN AND ENVIRONMENT: A CASE STUDY OF VEGETABLE GROWERS OF TEHSIL FAISALABAD

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### ABSTRACT

The aim of this study is to analyze the awareness level of vegetables growers regarding residual effects on environment in peri urban areas of tehsil Faisalabad sadder. Chemical use in agriculture is increasing and residues of chemicals are excreting out into the environment which leads to serious environmental conditions. Environmental pollution is very common problem in developing countries such as Pakistan, India which is rising day by day. A sample size of 128 respondents was selected by using online sampling calculator with 95% confidence level and confidence interval 7. Four vegetable-growing villages from two peri-urban union councils in Tehsil Faisalabad were selected purposively and 32 farmers were selected from each village randomly. A pre-tested and well-structured interview schedule was developed for data collection. The results indicated that more than half (56.3%) of the respondents were using sewage water and were more in numbers as compared to freshwater users. A vast majority (85.2%) of the farmers were using pesticides that indicating the farmers' interest in using pesticides. More than half (57.8%) of the respondents were aware that acid rain affects plants directly and decreases soil quality to reduce yields from agriculture. However, a vast majority (96.1%) of the farmer's perception was the harmful ingredients for health and environment must not be added during formulation. There is dire need to be started of the campaigns through media regarding awareness of pesticides residues in vegetables having harmful effects on human health. Government and society have to play key role in this spectrum through introduction of organic farming. Besides, one must be followed precautionary measures before consuming these harmful vegetables.

**Keywords:** Environmental effect, Farmers awareness, Use of residues, Water pollution, Soil pollution, Sewage water.

### INTRODUCTION

The environment is a complex system that includes all living and non-living elements on Earth, including sunlight. It is a subject of study in the fields of ecology and biological science. The environment plays a crucial role in shaping growth and development. It has an impact on human behaviour, can lead to diseases, and influences the nature of human beings (Micro et al., 2006; Yu et al., 2008). Environmental pollution is becoming a more common problem in all over the world and is defined as the physical and biological components affecting normal environment (Muralikrishna et al., 2017). Pesticides have extensive adverse effects on

environment and living beings, besides all this pollution is also increasing in air, soil, or water (Akhtar et al., 2009). Some pesticides such as dieldrin, heptachlor, aldrin, endrin, chlordane comprise persistent organic contaminants (POCs), have ability to live in the atmosphere for long time (Yadav et al., 2015). It had been predicted that non-target organisms are also being affected by 95% application of pesticides such as imidacloprid, confidor, confidor SL 200, thiodan, cadmium, Actara WG 25, Proclaim 019EC, Steward 150SC, Polo 500SC that have great ability of influence and largely spread into the environment (Simeonov et al., 2013).

Mishandling of pharmaceutical compound is a crucial source of environmental pollution which needs a strong reaction (Giger *et al.*, 2003). The principal passage for antiseptic discharge in the sublunary environment is through the practice of animal manure and biosolids comprising ejected antibiotics to agricultural land as fertilizer (Kemper, 2008).

Environmental situations introduce abnormal growth and lead to loss of production (Dornbos (1995). Chemical reactions between nitrogen oxides, water, sulphur and oxygen generate into the atmosphere. Acid rain also harmful for leafy vegetables and stimulate freckles on soft vegetables such as tomatoes (Markgraf, 2018). In air, contaminants are present in the form of gases, vapours or as aerosols. Airborne particles relate to lung diseases, tumour, asthma, skin allergic or annoyance and fever etc. and these particles enter into human body by breathing process (WHO, 2014). Greenhouse gases such as methane, CO<sub>2</sub>, nitrous oxide all are discharge into atmosphere from farming and bring consequential climate changes. Different USA regions were experimented, and pesticides were found in air of all investigated areas of USA (Savonen, 1997). Outflow of pesticides from applicate plants and soil leads the scattering of pesticides on surface of water (Kole *et al.*; 2001). A study was conducted in hungry and found the utmost pollutants in water at various quantities such as diazinon, atrazine and acetochlor (Szekacs *et al.*, 2015). In Pakistan, due to imidacloprid persistence and mobility, imidacloprid may have a potential to pollute groundwater. Imidacloprid is presently listed as a potential ground water pollutant by the DPR, based on its high solubility in water, mobility and persistence in soil (Baig *et al.*, 2012). Extreme use of insecticides from long history in vegetables growing areas is becoming the reason of ground water contamination which is very important source of water (Ahad *et al.*, 2001; Tahir *et al.*, 2001 and Tariq *et al.*, 2004 a, 2006b and 2010c). In Pakistan chemicals are utilized to trick the fishes (Ahad *et al.*, 2006).

