

Study on Pesticide Residues in Selected Foods in Jimma Zone, Southwest Ethiopia

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Abstract: Plant protection products (PPPs) in agriculture are regularly used to protect crops. Pesticides can be classified into a number of different types and chemical groups, including fungicides, insecticides, growth regulators, etc. The residual pesticides could pollute the environment; contaminate water, soil, and foodstuffs like fruits and vegetables, in addition to their use for pest control. These chemicals can build up and lead to major health issues. Some types of pesticides cause specific illnesses, whereas others impair liver or lung function and some simply mildly irritate the skin, some are carcinogenic. In the other way, pesticides especially insecticides are neurotoxic to both insects and people. Today, pesticides detected in several samples, including those of milk, cereal crops, coffee, and staple foods. The leftovers build up in the soil, water, cereal crops, fruits, and vegetables, among other places, and they stay there for a while. The aim of this paper was to study the presence of pesticide residues in some selected food items in Jimma areas. Although it indicates the presence of pesticide residues in the area. We advise against utilizing them or only using them when absolutely essential, at the appropriate rate, and only where they are intended. It is also recommended to assess the pesticide residue concentration levels and follow up in the food items.

Keywords: Food, Fungicides, Health, Insecticides, Jimma, Pesticide Residue, Protection

1. Introduction

In agriculture, plant protection products (PPPs) are frequently employed to safeguard crops. Pesticides fall under several types and chemical groupings (such as fungicides, insecticides, growth regulators, etc.) as a result of their unique chemical structures. Scientists are therefore faced with the difficulty of creating an all-encompassing, environmentally friendly analytical method that can identify a variety of pesticide residues in a single analytical cycle [16].

Today, the environment in which bee products are made is polluted by several toxins. Application of pesticides to crops has the potential to pollute the soil, air, water, and flowers from which bees collect nectar to make honey. This could result in the entry of those hazardous chemicals into the food chain, which could have an adverse effect on human health [1, 8]. The determination of pesticide residues in honey at trace levels is a challenging task owing to the complex matrix of honey and its high sugar content [5].

To protect plants and crops from pests and plant diseases,

pesticides are agrochemicals that are frequently employed in agriculture [7, 13, 15] Pesticides are used to manage pests, boost crop yield, and enhance product quality. In addition to their utility for pest control, the leftover pesticide residue could pollute the environment; contaminate water, soil, and edibles like fruits and vegetables. A major global public health concern is the tainting of food products by dangerous compounds, such as residuals of persistent pesticides. Some pesticides are dangerous and poisonous to human health; contact with their residues can endanger people and lead to certain disorders [12]. The majority of pesticides are typically (toxic) poisonous to non-target species, including people. Pesticides have a variety of negative effects on human health. Some are carcinogenic; others damage liver or lung functioning, while some have only mildly irritating effects on the skin. Numerous pesticides, especially insecticides, are neurotoxic to both insects and people [7].

Pesticide exposure can happen in a variety of ways. Pesticide residues in food, the mixing, loading, and application of pesticides, as well as the harvesting of crops sprayed with pesticides, are common exposure routes that

carry a higher risk of harm. The majority of high exposure by these means takes place in underdeveloped nations [7].

Due to their distinctive nectar release during the summer, a season with no other blooming of significance for beekeeping, cotton plants are particularly well-liked by beekeepers. The biggest problem with cotton plants is the extensive use of several pesticides, which causes a drop in the bee population and taints honey. However, the over use of pesticides has led to a number of environmental issues, such as pesticide residues in food that pose a possible risk to human health [4].

Pesticide application for the control of pests, insects, herbs and weeds in house hold, agricultural crops, the soil and water causing serious health problems. Therefore pesticide applications need critical attention. The investigation's main goal of this paper was to determine the presence of pesticide residue in selected foods and crops of Jimma Zone, Ethiopia.

