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Impact of Locally Available Synthethic Insecticides on Public Health and Environmental Equity Field Survey in Swat

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ABSTRACT

A market survey of insecticides in Swat during June–July 2021 has provided specific preferences of the selection and use of classes of insecticides to manage chewing, sucking and medically important pests. The results show that growers tend to select and use an exclusive set of the following classes of insecticides: Carbamates (Carbofuran, Cartap Hydrochloride and Monomehypo) and Organophosphates (Acephate, Chlorpyrifos, Triazophos) to manage chewing pests. Carbamates are generally applied as the granule form and are systemic in plants. They are good to target chewing pests such as maize and rice stem borers as they interfere with the nervous and digestive system of the pest. Organophosphates are applied as an emulsifiable concentrate (EC) and as a wettable powder (WP) and they inhibit acetylcholinesterase, which results in control of termites, jassids, bugs, shoot flies and army worms.For sucking pests Neonicotinoids(in WP, WG and EC form) dominates the market due to their activity on nicotinic acetylcholine receptor which leads to paralysis and death of whiteflies, aphids, leaf miners and planthoppers. Insect Growth regulators (Buprofezin) alter development of exoskeleton, while Pyrroles (Chlorfenapyr) and Phenyl Pyrazoles (Fipronil) alter nerve functioning are also useful against hoppers and borers. In addition to the above categories of insecticides, we suggest using other groups, including, of, Pyrethroids (Deltamethrin, Lambda Cyhalothrin), Avermectins (Emamectin Benzoate) and Benzoylureas (Lufenuron) in your integrated pest management as they all affect pests in very different manners, such as contact, paralyses of the pest and inhibition of molting.For pests of medical significance, the major player is the class of chemicals called pyrethroids (Permethrin, Cyfluthrin, Deltamethrin) and natural pyrethrum are commonly used against mosquitoes and flies based on their actions on the sodium channel. In addition, organophosphates (Malathion, Dichlorvos), carbamates (Bendiocarb), and avermectins (Abamectin, Ivermectin), have some applicability, particularly bedbugs and lice. Pest management depends on different chemical classes such as Carbamates and Organophosphates for chewing pests and Neonicotinoids, and IGRs for sucking pests. There are also Pyrethroids and avermectins for control of medically important pests. This blends with Integrated Pest Management (IPM) system by providing multiple options for pest control while management resistance and sustainability.

Keywords: insecticide market, Swat, Carbamates, Organophosphates, Pyrethroids, Neonicotinoids, insect growth regulators, pest, environmental effects.

INTRODUCTION

About 1.8 billion people globally are farmers and farm labors, and most of them continue to use pesticides for protection of crops. Some people also use pesticides for Vector control while many others use them in gardening, in and around residential homes (Kiely et al., 2004). Over the last few decades, the amount of pesticide used in agriculture has been rising steadily through sales. Global sales volume has boosted from US $31 billion in 2005 to US $38 billion in the year 2010, and the amount of pesticide used applied internationally has risen fifty folds since the year 1950 (Keding et al. 2013). Global pesticides market is projected to rise from nearly $ 75 billion in 2017 to $ 90 billion in 2023 (Techsci Research, 2018) Pesticides were thought have adverse effects through one use sector, the same pesticide has been found to have a similar effect on other use sectors due to health.

In crops, vegetables and fruits, the control of diseases, weeds and insects is done using pesticides, but this has always had a toll on health. Thus for the purpose of gaining the present day perception towards the usage of pesticides the current study was carried out in 2018 with Khyber Pakhtunkhwa Province as laid down in the subsequent chapters as the universe of study. An example of incomplete context, Problems and environmental pollution globally (Soares et al., 2003; Mancini et al., 2005; Remor et al., 2009). The use of chemicals also poses danger to farmers, children and field workers, and rather than reducing the cases of poisoning, the statistics is on the increase. This has led to aggravation of health risk and pollution of the rural and agricultural environment due to uncontrolled use of pesticides by unprofessional farmers (Akbar et al. 2009). Socio-culturally, poor education, especially at higher rural literacy, inadequate or no information and training, inept spraying technique and no or poor personal protective measures while applying pesticide have been established to aggravate pesticides hazards.

However, on the topic of pesticide hazards and its causes and effects, the extent and conditions in developing countries differ with countries (Atreya, 2008; Hurtig et al., 2003). Agricultural pesticide has been in utilized in Pakistan since 1952; the agricultural department of the government fully sup-ported the application of pesticide to mitigate problems which are created by pests and diseases so that crop losses should be reduced and healthy production of crops made possible (Rasheed, 2007). Most of these farmers cannot read and write and have not been properly educated on how best to apply these chemicals, they spray without appreciating the insect pest population, the natural enemies or the health status of the crops. The Pakistan farmers just use pesticides following the calendar basis and one of the farmers said as, “this is medicine the pesticide rather than poison”. This shows such severe environmental problems and serious health consequences happen in Pakistan because the farmers lack knowledge of the right use of the pesticides; much of the pesticides gets into the other areas due to improper methods during pesticide application and wrong equipment for spraying. This research used over-dosing and found that it has disastrous effects such as killing nontarget organisms and therefore causing the re-emergence of the pest insects (Hasnian, 1999). Many farmers lack information about the health risks of inhaling pesticides as well as practices to be adopted in applying them during adverse weather conditions.

As stated earlier, it has been estimated that less that 19% of the farmers have been made to understand how to manage and apply pesticides [Plianbangchang et al., 2009]. Rijal et al., 2018 at Nepal found out that only 17% of the farmers received sensitization to a single training programme on pesticide utilization. They proposed on the basis of the results of conducted study By studying the foreigners as local people they pointed out that they need to show there the local situation and explain them the various right ways of using the pesticides or how to dispose it other than improper or illegal use and its necessity. After analyzing the above adverse effects of these pesticides on human health through wrong application the FAO (2008) was alarmed. , Ashburner & Friedrich (2001) and other authors also highlighted (Khan et al., 2015, Rijal et al., 2018) that extensive use of pesticide in developing country has a lot of negative impacts on human health and environment and also bring economical problem. One million people fatally intoxicated annually with 20000 (WHO 2006). This may lead to alterations in immune functions, peripheral neuropathies and allergic sensitisation reactions ; the latter showing a predilection for skin. It could cause simple inflammation of the skin to rigorous systematic diseases which cause the death of the affected person. Pest control by chemical methods has interfered with the above mentioned agro-ecosystem, have resulted in extensive mortality of the beneficial parasitoids, predators and birds which are naturally friendly to the environment. Using pesticides in food production, carbon 800,000 people die annually globally and at least 10,000 farmers in cotton-growing areas of Pakistan are poisoned every year, highly unhygienically and uncontrollably. These pesticide companies supply their products to the farmers without necessary training to the farmers and, at times, devoid the farmers of the information on the harm these chemicals cause. Schreinemachers and his colleagues (2015) observed that a huge percentage of farmers in South Asian countries including

Pakistan, India, and Thailand were using WHO rated highly toxic and sometimes banned pesticides without realizing the detrimental impacts on their health, and their immediate environment. With regard to the aforementioned data and going forward, the present study was marked by having an
aim.

MATERIALS AND METHODS

Study Area:

Different markets in Peshawar KPK. University of Agriculture Peshawar in 2021. A Survey of the insecticide available in the market in Peshawar, KPK.

Data Collection

Survey was taken by visiting several markets of insecticides in Peshawar KPK. The observation of several insecticides and their local and scientific names and their uses against pest population. In order to evaluate to pesticides using in the market.

Questionnaire Survey of Insecticides

Section	Question
1. Market Information	
	Market Name:
	Location (Area/Street):
	Date of Survey:
2. Vendor Information	
	Vendor Name (if applicable):
	Contact Information (if applicable):
3. Insecticide Product Details	
	Product Brand Name:
	Local Name:
	Scientific/Trade Name:
	Active Ingredients:
	Formulation Type (e.g., liquid, powder, granules, etc.):
	Mode of Action (e.g., contact, systemic, etc.):
	Target Pests (e.g., insects, rodents, etc.):
	Usage Instructions (e.g., dosage, application method, frequency):
	Safety Precautions (e.g., protective gear, handling instructions):
	Price Range (if available):
4. Observations	
	Are there any insecticides that are particularly popular or frequently mentioned?
	Are there any new or unusual insecticide products observed?
	Are there any gaps or issues noted in the availability or quality of insecticides?
	Feedback from vendors or users about the efficacy and safety of these insecticides:
5. Additional Information	
	Any additional comments or observations about the insecticide market in Peshawar:
	Suggestions for improving pest management practices in the region:
6. Follow-up Information	
	Would you be willing to provide further information or participate in follow-up surveys if needed?
	If yes, please provide contact details:

RESULTS

This may lead to alterations in immune functions, peripheral neuropathies and allergic sensitisation reactions ; the latter showing a predilection for skin. It could cause simple inflammation of the skin to rigorous systematic diseases which cause the death of the affected person. Pest control by chemical methods has interfered with the above mentioned agro-ecosystem, have resulted in extensive mortality of the beneficial parasitoids, predators and birds which are naturally friendly to the environment. Using pesticides in food production, carbon 800,000 people die annually globally and at least 10,000 farmers in cotton-growing areas of Pakistan are poisoned every year, highly unhygienically and uncontrollably. These pesticide companies supply their products to the farmers without necessary training to the farmers and, at times, devoid the farmers of the information on the harm these chemicals cause. Schreinemachers and his colleagues (2015) observed that a huge percentage of farmers in South Asian countries including Pakistan, India, and Thailand were using WHO rated highly toxic and sometimes banned pesticides without realizing the detrimental impacts on their health, and their immediate environment. With regard to the aforementioned data and going forward, the present study was marked by having an aim.

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The pattern is well defined from the survey when it says that Carbamates and Organophosphates are used against chewing pests, Neonicotinoids and IGRs are used against sucking pests, and the Pyrethroids and Avermectins against medically important pests. The varied formulations and modes of action show that they work very well and strategies used to handle different pests show how people have tackled.

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Table 1: Chemical Groups and Formulations of Insecticides for Chewing Insect Pests Available in Local Markets, District Swat 2021

Chemical Group	Examples	Formulations	Mode of Action	Target Pests
Carbamates	Carbofuran, Cartap Hydrochloride, Monomehypo	Granules	Systemic action affecting nervous or digestive system	Maize borers, sugarcane borers, rice stem borers
Organophosphates	Acephate, Chlorpyrifos, Triazophos	Emulsifiable concentrates (EC), Wettable powders (WP)	Inhibit acetylcholinesterase, leading to nerve signal disruption	Termites, jassids, various borers, bugs, armyworms, shoot flies
Pyrethroids	Deltamethrin, Lambda Cyhalothrin	Various forms including EC	Contact and stomach action disrupting nerve signal conduction	American Bollworm, specific chewing pests
Avermectins	Emmamectin Benzoate	Various forms including EC	Unique mode of action reducing cross-resistance	American Bollworm
Benzoylurea	Lufenuron	Various forms including EC	Contact and stomach action disrupting molting process	Termites, armyworms

Table 2: Chemical Groups and Formulations of Insecticides for Sucking Insect Pests Available in Local Markets, District Swat 2021

Chemical Group	Examples	Formulations	Mode of Action	Target Pests
Neonicotinoids	Simida, Titonic, Feiniao, Veyong Jinteng	Wettable powders (WP), Water-dispersible granules (WG), Emulsifiable concentrates (EC)	Agonize nicotinic acetylcholine receptors, causing paralysis	Whiteflies, aphids, plant hoppers, leaf miners
Insect Growth Regulators (IGRs)	Buprofezin	Various forms including WP	Prevent exoskeleton formation after molting, targeting nymph stages	Whiteflies, aphids
Pyrroles	Chlorfenapyr	Various forms including EC	Contact and stomach action with systemic properties	Whiteflies, aphids
Phenyl Pyrazole	Fipronil	Various forms including EC	Disrupt central nervous system by blocking chloride ion passage	Plant hoppers, sugarcane borers, termites

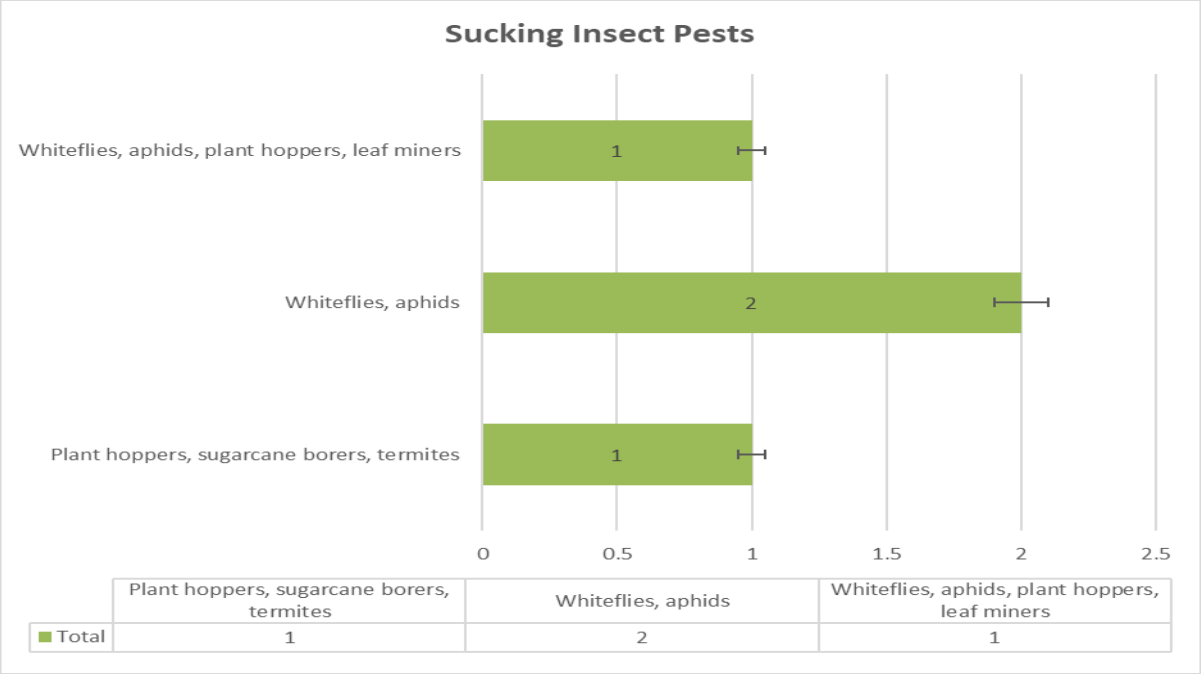
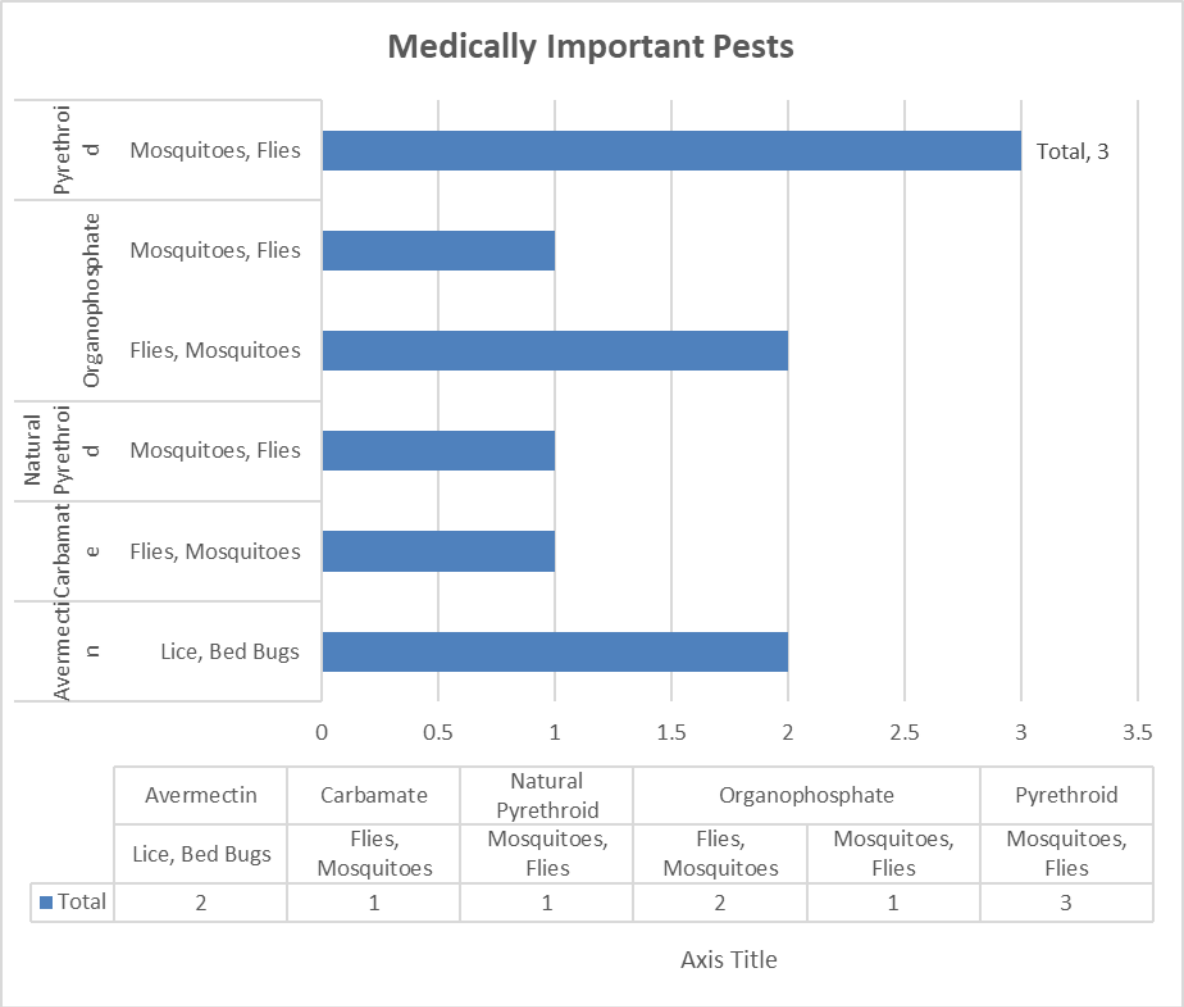


Table 3: Chemical Groups and Formulations of Insecticides for Medically Important Pests Available in Local Markets, District Swat 2021

Trade Name	Chemical Group	Formulation	Mode of Action	Target Pest
Permethrin	Pyrethroid	Emulsifiable Concentrate	Disrupts nerve function by affecting the sodium channels	Mosquitoes, Flies
Deltamethrin	Pyrethroid	Emulsifiable Concentrate	Interferes with the normal production and conduction of nerve signals	Mosquitoes, Flies
Malathion	Organophosphate	Emulsifiable Concentrate	Inhibits acetylcholinesterase, leading to nervous system disruption	Flies, Mosquitoes
Bendiocarb	Carbamate	Wettable Powder	Inhibits acetylcholinesterase, leading to nervous system disruption	Flies, Mosquitoes
Pyrethrum	Natural Pyrethroid	Emulsifiable Concentrate	Affects the nerve axons, leading to paralysis	Mosquitoes, Flies
Abamectin	Avermectin	Emulsifiable Concentrate	Disrupts nerve function, leading to paralysis and death	Lice, Bed Bugs
Ivermectin	Avermectin	Emulsifiable Concentrate	Disrupts nerve function and causes paralysis	Lice, Bed Bugs
Dichlorvos	Organophosphate	Emulsifiable Concentrate	Inhibits acetylcholinesterase, leading to nerve disruption	Flies, Mosquitoes
Cyfluthrin	Pyrethroid	Emulsifiable Concentrate	Affects nerve cell sodium channels, causing paralysis	Mosquitoes, Flies
Chlorpyrifos	Organophosphate	Emulsifiable Concentrate	Inhibits acetylcholinesterase, disrupting nerve function	Mosquitoes, Flies



SUMMARY

The present study was conducted in various markets of District Swat in 2021. One of the key factors for the development of sustainable agricultural systems is the choice of pesticides with a reduced ecological footprint. Generally, policy directing the choice of pesticides emphasizes a lot on natural products and organic-certified pesticides for sustainability purposes, considering prevailing public opinion that natural products are uniformly safer, and therefore more environmentally friendly, than synthetic chemicals.

Survey was conducted by doing round of different markets of insecticides in District Swat KPK. Observe the various pesticides along with their local and scientific name use against the pest population to estimate the usage of pesticides in market. Usage of pesticides is very common nowadays used against diseases, weeds, insects of crops, vegetables fruits etc. but very detrimental for human health. This present study was conducted in 2021, which was an attempt to find out the present scenario of insecticides use in District swat KPK. The high percentage of contact market were knowledgeable enough regarding the safe use of pesticides; and health and environmental hazards caused by pesticides. The contact farmers were very cognizant of the right pesticide application and significant relationships between knowledge levels of farmers and some of their demographics exist.

Pesticides are widely used in agriculture, overuse is the main challenge facing both environmental and health for the farming community in Pakistan. A large percentage of farmers use a mix of chemical pesticides to better manage the different kinds of insect pests and diseases. A major chunk of the applied pesticides falls in the highly or moderately toxic category for the biological system. Misuse or mishandling of these toxics contaminates all matrices of the environment, which contain air, water, and land. All these contribute to entering into the human body and food chain to cause various health problems in a human being.

CONCLUSION:

This attempt aims at measuring the levels of

knowledge markets, sources of information, and trainings on safe use of pesticides have. From the above findings, the following conclusions can be drawn: A majority of the respondents received an average level of information; similarly, the majority of them received an average number of trainings on pesticides related issues the high percentage of contact market were knowledgeable enough regarding the safe use of pesticides; and health and environmental hazards caused by pesticides. The fact that knowledge level has a significant correlation with some of the demographics is an indication that the farmers who are under contact know how to apply pesticides and at what times. Some of the primary sources that the farmers have used have been their fellow farmers or agricultural extension advisors. Agricultural literatures and agricultural programs which are on television seem less frequent sources of information in regard to the pesticides besides their proper usage. Many pesticides are available in the market. new companies using their market name with formulation.

RECOMMENDATIONS

There is a need for special training programs for farmers regarding the right selection, safe use and appropriate handling of pesticides. In this regard, print and electronic media may be used to provide maximum information to the farmers. Informational exchange between farmers and their sources of information on pesticide issues needs to be improved. Emphasis should be given on sources from where farmers obtain the least information, namely, agricultural literature and programs shown on television and radio. Improve the programs of agriculture extension education and combine them with the campaigns for the awareness of proper pesticides usage for the capacity building of farmers. Alternate pest control methods must be encouraged. Agricultural extension activities like the farmers' field schools on integrated pest management may be encouraged and fully supported so that health and environmental risks associated with the over/misuse of pesticides could be reduced and pesticide-residue-free agricultural products may be produced.

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