

## **A Study on Harmful Effects of Pesticide Residue in Vegetables**

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**Abstract-** Pesticides are very hazardous and lethal for organisms as well as for humans. They present danger to consumers, bystanders and workers during manufacture, transport or, during and after use. Pesticides are also toxic to plants and many food crops, including fruits and vegetables, contain pesticide residues after being washed or peeled. Pesticides decrease the biodiversity in soil and it has been found that the quality of soil is higher in the absence of pesticides with the additional effect of higher water retention. A number of pesticides are highly toxic and even in very small quantities these pesticides can result in the death of humans and animals, while exposure to a sufficient amount of almost any pesticide can initiate long-term illness. Due to this the use of organophosphorus pesticides has been increased as they are less persistent and damaging to the environment when compared to organochlorine pesticides.

**Keywords-** Pesticides, organophosphorus pesticides, organochlorine pesticides, DDT, DDE

### I. INTRODUCTION

Pesticides are widely used in fruit and vegetables because of their susceptibility to insect and diseases. They have been widely used throughout the world since the middle of the last century for their various benefits. Pesticides have been applied in agriculture and animal production to eliminate pests [1]. In this way, to increase both animals and crops outputs, improve quality of products, and decrease the incidence of illnesses propagated by insects. In fruits and vegetables production, insecticides are used to control pests and

fungicides to control diseases. They are directly applied to the crops and some may still be present as residues in the fruits and vegetables after their harvest. It is true that that most insecticides and fungicides are toxic substances, but when used properly they constitute an important input in fruits and vegetable production in order to produce economically marketable products. However such improper usage has occasionally been accompanied by hazards to man and the environment. Residues of most pesticides are present in all compartments of agro-ecosystems [2], but perhaps the most real risk of human is through consumption of residues in food as vegetables and fruits [3]. Some of these pesticides in particular are persistent and very resistant to microbial degradation. The high toxicity of most pesticides has made their use very restrictive and currently forbidden in most developed countries since 1970s. The organophosphate, organochlorine and related pesticides act by binding to the enzyme acetyl cholinesterase, disrupting nerve function, resulting in paralysis and may cause death [4]. They may produce acute effects manifesting as meiosis, urination, diarrhea, diaphoreses, lacrimation, excitation of central nervous system and salivation. The chronic exposure involves neurotic and behavioral effects. Specific effects of pesticides can include cancer, allergies and hypersensitivities, damage to the central and peripheral nervous systems [5], reproductive disorders and disruption of the immune system whereas many of the

banned pesticides are no longer in use in the developed world, they are still used in many developing countries including Ghana. Other legitimate pesticides are also used in variety of applications. Additionally, there are indications of widespread contamination of various components of the environment with dichlorodiphenyltrichloroethane and their hexachlorocyclohexane (BHC) residues in several Third World nations. The problems of environmental pollution in these countries are not well documented, because of potential toxic and persistent nature of some pesticides, developed nations like United States, Japan, and European Union have put in place measures for pesticides control and monitoring in the environment. Consequently, regular survey studies and monitoring programs of pesticides residues have been carried out [6].

## II. REMOVAL OF TRACE PESTICIDE RESIDUES FROM PRODUCE

Over the past ten years more residues have consistently been found on raw produce than on the corresponding processed commodities. This led to the hypothesis that certain types of processing or household preparation may serve to reduce pesticide residues. Hypothesizing that rinsing during the processing procedure may play some role in reducing residue levels [7], we initiated a study to examine the effects that rinsing produce under tap water has upon pesticide residue levels [8]. Numerous fruit and vegetable wash products recently appeared in the marketplace.

## III. RINSING WITH TAP WATER

Although it has been assumed for many years that rinsing fruits and vegetable prior to consumption reduces the amounts of pesticide residues, this anecdotal approach needed laboratory confirmation. There are numerous studies in the scientific literature that have examined the effect of washing produce to remove pesticide residues as a step in commercial crop

processing. These studies are of little practical use to the consumer who wants to know what effect household preparation has upon reducing pesticide residue levels. There are also a handful of studies that examine the effects of washing as part of larger household preparation studies. In most cases, however the sample sizes were too small to apply statistical analysis (1). A wide variety of crops that contained residues were examined. Residues of DDE, a metabolite of DDT, were also studied. Although many persistent organo halogen pesticides (POPs), such as DDT, were banned for use on food crops between 1972 and 1978 in the United States, they have remained in the environment where they continue to be incorporated into plant biomass [9]. Data presented in this study as shown in Table I shows that a short rinse in tap water reduces pesticide residues on many types of produce. Residues of vinclozolin, bifenthrin and chlorpyrifos were not reduced. This study also shows that the water solubility of pesticides does not play a significant role in the observed decrease. The majority of pesticide residue appears to reside on the surface of produce where it is removed by the mechanical action of rinsing [10].

## IV. FRUITS AND VEGETABLES WASH RINSING

In the spring and summer of 2000, the effectiveness of four commercially available fruit and vegetable wash products at removing pesticide residues from produce was compared to a 1% solution of Palmolive and to rinsing with tap water alone. The nine pesticides examined in this study included many of those from our previous study. The three fungicides chlorothalonil, iprodione, and vinclozolin were examined as was the herbicide DCNA, and the insecticides bifenthrin, diazinon, endosulfan, malathion and permethrin. A total of twenty-eight harvests were made including sixteen of lettuce, four of strawberry, four of tomatoes, and four control lettuce batches. Each batch was divided into seven treatment groups. One group was analyzed in an unrinsed state as received from the field; one group was rinsed under tap water for one minute. The five

remaining groups were individually treated with either FIT, Fruit & Vegetable Wash<sup>®</sup>, Organiclean<sup>®</sup>, Vegi-Clean<sup>®</sup>, or a 1% solution of Palmolive and then rinsed under tap water for one minute. In the case of the control lettuce batches all seven-treatment groups were processed in an unrinsed state to ensure that each group contained statistically equivalent pesticide residue levels. A total of 196 samples were processed. Detailed statistical analysis showed that in all cases at least one group was different from the rest. Pairwise comparison showed that the group that was different was the unrinsed produce. There is little or no difference between tap water rinsing or using a fruit and vegetable wash in reducing residues of the nine pesticides studied. The removal of waxes and/or dirt from the produce was not examined as part of this study.

## V. CONCLUSION

Pesticide exposure can cause a range of neurological health effects such as memory loss, loss of coordination, reduced speed of response to stimuli, reduced visual ability, altered or uncontrollable mood and general behavior, and reduced motor skills. These symptoms are often very subtle and may not be recognized by the medical community as a clinical effect. Other possible health effects include asthma, allergies, and hypersensitivity, and pesticide exposure is also linked with cancer, hormone disruption, and problems with reproduction and fetal development.

## VI. REFERENCES

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Table I

Results of tap water rinsing in reducing residues across all commodities

<b>Pesticides</b>	<b>Pairs of Data</b>	<b>Significantly Reduced</b>	<b>Water Solubility (mg/L @ 20 ° C)</b>
Insecticides			
Endosulfan	60	Yes	0.32
Permethrin	37	Yes	0.2
Diazinon	22	Yes	40
DDE	21	Yes	<1
Chlorpyrifos	13	No	2
Methoxychlor	12	Yes	0.1
Malathion	7	Yes	130
Bifenthrin	7	No	0.1
Fungicides	10	Yes	2.2
Captan	34	Yes	3.3
Vinclozolin	23	No	3.4
Iprodione	13	Yes	13
Chlorothalonil	9	Yes	0.6