In Pakistan soil and water pollution is also increasing by the action of pesticides, as a result residues get accumulate into the soil for long period, when plants are grown on this contaminated soil, residues are passed into numerous parts of the plants (Ahmad, 2004). Presence of pesticide residues had been observed in groundwater of Multan at 50-180-meter-deep and detected, dichlorvos, fen-valerate,

phosphamide, carbofuran, dimethoate, diazinon, and endosulfane had been detected (Ahad *et al.*, 2001). Pesticide residues were noticed from SCARP places of the Punjab, Pakistan when in 2000 models of earth water were taken (Anonymous, 2002). Pesticides residues were also observed whenever the samples were taken in from the water of Rawal Stream, Islamabad, Pakistan in 2004. "Remains of chemicals such as azinphosmethyl, methyl parathion, alphacypermethrin and fenitrothion had been observed in various concentrations" (Ahad *et al.*, 2006). The influences of chemicals combinations may last for decades, not only badly interrupting soil fertility, side by side soil quality is also decreasing and affecting the population of beneficial soil microorganisms (Jacobsen and Hjelmsø, 2014). Because of runoff and leaching soil is the major source of transportation of pesticides to air, water and food. Pesticides are shifted from soil to plants and animal then eventually to the human beings (Burauel and Bassmann, 2005). According to Hough *et al.*, (2004) land is only contaminated when it has a potential to induce undesirable health vulnerability to human or to the environment. It is not an easy task to eliminate hefty metals if they once gather and hence pollute the soil bountifully, this is undesirable (Okoronkwo *et al.*, 2005). Presence of harmful hefty metals into the environment is a perilous exercise (Qadir *et al.*, 2007). Pesticides had been studied in sandy loam soil of Pakistan at several water table depths, founded various residual contaminants in the soil (Tariq *et al.*, 2010). Chlorinated pesticides were analyzed in the soil samples that had been gathered from the outmoded insecticide stores from three provinces (Punjab, Sindh and KPK) of Pakistan (Ahad *et al.*, 2010). Therefore, the present study was conducted to analyze the awareness level of vegetables growers regarding residual effects on environment in peri urban areas of Tehsil Saddar Faisalabad.

## **METHODOLOGY**

It is necessary to spread awareness among farmers regarding harmful residual effects of pesticides on environment. Peri-urban area of tehsil Faisalabad Saddar was selected purposively as study area to check the awareness level of farmers regarding environmental pollution. Consecutive vegetable growers using pesticides (insecticide, fungicides, herbicides and rodenticides) were registered by the agricultural extension department. A list of 400

vegetables growers was collected from agriculture extension office of peri-urban area of tehsil sadder Faisalabad. A sample size of 128 respondents was selected by using online sampling calculator with 95% confidence level and confidence interval 7. Male farmers were taken for data collection. Four vegetable-growing villages from two peri-urban union councils in Tehsil Faisalabad were selected purposively and 32 farmers were selected from each village randomly. Interview schedule was prepared for quantitative analysis. It was pretested on 20 respondents and Cron batch alpha value varied from 0.82 to 0.95. After making necessary amendments a well-structured interview schedule was prepared under expert's consideration. Statistical Package for Social Sciences (SPSS) software was applied to draw results. Descriptive statistics (percentage, mean, standard deviation, Chi-square and Gamma Statistics) were applied for the meaningful interpretation of data.

