



REGULAR ARTICLE

DETRIMENTAL EFFECTS OF PESTICIDES ON HEALTH AND ENVIRONMENT

SHAFIQ UR REHMAN ZIA¹, IJAZ ASHRAF¹, KHALID MAHMOOD CHAUDHARY¹,
UMAIR TALIB^{1*}, IRFAN AHMAD²

¹Institute of Agricultural Extension and Rural Development, University of Agriculture, Faisalabad, Pakistan

²Department of forestry and Range Management, University of Agriculture, Faisalabad, Pakistan

ABSTRACT

Pesticides are toxic chemicals used for controlling of insects and pests which caused harms to plants or animals. Pesticides also effect the environment as well as human health. They play a vital role in securing of food but they require a number of risks and problems. Therefore, present study is designed to know the pesticide usage and its harmful effects on environment and health of cotton growers. There are 19 rural union councils out of which 4 were selected through simple random sampling. From each selected union council, 2 villages were selected at random and from each selected village, 20 cotton growers were selected randomly thus making a sample size of 160 respondents. A well planned pre-tested and validated interview schedule was prepared for the collection of data from the selected respondents. The collected data were examined by using Statistical Package for Social Sciences (SPSS) for illustration conclusions and making recommendations. A vast majority (90%) of the respondents selected the pesticides on better results, (83.1%) on behalf of multinational company and majority (76.3%) selected pesticides of national company and a significant of majority (70%) of respondents used the gloves whereas a huge majority (85.6%) of respondents wore the mask during pesticide application. It was found that a huge majority (81.9%) of respondents had headache effect, 67.1% had fatigue, and majority (68.8%) had dizziness while 68.1% had skin disorders. Govt. should promote the first aid training program for safety measurement regarding pesticide usage and enhance the protection techniques for environment and health of organisms regarding pesticides effect.

Keywords: Pesticides, Environment, Human Health, Sucking and Chewing Insects

INTRODUCTION

Cotton is the supreme main cash crop of Pakistan and has quarter number in cotton production after the USA, India and China. There are many diseases in this crop which reduces the yield, which fluctuates from year to year and origins a 30–40% decline in output [1]. Previous study [2] reported that the chemical released from agricultural practices, mainly pesticides are hazardous to the biomes. Another study [3] as an experiment on farmers' pest managing rehearses; responsiveness and their observation of pesticides have effects on environment. He reported that farmers when applying pesticides did not use caring clothes. Farmers have attitude about the risk of pesticide usage. Farmers' education, and contact with extension worker had a good relation with supposed effects of pesticides on an environment.

Pesticide is a substance or mixture of substances used for controlling, preventing, destroying, repelling or mitigating any pest. Pesticides played a vital role in enhancing yield by controlling the pest. Unnecessary and improper use of pesticides produces many kinds of health hazards. The use of pesticide in Pakistan began in 1950s to control locust

while in 1954 the Government of Pakistan imported 254 tonnes pesticide and it was the beginning of pesticide business in the Pakistan. In 1980 the plant protection department assigned another task to import and distribute the pesticide through national agriculture extension network across the country. Most of these pesticides were used to control pests and locust of cotton, tobacco, rice and sugarcane. Unnecessary and incorrect pesticide use has distributed the agro-ecosystem and killed environment-friendly organisms and birds also. Besides this, unnecessary use has caused the pest resistance [4]. Solids, liquids and gases are main form of pesticides. Liquids are mixed with water and sprayed after mixing with water. Clean water should be used for mixing of these liquids. Second form of pesticides is solids and solids include powder, dust, pellets and pastes and these applied directly (by hand). Gases are the third form of pesticides and they are usually tiny particles [5].

Pesticides have different kinds of effects on human body and these effects can be faced by farmer. Some effects are toxic and non-toxic. There are two types of toxicity, acute and chronic toxicity. Acute toxicity is to define effects that

Received 11 September 2017; Accepted 30 December 2017

*Corresponding Author

Umair Talib

Institute of Agricultural Extension and Rural Development, University of Agriculture, Faisalabad, Pakistan

Email: umair1754@gmail.com

©This article is open access and licensed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted, use, distribution and reproduction in any medium, or format for any purpose, even commercially provided the work is properly cited. Attribution – You must give appropriate credit, provide a link to the license, and indicate if changes were made.

appear promptly within 24 h and chronic toxicity is delayed poisonous effects due to exposure of pesticides and it can be found in both farmer and general public through air, food products and water. There are three ways in which pesticide enter in human body that is dermal route, inhalation route and oral route. Dermal route means pesticide can be absorbed through skin and this may occur during mixing and applying the pesticide. Second route is inhalation route and it means that pesticides can enter in human body through breath mixing powder and spraying pesticides. Third route is oral route and it means that pesticide can enter in human body through mouth it can occur when a farmer smoke or eat without washing his hands. Skin rash, dizziness and eye irritation are the example of reversible effects and these are not permanent whereas irreversible effects are permanent for example mutation, birth defects and cancer. Pesticide exposure also can effects also type of toxicity effects thus produce cancer in animal tissues and neurotoxicity effects poison the nervous system and brain [6, 7] found that inorganic fertilizers and pesticides are modern technology on which agrochemicals are depending. The uses of these chemicals have serious effects on environment that may cause an immediate and long term effects. Exploring farmers have no awareness of agrochemicals residues and their behaviors regarding application to reduce human factors that negatively affect agricultural safety. Due to acute pesticide poisoning there can be appeared many symptoms within few minutes to 96 h or later. The symptoms of acute pesticide poisoning are divided into three different levels and these levels are general for all pesticides. First level of symptoms is mild symptoms and these are included: feeling tired, loss of appetite, weakness, irritation of skin, dizziness, headache, nervousness, diarrhea, weight loss, nausea moodiness, thirst and irritation of throat, nose and eyes. Second level of symptoms is moderate symptoms and these are loss of coordination, excessive saliva, blurred vision, nausea, diarrhea, sweating, confusion, tightness of chest, vomiting, stomach cramps, yellow skin, rapid pulse, trembling and coughing. Third level of symptoms is severe symptoms and these are loss of reflexes, increased breathing rate, vomiting, muscle twitching, trouble breathing, unconsciousness, convulsions, pin-point pupils, death and thirst fever [8].

Methodology

The present study was conducted in rural areas of tehsil Khanewal.

Sample of the study

Cotton is the important crop of District Khanewal and cotton growing industry is well-established in this district. Due to limited budget and resources, research conducted in one tehsil of District Khanewal. The district consists of four tehsils (Khanewal, Jahanian, Mian Channu and Kabirwala). Out of these four tehsils, tehsil Khanewal was selected as a study area because Cotton is intensively grown in this tehsil Khanewal. There are 25 Union Councils (UCs) of tehsil Khanewal, out of which 6 and 19 urban and rural UCs, respectively. Four rural UCs were selected through simple random sampling. From each selected UC, 2 villages were selected at random and from each selected village, 20 cotton growers were selected randomly thus making a sample size of 160 respondents. Keeping in view the objectives of the study, a well-planned interview schedule was prepared for the collection of data from the selected respondents. The collected data were analyzed by using Statistical Package for Social Sciences (SPSS) for drawing conclusions and making recommendations.

RESULTS AND CONCLUSION

The data in table 1 shows that a vast majority (90%) of the respondents have selected criteria of better results for pesticide selection while a huge majority i.e. 81.2% had awareness regarding low price in the selection of pesticide. Similarly, 89.4% stated that they selected pesticides on behalf of neighbors farmers used whereas 66.6% had selected the pesticide on available credit. A huge majority (83.1%) had selected the pesticide due to multinational company and 76.3% farmers of national company.

The data in table 2 indicate about the engagement of respondents in different practices which are done during application of pesticide such as a vast majority (100%) of the respondents observed the wind direction during the application of pesticides whereas about one-fourth 28.1% of them used rain drop nozzle for spray, 34.3% used flat fan nozzle and about one third (37.5%) of the respondents used holocon nozzle for spray.

A majority (70%) of the respondents used gloves during application of pesticides while 85.6% wore the mask and most (43.1%) of them used long shoes whereas a huge majority (83.8%) of them covered their head during the application of pesticides.

Majority (68.8%) of the respondents used the glasses during the pesticide application whereas only few (9.4%) of them ate or drunk during pesticide application and only (20%) of them done smoking during application of pesticide.

Table 1: Distribution of respondents in selection of pesticide

Criteria for selection pesticide	Awareness			
	Yes <i>f</i>	Percentage %	No <i>F</i>	Percentage %
Better results	144	90	16	10
Low price	130	81.2	30	18
Used by neighbor farmer	143	89.4	17	10.4
Available on credit	107	66.6	53	33.4
Multinational company	133	83.1	27	16.9
National/generic company	122	76.3	38	23.8

Table 2: Distribution of respondents according to practices which are done during application of pesticide

Practices during application	Yes		No	
	F	%	f	%
Observe wind direction	160	100	0	0.0
Rain Drop	45	28.1	115	71.9
Flat fan	55	34.3	105	65.7
Holocon	60	37.5	100	62.5
Use gloves	112	70	48	30
Wear mask	137	85.6	23	14.4
Use long Shoes	69	43.1	91	56.9
Cover your head with cap/hat	134	83.8	26	16.3
Use glasses	110	68.8	50	31.3
Eat or drink	15	9.4	145	90.6
Smoke	32	20	128	80

The data presented in table-3 that pesticide have health effect on cotton growers. A huge majority (81.9%) of respondents had low headache effect while only (14.4%) had medium headache effect while only few (3.7%) did not give response while a majority (67.5%) of respondents had low fatigue effect and 0.6% had medium effect of pesticide while 31.8% did not give response about pesticide effect. About one-fourth (27.5%) of respondents had low insomnia effect and only (15.6%) had medium effect while fair majority (56.9%) did not give response whereas 68.8% of respondents had low dizziness effect and (7.5%) of them had medium effect while only few (3.8%) had high effect of pesticides on their health and only (20%) had no response about it. Only (10%) of respondents had low hand tremors effect of pesticide and 0.6% had medium effect while a huge majority (89.4%) did not give response about it whereas 68.1% of respondents had low skin disorders effect caused by pesticides and only (18.8%) had medium effect while only (13.1%) did not give response. About one-third (33.1%) of respondents had low cardiopulmonary problems and 2.5% had medium effect due to pesticides while 64.4% did not give response whereas 1.3% of respondents had low effect of neurological, hormone systems, reproductive dysfunction, birth effects, cancer, damage of liver and kidney problems while 98.7% of them did not have response. About one-fourth (28.1%) of respondents had low

effect of asthma and only few (2.5%) had medium effect while a majority (69.4%) did not give response about it whereas only (18.1%) of respondents had low effect of diabetes and 88.9% did not give answer about it.

Table 4 indicates that pesticide has also contribution in effecting the environment. A huge majority (86.9%) of respondents had awareness about air pollution caused by pesticide application and only (13.1%) of them had no awareness whereas 100% had awareness about water pollution caused by pesticide usage by cotton growers. A good number (41.3%) of respondents had awareness of soil biodiversity and 58.8% had no awareness of it whereas 50% of the respondents had awareness of ground water pollution while half of respondents had no awareness. About one-third (33.1%) of the respondents had awareness of food contamination by pesticide and majority (66.9%) had no awareness of it. A vast majority (99.4%) of respondents had awareness of birds affected by pesticide and 0.6% of them had no awareness whereas 91.3% of respondents had awareness of animal affection caused by pesticide and only few (8.1%) of them had no awareness. Almost (15%) of the respondents had awareness of fish effect by pesticide and a huge majority (85%) of them had no awareness whereas only (8.1%) of respondents had awareness that pesticides are harmful for non-target organisms while 91.9% had no awareness.

