Introduction

The use of pesticides is not new, as man has developed several methods to control the invertebrates, vertebrates and microorganisms that constantly threatened the supply of food and his health. In order to maximize food production, it is advantageous to protect crops from competing species of plant, threatened invertebrates, vertebrates and microorganism. Over the centuries, man has developed many ingenious methods to control these harmful organisms and use of pesticide is one of them.

The term “pesticide” refers to any substances used to control something which has been designated as a “pest”-itself another term, covering a diverse array of organism. Insects are probably the most common type of pest encountered and as a group; they are arguably the most destructive globally (Worthing 1991). The pesticides usage has contributed for increasing agriculture production and suppressed the vectors of health diseases, but sometimes due to wrong identification of pests and diseases, the farmers will not apply suitable chemical which in turn will create pollution problems.

FAO has defined the term of pesticide as : “any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or animal diseases, unwanted species of plants or animals causing harm during or otherwise interfering with the production, processing, storage, transport or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs, or substances which may be administered to animals for the control of insects, arachnids or other pests in or on their bodies. The term includes substances intended for use as a plant growth regulator, defoliant, desiccant or agent for thinking fruits or preventing the premature fall of fruits, and substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport”.

Since before 2000 BC, humans have utilized pesticides to protect their crops. The first known pesticide was elemental sulfur dusting used in ancient summer about 4500 years ago in ancient Mesopotamia (Rao GUR et al., 2007). By the 15th century, toxic chemicals such as arsenic, mercury and lead were being applied to crops to kill pests. In the 17th century, nicotine sulfate was extracted from tobacco leaves for use in insecticide. The 19th century saw the introduction of two more natural pesticides,
pyrethrum, which is derived from Chrysanthemums, and Rotenone, which is derived from the roots of tropical vegetables (Miller, 2002).

Until the 1950s, arsenic based pesticides were dominant (Ritter, 2009). Paul Müller discovered that DDT was a very effective insecticide. Organochlorins such as DDT were dominant, but they were replaced in U.S. by organophosphates and carbamates by 1975. Since then, pyrethrin compounds have become the dominant insecticide (Ritter, 2009).

In the 1940s, manufacturers began to produce large amount of synthetic pesticides and their use became widespread (Daly H. et al., 1998). Some sources consider the 1940s and 1950s to have been the start of the “pesticide era” (Graeme Murphy, 2005).

Pesticides are used to control organisms which are considered harmful. For example, they are used to kill mosquitoes that can transmit potenti Herbicides are commonly applied in ponds and lakes to control algae and plants such as water grasses that can interfere with activities like swimming and fishing and cause the water to look or smell unpleasant (Helfrich et al.).

Unfortunately, pesticides don’t affect only the target species, they might affect frequently non-target species because they posses physiologic and biochemical systems similar to those of target organism.

The World Health Organization and the UN Environment Programme estimate that each year, 3 million workers in agriculture in the developing world experience severe poisoning from pesticide, about 18,000 of whom die (Miller, 2004).

Many pesticides can be grouped into chemical families. Prominent insecticide families include organochlorines, organophosphates, and carbamates (Kamrin MA., 1997).

According to the U.S. EPA, chemical pesticides can be divided into four main categories : Organophosphate pesticides, Carbamate pesticides, Organochlorine insecticides and Pyrethroid pesticides. The newest major class of insecticides is the synthetic pyrethroids, a group of chemicals just entering the market place in 1980; but by 1982, accounting for approximately 30% of the worldwide insecticide usage (Anon, 1977).
Synthetic Pyrethroids are synthesized derivatives of naturally occurring pyrethrins which are taken from pyrethrum, the oleoresin extract of dried Chrysanthemum flowers. The insecticide properties of pyrethrins are obtained from ketoalcoholic esters of Chrysanthemic and Pyrethroic acids (Mueller et al., 1990). These are strongly lipophilic and rapidly penetrate many insects and paralyze their nervous system (Reigart et al., 1999). Pyrethrins affect the nervous system of insects by causing multiple action potentials in nerve cell by delaying the closing of an ion channel (Bradberry et al., 2005).

The major active principles in Pyrethrum are Pyrethrin I, ester of Chrysanthemic acid (Pyrethrin I, Cinerin I, and Jasmine I), and Pyrethrin II which are esters of pyrethric acid (Pyrethrin II, Cinerin II, Jasmoline II). Pyrethrin I is most active ingredient for lethality whereas Pyrethrin II possess remarkable knockdown properties for wide range of household, veterinary and post-harvest storage insects. Several of Pyrethroid esters exist in isomeric forms which have distinctively different toxicities and potencies.

Based on symptoms produced in animals, the Pyrethroids fall into two distinct classes of chemicals:

The type I poisoning Syndrome or “T” syndrome is produced by esters lacking α-cyano substituent and is characterized by restlessness, sparing, aggressive behavior, enhanced startle response, whole body tremor prostration. Chemicals included are Pyrethrin I, Allethrin, Tetramethrin, Permethrin and Phenothrin.

The Type II syndrome, also known as the “CS Syndrome” is produced by those esters containing the α-cyano substituent and elicits intense hyperactivity, incoordination, and convulsions, burrowing behavior, coarse tremors, seizures, sinus writhing (Chreothetosis) and profuse salivation without lacrimination, hence the term CS (Chreoathetosis salivation) syndrome. Chemicals are Cypermethrin, Deltamethrin, Cyphenothrin, Cyfluthrin, and Fenvalerate.

Cyfluthrin is a synthetic type II pyrethroid insecticide. The original compound was isolated from the flower of *chrysanthemum* (Bloomquist, 1993). Cyfluthrin was first registered for use in the U.S. in 1987. It is used to kill unwanted insects in agriculture, in or around buildings, and on ornaments plants (U.S. EPA, 1987). A resent survey of
household pesticide use conducted for the U.S. Environmental Protection Agency (EPA) showed that cyfluyhrin use is extensive.

On a biochemical level, cyfluthrin has a complex mode of action and affects normal nerve function in several ways. It induces alterations in nerve membranes, causing abnormal sodium and potassium flows.

The most common symptom of acute exposure to cyfluthrin (and other synthetic pyrethroids) is paresthesia (a stinging, burning, itching and tingling of the skin particularly common on the face), progressing to numbness (Morgan, D.P. 1989). Large doses of cyfluthrin cause excess salivation, irritability, tremors, incoordination, convulsions, and a fall in blood pressure (Morgan, D.P. 1989). It caused changes in wide variety of organs such as submaxillary glands, liver, adrenal, spleen and ovary in rats.

Liver, the largest organ in the body, is being evolved to maintain the body’s internal milieu and also protect itself from the challenges it faces during its functioning. Since it is evolved in the biochemical conversions of various endogenous and exogenously administered/ ingested substances, there is a possibility of generation of various highly reactive species of free radicals.