## RESULTS AND DISCUSSION

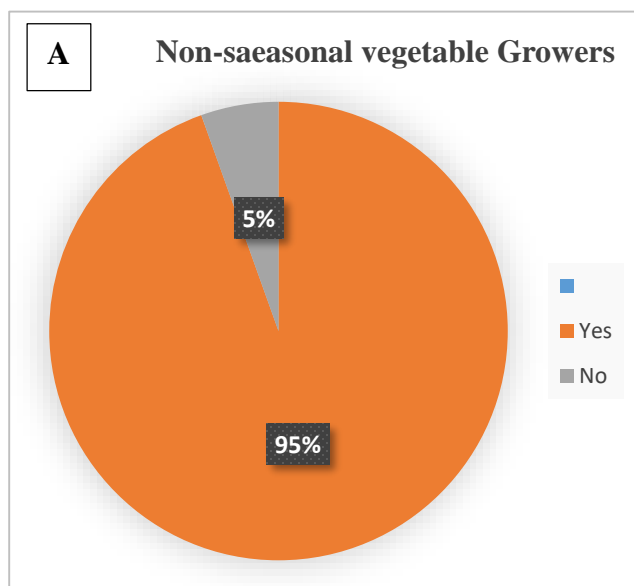
### Figure 1 (A) Size of land holding (Acres)

Data depicted in Figure 1. Indicate that less than half (48%) of the respondents were small farmers possessing land up to 6 acres. More than one third 37% of the farmers have >6-12 acres of land. Furthermore, the percentage of farmers having land more than 12 acres was least (15%). According to statistics, a significant majority of farmers have small landholdings (GOP, 2005). Farmers in Pakistan with

limited resources cultivate a diverse range of vegetables, which can significantly boost their income (Chaudhary and Ahmad, 2000). Small-scale farmers with limited financial resources face challenges in cultivating major crops such as wheat, cotton, sugarcane, and rice due to the extended time required for these crops to mature (Barrett, 1996).

### Figure 2 (B) Annual income from vegetables

According to the data depicted in Figure 2 show that majority of the respondents (76%) were receiving annual income up to 50000 (Rs.) from vegetables. About 18% of the respondents were receiving annual income 51000 to 100000 (Rs.) and 6% of the respondents had annual income of above 100000 (Rs.). Anjum (2018) depicted that (14.1%) of the respondents had up to Rs. 1000000 average income per acre, while (74.7%) of them had Rs. 100001 to 200000 average income. Only (4.7%) of the respondents had Rs. 200001 to 300000 average income per acre, (3.9%) of them had Rs.300001 to 400000 income and (4.7%) of them had above Rs. 400000 average income per acre. According to Borcz (1992), smaller plots of land are ideal for growing crops that have a short gestation period and generate significant cash earnings for farmers with limited resources. These enterprises are like short duration crops that yield higher returns. Thus, the primary sources of farm revenue for small and limited resource farmers revolve around the cultivation of both vegetables and non-vegetable crops.