Table 3: Distribution of respondents according to awareness about health effect of pesticide

Pesticides effects	Awareness				No response
	Yes		No		
	f	%	f	%	
Increase in headache	133	83.1	21	13.2	6
Fatigue	105	65.6	55	34.4	0
Insomnia	65	40.6	95	59.4	0
Dizziness	118	73.8	42	26.3	0
Hand tremors	17	10.6	143	89.4	0
Skin disorders	139	86.9	21	13.1	0
Cardiopulmonary problems	57	35.6	103	64.4	0
Neurological and hematological symptoms	2	1.3	158	98.8	0
Reproductive and sexual dysfunction	2	1.3	158	98.8	0
Hormone systems	2	1.3	158	98.8	0
Cancer	2	1.3	158	98.8	0
Birth defects	2	1.3	158	98.8	0
Damage of liver	2	1.3	158	98.8	0
Damage of kidney	3	1.9	157	98.1	0
Asthma	49	30.6	111	69.4	0
Diabetes	31	19.4	129	80.6	0

Table 4: Distribution of respondents according to awareness about environmental effect of pesticide

Environmental effect	Awareness			
	Yes		No	
	<i>f</i>	%	<i>f</i>	%
Air pollution	139	86.9	21	13.1
Water pollution	160	100		
Soil Biodiversity	66	41.3	94	58.8
Ground water pollution	80	50	80	50
Food Contamination	53	33.1	107	66.9
Animals	148	91.3	12	8.8
Birds	159	99.4	1	0.6
Fish	24	15	136	85
Harmful for non-target organism	13	8.1	147	91.9

From research findings the following conclusion were drawn: Participation of respondents in Agriculture activities has great importance which is playing a vital role in the development of Pakistan's economy. Majority of population is living in rural areas and also depend on Agriculture sector. It was found that the rural community had great participation in agricultural activities i.e. seed cleaning, sowing, irrigating the crops, hoeing, fertilizer, pesticides application and harvesting. It was found that a huge majority of the rural sampled respondents had participation in agriculture for better living standard and to increase the family income. Food is saving in worldwide through controlling pests and plant diseases are forty percent by using pesticides. If plant protection activities would be stop then eighty percent of food would be lost. Our farming community does not have sufficient knowledge regarding implications and use of pesticides. Farmers do not have awareness and misuse of these chemicals. Pesticides have many health risks on farmers as well as on consumer's health. Integrated Pest Management IPM are need to be introduced in our country as alternative methods of plant protection and consumers must be educated and trained regarding safe use of pesticides and handling of it.

REFERENCES

1. Abro, G. H., T. S. Syed, G. M. Tnuio and M. A. Khuro. 2004. Performance of transgenic Bt cotton against insect pest infestation. *J. Biotechnology*. 3(1): 75-81.
2. Adeola, R. G. 2012. Perception of environmental effects of pesticide use in vegetable production by farmers in Ogbomoso, Nigeria. *Global. J. Sci. Frontier research Agriculture and biology*. 12(4): 73-78.
3. Ahmad, I., M. A. Khan, M. H. Soomro and H. Waibel. 2002. Pesticides hazards for health and environment. *Farming Outlook* October-December.14-16.
4. Atlantic Canida. 2014. Applicator core training manual in Nova Scotia. 1-301.
5. Bhandari, G. 2014. An overview of agrochemicals and their effects on environment in Nepal. *Applied entomology and environmental sciences*. 2 (2): 66-73.
6. Department of labour South Africa. 2013. Pesticides. Limpopo Polokwane. Labour. Dpt. South. Africa.
7. EPA (Environment Protection Agency U. S. A). 2015. Assessing health risks from pesticides.
8. Soomro, A. M., G. Sehar., G. M. Bhanger., M. I and Channa, N. A. 2014. Pesticides in the blood samples of spray-workers at Agriculture environment. The toxicological evaluation. *Pak. J. Anal. Environ. Chem*. 9(1): 32-37.