2. Most Commonly Used Pesticides

Organophosphorus compounds (OPCs) are the pesticides that are most frequently employed in agriculture. There are more over 100 distinct OPCs, and intentional and unintentional chemical poisoning is a major global health issue [2]. For the purpose of eliminating insects like fleas, lice, flies, and mosquitoes, organophosphate chemicals are utilized [6]. In agriculture, these substances are employed to control pests on crops and livestock [6]. High acute toxicity characterized by these pesticides. Acetylcholine esterase enzyme (AChE), an enzyme that is responsible for hydrolyzing acetylcholine, a neurotransmitter in the central and peripheral nervous systems, is the target site of OPs insecticides for toxicity. The cholinesterase (ChE) enzyme and organophosphate insecticides bind at the neuromuscular junction, and the deactivator inhibits the enzyme's action through irreversible phosphorylation [6, 7]. Acetylcholine accumulates in cholinergic synapses as a result of OPs' inhibition of AChE, which also overstimulates muscarinic and nicotinic cholinergic receptors. Due to the location of these receptors in the majority of the body's organs, a cholinergic syndrome develops. This syndrome includes increased sweating and salivation, profound bronchial secretion, bronchoconstriction, miosis, increased gastrointestinal motility, diarrhoea, tremors, muscular twitching, and various effects on the central nervous system. The central nervous system (CNS) may suffer long-lasting negative health effects from acute exposure to excessive dosages of OPs [6, 7]. OPs may also result in an intermediate state in addition to the acute cholinergic syndrome [6, 7]. The signs and symptoms of organophosphate-induced delayed polyneuropathy (OPIDP), which may appear 2-3 weeks after a single exposure, include tingling in the hands and feet, followed by sensory loss, progressive muscle weakness, flaccidity of the distal skeletal muscles of the lower and upper extremities, and ataxia [6, 7]. A pesticide-related sickness arises from exposure to organophosphate pesticides at low to moderately high dosages. These mild to moderate

organophosphate toxicity symptoms also include ChE depression, nausea, headache, dizziness, impaired vision, stomach discomfort, vomiting, and chest tightness [6].

Even though organochlorine and organophosphorus pesticides are now illegal to use everywhere, their persistence means that their residues can still be found in biological and environmental samples. OCPs have been used in Ethiopia for a long time to prevent malaria in households as well as insecticides on agricultural areas. Although these pesticides have been used for long time, their residues detected in various samples such as khat, [12], milk [14], staple foods (10), maize (11), which were studied around Jimma zone and the surrounding, Ethiopia. In this review we understand the presence of pesticide residue in edible goods around Jimma zone.

Table 1. Status of pesticide residues around Jimma zone.

Sample type	Status of the study	References
Khat (<i>Catha edulis</i>)	Found	Seblework et al., 2017
Maize	Found	Seblework et al., 2015
Teff	Found	Seblework et al., 2014
Milk	Found	Sosina et al., 2013

From the above table, we observe the presence of pesticide residue in different food items and khat, which are frequently consumed by humans. As the study in [11] indicates, the pesticide residue was found complementary foods for infants which were made from maize. As well as the study in [14] shows the presence of pesticides in cow and human milk. This is very critical for infant health. Therefore serious assessment and follow up will be needed.

3. Conclusion

In general, pesticide residues are worldwide concern in this time especially in developing nations. Frequently pesticide residues are applied without care. It causes serious problems on the person who consume the crop products, water found where around which pesticide was applied, honey, milk, crops and others produced there. Especially honey is produced widely used as a common meal and having traditional medicinal values, particularly among Ethiopians. It must be safe for human consumption and devoid of any chemical contaminates, since it is directly ingested without any treatment or cook. Given the state of the environment, food safety, and human health, it is a serious problem. The residues accumulate in the soil, water, cereal crops, fruits, vegetables etc. it also remains on where it accumulated for several years. The accumulations of these pesticides cause serious health problems like chronic diseases after several years of accumulations.

As the studies show that, the pesticide residue was found in complementary foods for infants which were made from maize. As well as the shows the presence of pesticides in cow and human milk. This is very critical for infant health. Therefore serious assessment and follow up will be needed.

We recommend that it is advisable against using them, or just using them for necessary purposes, at the proper pace,

and only in the intended locations. It is also preferable to sequentially evaluate the pesticide content in the commodities.

Data Availability

Data sharing is not applicable to this article as no datasets were generated, since this is a review paper.

Conflicts of Interest

There is no conflict of interest that author can identify with regard to the publishing of this review study.

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