

Pesticides are chemical or biological substances biology essay

[Science](#), [Biology](#)



INTRODUCTION

Pesticides are chemical or biological substances that are used to protect plants against pests and/or diseases. They operate by either killing, repelling or weakening insects, diseases and weeds that cause harm to the plant. The pesticide industry has grown exponentially during the past few decades as a result of an increase in global food demand. The world insecticides market is expected to reach almost 535 kilo tons by 2016, recording in excess of 4% yearly growth for the five preceding years. Nowadays, crops are grown on industrial scale and tons of food is produced. Farmers cannot afford to lose their harvest. To increase productivity a great deal of fertilizers and pesticides are used to produce quality crops. This practice has unfortunately lead to numerous problems associated with pesticide abuse such as unintentional poisoning to man and toxic residues that are hazardous to health in the environment. According to WHO estimates, one million cases of pesticide poisoning occur every year and consequently there are 20, 000 deaths globally (Nasir, 1999). The existence of high concentration of pesticide residues in food chain, together with knowledge of some of their adverse effects, has alerted the public to the need for regulation. To remedy this situation, MRLs (Maximum Residue Levels) have been set by international health organization such as the WHO (World Health Organization) and the EFSA (European Food Safety Authority) to ensure food safety. These MRLs need to be strictly followed by the planters. Although there are human benefits in terms of increasing productivity to a greater extent, the use of pesticides, have some drawbacks such as potential toxicity to humans and other animals. According to the Stockholm Convention on

Persistent organic pollutants, 9 of the 12 most dangerous and persistent organic chemicals are pesticide. Pesticide residues can have a great impact on human health if not taken into consideration although the long term effect of pesticide exposure are not well known. There are 2 type of pesticide: Contact pesticide are pesticides which kills insects on direct contact that is they act immediately when they are sprayed. Weed foliage is killed when enough contact herbicide is sprayed on the area. Systemic pesticide are pesticides which are absorbed by plants and move to infected tissues. Systemic herbicides move within the plant to infected areas of leaves, stems or roots. Several type of pesticides (fungicide, herbicides and insecticide) are used in combination for better protection in vegetable cultivation. Although most vegetables are washed before sales, it is incorrect to assume that all the pesticides have been removed. There are 4 common class of pesticide:

Organophosphate Pesticides

http://www.eoearth.org/files/207901_208000/207993/320px-chlorpyrifos-wikicomm.png These pesticides affect the nervous system by disrupting the enzyme that regulates acetylcholine, a neurotransmitter. Most organophosphates are insecticides. They were developed during the early 19th century, but their effects on insects, which are similar to their effects on humans, were discovered in 1932. Some are very poisonous (they were used in World War II as nerve agents). However, they usually are not persistent in the environment.

Carbamate Pesticides

File: Carbofuran-from-xtal-2D-skeletal. svg These affects the nervous system by disrupting an enzyme that regulates acetylcholine, a neurotransmitter. The enzyme effects are usually reversible. There are several subgroups within the carbamates.

Organochlorine Insecticides

http://0. tqn. com/d/chemistry/1/0/K/F/1/Dieldrin. jpg They were commonly used in the past, but many have been removed from the market due to their health and environmental effects and their persistence (e. g. DDT and chlordane).

Synthetic Pyrethroid Pesticides

http://upload. wikimedia. org/wikipedia/commons/6/6d/Deltamethrin-2D-skeletal. png Synthetic-pyrethroid pesticides are a pesticide synthesized by imitating the structure of natural pyrethrins. They are comparatively more stable with longer residual effects than natural pyrethrins. Synthetic-pyrethroid pesticides are highly toxic to insects but of only slight toxicity to mammals. Allethrin and Permethrin are examples of synthetic pyrethroid pesticides.

TOXICITY AND HAZARD

The toxicity of any substance is directly related to its dose. A small dose of a highly toxic substance can cause severe symptoms of poisoning. However, for a substance with a low toxicity, larger doses are required to produce mild symptoms. Even common substance such as coffee can become poisons if

consumed in excess. Toxicity can be either acute or chronic. Acute toxicity is the ability of a substance to cause harmful effects within 24 hr. after contact. