

A Note On The Pesticides Pollution In Agricultural Environment In Madan-pokhara VDC Area, Palpa, Nepal

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INTRODUCTION

The chemicals that control and destroy insects related to vegetables and food grains like mites, rats, viruses, fungi, bacteria and weeds and microorganisms destroying substances have affected not only pest but, it has also affected whole ecosystem. Where such pesticides are used on a large scale, the birds, fishes and other creatures are killed and their population is also being declined very rapidly, due to the affect of such pesticides. "Health of different man, animal and birds is badly affected, and most of them have contained poisonous residue. Thus in such environment, the vegetables, fruits, food grains, dairy product and other edible are not suitable to use from hygienic point of view, because such products have been poisonous". (Neupane 2057).

A chemical substance that is used to destroy harmful insects, small animals, wild plants and other unwanted organism is called pesticide. The pesticides, used by farmers, destroy the pests, but at the same time it ruins the people's health too. The nature and natural elements those are noticed around us, may collectively be termed as the environment. The air which we breathe, the soil on which we stand, water which we drink, and several other living or non-living things around us, have influenced and shaped our lives since beginning of life.

Surrounding, whether of men or any other living organism, include physical, social and cultural conditions affect the development of the organism. It influences the physical, chemical, biotic and cultural conditions also. And their ramifications collectively comprise the environment. All organisms depend upon the environment to sustain their life. The activities of organisms affect their surroundings in many ways, which in turn may affect the organisms themselves. So, there is an intimate relationship between organisms and the environment.

Around 1940, pesticides of different groups like chlorinate hydrocarbon etc. were seen in world market. Before that year some inorganic chemicals like calcium, arsenate, and some botanical products, nicotine, pyrethrum, and rotenone, were being used to save the crops. These substances were used in limited fields. The poison bait was used to prevent butterfly larva, grasshoppers, cricket etc. Before the beginning of

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these organic and botanical substances, peasants used to apply cultural practices to prevent harmful organisms (Neupane 2057) Before 1950 pesticides were not being used either in food materials or in cash crops in Nepal. At that time, peasants were forced to use botanical pesticides to destroy harmful organisms. These medicines were made from local resources. So, such medicines made of herbs did not affect natural ecosystem in local areas. The harmful insects of the crops were being eaten by their natural enemies, so there was very limited loss of food and cash crops. Around 1950 DDT was being used to great extent to eradicate malaria, after that peasants started to use pesticides to prevent their crops from harmful insects.

After the census of 2028 B.S., the population of Nepal has been increasing rapidly. As the population is being increased rapidly, at the same time it needs a lot of food, vegetables etc. to sustain. Due to this reason, the peasants started to use chemical fertilizer and pesticides to increase their agricultural products to get more profits. At the same time, the international pesticides companies are inventing and producing a lot of pesticides. The proclaimer and propagator of the companies and their projects, donor agencies, as well as the reorganized association of agriculture department 2029 B.S., later known as Vegetable Development Branch and Khumaltar Vegetable and Seed production Center have all emphasized to use chemical fertilizer and pesticides (VDB 2046 B.S.).

Now a day, most of the peasants are using pesticides as a medicine. Peasant's target is to increase their production. Such pesticides which they use to kill harmful insects, kill also useful organisms like spiders, ladybird beetles, dragon flies, fire flies, wasps, mud-bees, earth worms, miridbugs, and other micro organisms inside the soil. These beneficial organisms eat other harmful insects. The frequent use of pesticides on the crops, develops the poison resistance power of insects. And it brings different new insects and diseases, as a result, we face violent outbreak. Pesticides destroy the structure and composition of soil as a result, the agricultural productivity is being decreased day by day. In Nepal there are 60 meters high from sea level to 8884 meters highest peaks of the world, and a lot of mountain ranges as well as suitable natural environment. To protect these opportunities, we should check and control the use of pesticides. We can use integrated pest management to get rid of harmful insects. Now a day, this method is coming in use all over the world. This method is cheap and effective, and does not affect the human health, environment and all biodiversity. This method helps to achieve healthy crop products and it protects useful organisms alongwith it educates and makes aware the peasants for regular care and observation of their cultivated land.

Madanpokhara V.D.C. in Palpa district is model village among the 3913 V.C.C. of Nepal. Every infrastructure of development has been constructed in this village and the main occupation of the villagers is

agriculture. The peasants of Madanpokhara have been applying the modern system of commercial agriculture for past two decades. Among them, seasonal and un-season vegetables are major crops. The demand of vegetables is very high in the nearest commercial town Butwal and health resort Tansen. So peasants of Madanpokhara are much interested in vegetable farming. This commercial, agriculture system has brought a great change in the living status of poor, medium and rich peasant of this village. But the peasants of this place are using pesticides improperly and excessively. They have been creating great epidemic problem for present and future generations. The pesticides affect not only harmful insects but also it affects human beings, pet animals, local environment, water, land and air etc. During last 10 years, the application of pesticides shows that it is rapidly increasing.

However, there are several reasons behind the use of such pesticides, for instance the lack of knowledge and skill, greed for much profits, open market system, lack of regular supervision, the weakness of government to control pesticides etc. Moreover, peasants and consumers are not sensitive about pesticides. These are causes to create ferocious situation at present and in near future. In most of the vegetables, fruits, and foods, the residues of pesticides are remained, which brought new pernicious malady over men and animals. The use of pesticides, in Madanpokhara has created the dangerous effect on agricultural environment, human health and local biodiversity. Every year, demand of pesticides is increasing rapidly, so intensive scientific study has been necessary in this context. The present paper attempts to investigate the negative impact of pesticides on agricultural environment and to evaluate its effect on other aspects too.

METHODOLOGY

The present study is based on primary data collection. During the data collection, structured questionnaires were filled and participant observations as well as focus group discussion were done. Samples were selected from target households. Target households are those households who have their vegetable farms. Random sample technique was used during the data collection. 1020 households are living in Madanpokhara (Palpa District Profile 2057), among them 104 households were selected for not to be less than 10 percent of total households. During the period of investigation the researcher collected lids of empty bottle of pesticides which were used by the peasants.

FAVOURABLE CONDITION OF VEGETABLE FARMING

In 2040, B.S., the peasants of Madanpokhara started transforming subsistence agricultural system into commercialized agricultural system, vegetable farming, for sustainable agriculture development. There is favorable geographical condition, such as gentle slope fertile soil, climate,

as well as enthusiastic trend of peasants. Modern agricultural technology and new method of irrigation are available. Thus there is much possibility to modify vegetable farming and other commercial farming system. The village is linked with Siddhartha High Way. Butwal, the main commercial center is 30 K.m. away in south, and Tansen Municipality is situated 8 k.m. North of this VDC. The population of these two centers has been increasing rapidly. So, the conscious peasants have been quite careful in their vegetable farming to take more profits from their limited agricultural land. In the process of intensive vegetable farming, they use excessive pesticides on their vegetable crops, which are harmful for human health and other animals.

To fulfil the increasing demand of urban centers and to improve their own economic status, conscious peasants have been involved in such vegetable farming. Such farming can be noticed in neighboring areas of urban centers, rural market center or wherever they get proper transportation network. In other words, such commercial agriculture system is implemented wherever proper transport, electricity and modern technology are available.

APPLICATION AND QUANTITY OF PESTICIDES ON VEGETABLE CROPS

In Nepal pesticides are being used more or less either on vegetable or crops. Comparatively, food grain is used a few months later after the application of pesticide, but farmers bring pesticide used vegetables to sell in the market without caring the allotted waiting period hence, these poisonous vegetables create dangerous effect on the consumers. Table 1 shows the application and quantity of pesticides, Table 2 describes waiting period of peasants after application of pesticides, Table 3 explains the acquainted peasants about pesticides and their resisting, Table 4 shows effects of pesticides in useful organisms, while Table 5 shows the variations in agriculture production after the use of pesticides.

Table 1
Application And Quantity Of Pesticides In Vegetables
 (Quantity in Milliliter)

Ward	Name of Pesticides	Quantity (ML) I L. Water A. M. Mi.	Name of Pesticides	Quantity (ML) I L. Water A. M. Mi.	Name of Pesticides	Quantity (ML) I L. Water A. M. Mi.	Name of Pesticides	Quantity (ML) I L. Water A. M. Mi.
1			Metacid	3.40 3 2	Nuvan Dithane M 45 Malathin	2.25 2.5 3	Cythion Nicotine	3 30
2			Metacid	2.25- 3- 2	Nuvan	1	Nuvacron	2
3	Blitox	3	Metacid	4 10 3	Malathion	2		
4	Thiodan	2.41 4 2.3	Metacid	3 5 2	Nuvan Malathion	4 3 3.4 2		
5	Besidis Thiodan	3 4 9 2	Metacid	3.5 6 4	Malathion Fungicides	3 2	Bavistin Krilaxyl	5 10 2 9
6			Metacid Dithanr m78	2.75 2	Malathion Nuvan Dithane m 45	2 3 2 2 3 2 10	Bavistin	3
7	Thiodan Decis	2 3	Metacid	3.7	Nuvan	2		
8	Decis Thiodan	2 2	Metacid	3.5	Nuvan Dithanrem 45	2 3	Krilaxyl	4
9			Metacid	2.61	Dithane m 45	2.5		
Total	Blitox Thiodan Decis	(3ml av) 2.60 ml av. 2.5 ml av.	Metacid	3.19 ml av.	Nuvan Malathin Dithane m 45 Fungicide	2.21 ml av. 2.6 ml av. 4.5 ml av. 2.0 ml av.	Cythion Nuvacron Bavistin Krilaxyl	3 ml av. 2 ml av. 4 ml av. 4 ml av.

Source : Sample Survey by the Author 2058.

Table 2
Waiting Period Of Peasants After Application Of Pesticides

Ward	Name of Pesticides	Quantity (ML) I L. Water A. M. Mi.	Name of Pesticides	Quantity (ML) I L. Water A. M. Mi.	Name of Pesticides	Quantity (ML) I L. Water A. M. Mi.	Name of Pesticides	Quantity (ML) I L. Water A. M. Mi.
1			Metacid	9 18 7	Dithane M 45 Nuvan	7 10	Malathion Cythion Nicotine	5 7 5
2			Metacid	7 15 5	Nuvan	8 10 7	Nuvacron	15
3	Blitox	21	Metacid	8 10 7			Malathion	7
4	Thiodan	10	Metacid	9 15 4	Nuvan	7 10 3	Malathion	7 10 4
5	Besidis Thiodan	14 14	Metacid	14	Bavistion Fungicides	10 30	Malation Krilaxyl	5 14
6			Metacid	11	Bavistion Nuvan Dithanem 45	10 10 15	Malthion	10
7	Thiodan Decis	10 30	Metacid	10	Nuvan	10		
8	Decis Thiodan	8 7	Metacid	13	Nuvan Dithane m 45	10 15 7 6	Krilaxyl	20
9			Metacid	5	Dithane m 45	15		
Total	Blitox Thiodan Besibis Decis	21 day av. 10.25 " 14 " 8 "	Metacid	9.56 day av.	Dithane m 45 Nuvan Bavistin Fungicide	10.75 d a y av. 9.15 " 9 " 30 "	Malathion Cythion Nicotine Nuvacron Krilaxyl	6-8 day av. 6 day av. 5 day av. 15 day zv. 17 day av.

Source : Sample Survey by the Author 2058.

Table 3
Acquainted Peasants with Pesticides And Their Resisting
(In Household Unit)

Ward	Informed H.H. About the Pesticides	Dose Of Pesticide H.H. About Pesticides	Dose Of Pesticide		Resistively Developed Insects	Quantity Of Chemical Fertilizer.	
			Increasing HH	Decreasing HH		Increasing HH	Decreasing HH
1	5	7	3	9	Stinkbug, flea beetle	8	4
2	11		7	5	Stink bug, Hairy caterpillar, aphid, grasshopper	11	
3	4	7	6	5	Flea beetle, Hairy caterpillar, aphid, grasshopper	1	10
4	13	2	13	2	Stinkbug, aphid, grasshopper, Hairy caterpillar	11	4
5	7	7	3	11	Stinkbug, Aphid, Termit, White fly, Viruses	14	
6	5	7	7	5	Hairy Caterpillar, Termite, Grasshopper, stink bug, Jhimauri, Snail	7	5
7	7	4	3	8	Greenstink bug, grasshopper, hairy caterpillar, snail	2	9
8	6	5	7	4	Caterpillar, hairy caterpillar, Termite, snail	7	4
9	1	6	7		Hairy caterpillar, Jhimauri	7	2
Total	59	45	55	49		67	34

Source :- Sample Survey by the Author 2058.

Table 4
Effect Of Pesticides In Useful Organisms

(In Household Unit)

Ward	Name of declining useful organisms	Experienced Households	Frequency of Pesticides application A. M. Mi.	Family Having Separates Plots For Individual use	Difference In Pesticides Use In Individual Families	
					Un user family	User family
1	Earthworm, frog, bee, wasp	7	3 7 1	4		
2	Lizard, Dragonfly	5	2	1	10	1
3	Earthworm, spider, Bigbee	6	3	6	6	6
4	Frog, dragon fly	12	5.5 8 3	15	15	
5	Bee, wasp	8	4	14	14	
6	House lizard, earthworm	8	2	6	11	1
7	Bacteria, Fungi	4	3	1	1	10
8	Dragon fly, Fire fly	7	2	5	2	9
9	Earthworm, Hjimauri, Frog	5	2	2	1	6
Total		72	3 times (a ml av.)	58	64	37

Source :- Sample Survey by the Author 2058.

Table 5
Pesticides And Agricultural Production
(In Household of Unit)

Ward	Status of Agricultural Production, due to Pesticides		Agricultural Cost		Comparioson to Past ten year, Real Profit of Agricultural Production	
	Increasing	Decreasing	Increasing	Decreasing	Increasing	Decreasing
1	8	4	8			12
2	10	1	11			11
3	3	8				11
4	8	7	11	2		15
5	14		14			14
6	8	4	12			12
7	9	2	10			11
8	11		12			11
9	1	6	7			7
Total	72	32	84			104

Source :- Sample Survey by the Author 2058.

Application And Quantity Of Pesticides Used In Vegetables

The table 1, 2, indicate real picture of pesticide application and waiting period in Madanpokhara V.D.C. There are fifteen types of pesticide using in this village. Most of the peasants use very hard poison like metacid, without diagnosis. According to scale, in one litre water, metacid should be used 1 to 2 ml. But they use 3.19 ml on average and some peasants use excessively high dosage as, 10 ml per litre water.

The waiting period of metacid is 21 days after application but they don't wait more than about 9.56 days, average. Some peasants wait only five days (Table 2)

In Madanpokhara highly poisonous pesticides like metacid, thiodan and krilaxyl are being applied according to peasants individual choice. Total sample survey reveals that 30.76 percent tetacid, 32.08 percent thiodan 6.63 percent krilaxyl are being used. The peasants use very high dosage of poison in all kinds of pesticides. That has developed poison resistance power in harmful insects. To Protect crops from insects and diseases, we should change our farming method. In this case we can apply mechanical control, sweet net, trap, snare, and zoological control. The use of botanical pesticides on the basis of local resources may also be used. In the beginning period we should apply these methods. If these methods can't protect the crops, we should apply the pesticides on the standard scale with the help of agriculture technicians that can create a little effect on human health and local environment.

POLLUTION OF AGRICULTURAL ENVIRONMENT

Modern system of agriculture has created a large number of environmental problems. The application of hybrid seeds, chemical fertilizers, pesticides, and artificial irrigation have brought the farmers

large returns primarily, at the expense long term health and productivity of the land. Every crop removal has meant the diminishing value of micronutrients in the soil.

Agricultural environment is such a milieu where necessary elements of cultivation like soil, water temperature, rainfall, climate as well as geographical location are to be found. These biotic elements directly affect agricultural activities, controlling agricultural activities perpetually. All living beings of the earth are freely allocated on the basis of physical environment. A lot of useful and harmful organisms are dwelling in different environmental condition, but in spite of differences they are closely dwelled and related to each other. So, this intimacy has balanced the natural ecosystem.

Modern agricultural technology, and advantageous commercial farming system has been replacing subsistence agriculture, but these technologies, chemical fertilizer and pesticides are being used extravagantly, that has polluted present agricultural environment. The quality, structure and composition of soil are being deteriorated.

Soil productivity and resistance power of crops has been declining, and the price of vegetables and food grains is rising frequently. Peasants are investing too much but their out put is diminishing gradually. Peasants are not gaining hopeful return from their farm products. In comparison to last twenty years, at present, the peasants don't gain the expected return from their farm products.

Sample study of Madanpokhara shows that the use of pesticides has been creating negative effect on agro-biological diversity. About 43.26 percent of the peasants are using pesticides quite unknowingly (Table 3). Thus, the use of pesticides doesn't destroy harmful insects but also the useful organisms like earthworms wasps, bees, ladybird beetles, bacteria, fungi, etc. Among 59.23 percent of total households reported that the population of useful organism like earthworms, lizards, frogs, bees, wasps has been declining due to the use of pesticides (Table 4). Field experiment has also proved the given report. The population of useful organisms is decloning rapidly. In contrast to such organisms, the new harmful insects are being appeared and their population is growing fastly. The peasants of Madanpokhara are not getting hopeful profit from their agricultural products although they work hard.

The regular use of pesticides has been developing resistivity of the harmful insects. The pesticides which were quit eeffective, some years ago, have been useless now. For instance, hairy catterpillar has resisted metacid and thiodan. Likewise stinkbugs, semiloopers, thimres, grasshoppers, snails, jhimauris has resisted the useful effect of pesticides (Table 3).

In the cultivated land where pesticides have been used, the poison residue remains there for a longer time. The residue of chlorinated hydrocarbon (D.D.T. and B.H.C) remains from 6 to 12 years in the

cultivated land. The cultivated land, where such pesticides are used once, the soil and water of that land becomes polluted for longer time. The crops of such lands are also being affected. So, it has created negative impact on local environment. And the unrestricted use of powerful pesticides has destroyed the natural biotic system of pest management. At the same time chemical residues also arrive into the human chain from vegetable crops, water and soil. So, food chain is automatically disbalanced and a major part of living creatures in a micro environmental region is affected. For instance more biotic animals and insects into a micro environmental region are ravishing. These living creatures survive by eating the beings like house lizards, lizards, frogs, snakes etc. Moreover, the bird population is also declining. And further more, same scavenger animals and birds like vulture, eagle, crow, fox etc. which eat corpse and rotten materials and clean our environment, are also badly affected. Such conditions are noticeable in Madanpokhara.

In Modanpokhara, farm expenditure is highly increased due to the uncontrolled use of pesticides. All harmful insects are not destroyed by the use of pesticides. Some part of their population is still remained there. After some time they developed their generations and destroy the crops. In this way, pesticides are being used over and over for an effective result. It is reported that the same pesticides are used three times on the same crop for a hopeful return. Even some peasants use eight times too (Table 4). 80 percent of the total households realize the increasing rate of their agricultural cost and the diminishing condition of their return (Table 5).

CONCLUSION

The commercial agricultural system has brought a great change in the living status of the peasants in Madanpokhara. But these peasants are using pesticides improperly as well as excessively. They have been creating great threat for present and future generations. People have been deteriorating agricultural environment and local bio-diversity intentionally and ignorantly. Now a day, peasants are practicing such pesticides as a medicine.

Due to the frequent use of such pesticides on the crops, the residues are remained in the agricultural products, which fetch new pernicious malady over men and animals. The peasants sell their vegetables in the market even without maintaining the waiting period after application of the pesticides. And, at the same time, the common consumers are using these poisonous vegetables benumbly.

Agricultural pollution is increasing rapidly. The structure and composition of soil is also destroying day by day. So, as a result, the agricultural productivity is being decreased and agro-climatic zone is also degrading gradually.

All living beings of biosphere like birds, animals aquatic animals and men have been affected by pesticides. So pesticides shouldn't be regarded as a medicine, because, actually these are poisons. Thus, let us consider and suggest to other to be far away from the use of such insecticides.

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