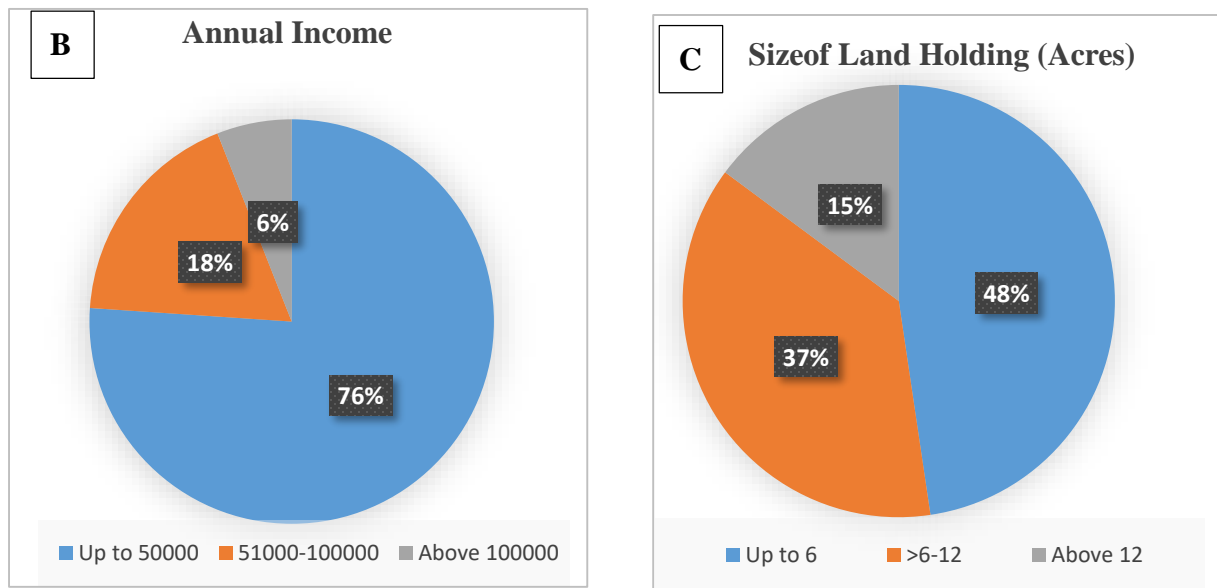


Fig 1. Distribution of the respondents based on their socio-demographic characteristics

**Figure 1 (C) Non seasonal vegetables growers.**

Data represented in Figure 3. indicate that vast majority (94.5%) of the respondents were growing non seasonal vegetables while, 5.5% of the farmers were not growing non seasonal vegetables, they used to prefer seasonal vegetables. Seasonal vegetables growers were small land holders, used to prefer seasonal vegetables to meet the domestic needs. While non seasonal vegetables growers were large in numbers due to some features of off-season

vegetables as they not only meet the domestic needs rather sell their vegetables at market level. People eat salad throughout the year and cucumber, tomato and some green vegetables are preferred as salad as these are most demanding vegetables in off season. Off season vegetable production is known as a successful economic enterprise in this region (Sohail, 2006). Off-season vegetables and fruits growing mean increasing the household income and to meet the needs of people.

**Table 2. Awareness level of respondents about residual impacts on environment.**

Statement	Mean	S.D.
Chemical reactions in the atmosphere bring acid rain?	3.2	1.19
Air pollution affects other trees, shrubs and crops due to presence of harmful chemicals?	2.9	.91
Environmental pollution has harmful effect on vegetables crops?	2.9	.98
Air pollution increase due to application of pesticides, Insecticides and fungicides?	2.7	.87
Environmental pollution induces abnormal development and contributes to vigor loss?	2.0	.96
Acid rain affects plants directly and decreases soil quality to reduce yields from agriculture?	1.8	1.05

Table 2 indicate the awareness level of respondents about residual impacts on environment. The effect of

environmental pollution on vegetables crops (mean = 2.89±.982). Air pollution increase due to

application of insecticides and pesticides (mean = 2.73±=.874) and awareness about sometimes air pollution affect other trees, shrubs (mean = 2.93±=.907), while awareness on environmental pollution induce abnormal development (mean = 2.02±=.960). Acid rain is due to chemicals reaction (mean = 3.22±=1.190). Awareness level of respondents about acid rain direct effects on plants and decreases soil quality to reduce yields from agriculture (mean = 1.81±=1.05).

**Table 3. Relationship between tenancy status of the farmers and use of pesticides.**

Tenancy Status	Use of Pesticides		Total
	Yes	No	
Owned	77 60.2%	6 4.7%	83 64.8%
Rented in	31 24.2%	2 1.6%	33 25.8%
Rented out	1 0.8%	11 8.6%	12 9.4%
Total	109 85.2%	19 14.8%	128 100.0%

**Chi-square = 61.84; Probability value = .000, Gamma Value = .747 Highly-significant**

Table 3 indicates the relationship between tenancy status and use of pesticides. The value of chi-square indicated the highly significant link between tenancy status and use of pesticides. The gamma value showed positive relationship between variables. Land owner had percentage of 60.2% in use of pesticides while farmers whose land was rented in had percentage of 24.2% in use of pesticides. Overall pesticides users were more in numbers and had the percentage of 85.2% as compared to non-users of pesticides which means farmers had interested in use

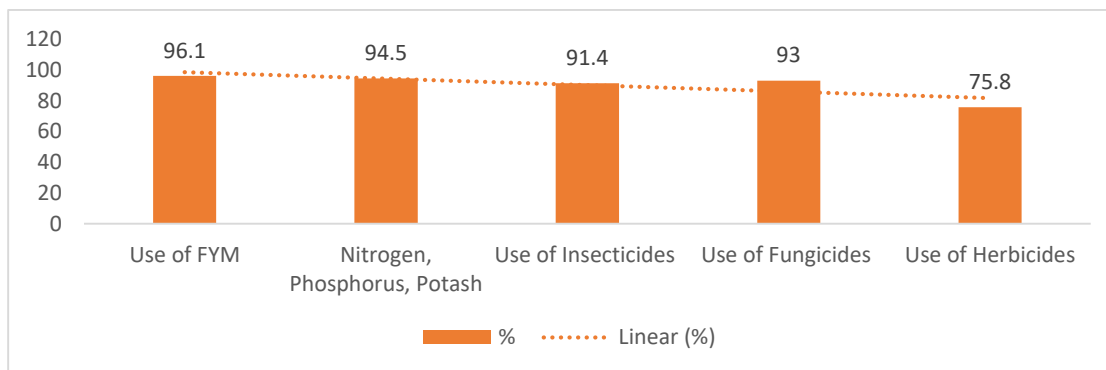
of pesticides. Among all the categories of pesticides, insecticides are considered to be most toxic which leads to increase in air, water and soil contamination (Warsi, 2015). Many studies revealed that in recent years, the use of pesticides have increased by 9% or even more per hectare in most developing countries including Pakistan (Schreinemachers & Tipraqsa, 2012).

**Table 4. Relationship between tenancy status and use of fungicides.**

Tenancy Status	Use of Fungicides		Total
	Yes	No	
Owned	76 59.4%	7 5.5%	83 64.8%
Rented in	33 25.8%	0 0.0%	33 25.8%
Rented out	3 2.3%	9 7.0%	12 9.4%
Total	112 87.5%	16 12.5%	128 100.0%

**Chi-square = 48.8; Probability value = .000, Gamma Value = .591 Highly-significant**

Table 4 indicates the relationship between tenancy status and use of fungicides. The value of chi-square indicated the highly significant link between tenancy status and use of fungicides. The gamma value showed positive relationship between variables. Landowner had percentage of 59.4% in use of pesticides while farmers whose land was rented in had percentage of 25.8% in use of fungicides. Overall fungicides users were more in numbers and had the percentage of 87.5% as compared to non-users of fungicides which means farmers had great interest in use of fungicides.



**Figure 2. Graphical representation of respondents according to use of chemicals.**



The response of the respondents regarding the use of chemicals is presented in Figure 2. Result revealed that 96.1% of the respondents were using farmyard manure (FYM). While 94.5% were using NPK. Users of insecticides were 91.4%. Farmers using fungicides were 93% and 75.8% also had interest in use of herbicides. The study conducted in Faisalabad revealed variations in pesticide residues found in vegetable samples. The residues ranged from low levels to higher levels, with different pesticides showing different concentrations. These included deltamethrin, permethrin, cypermethrin, profenofos, chlorpyrifos, bifenthrin, endosulfan, and dimethoate. The data obtained from the present study indicates that the residue of various pesticides in vegetable samples collected from farmers' fields exceeded their Maximum Residue Limits (MRLs). Various groups of pesticides, including organochlorine, organophosphate, and pyrethroids, possess distinct physiochemical properties, stability, persistence, and degradation behaviour. However, the farming community, particularly in developing countries, often lacks education and awareness regarding the potential dangers of pesticide residue in food. (Amir *et al.*, 2015).

### Conclusion:

Use of chemicals such as pesticides, fungicides, herbicides is just like an addictive drug for farmers without which their crops cannot be productive. Our finding showed that the application of pesticides is being practiced on large scale by farmers, having no awareness of surroundings, health sensations and thoughts. People are a country's most valuable asset. If this resource is robust, knowledgeable, and ecologically sensitive, then humankind and the planet as a whole will be able to advance. Forward-thinking nations allocate significant resources towards research in various fields, such as health, education, social, and biological sciences, with the aim of unlocking the full potential of their citizens. A majority of the country's issues stem from its unique cultural, contextual, and environmental factors.

Farmers need awareness on health and environment by running various campaigns and mass media. Besides, government should promote alternate methods in place of pesticides so that use of pesticides may be reduced. It has become a mentality that the more the use of pesticides the more will be

the productive and healthy crop by which we have neglected health and environment to a large extent.

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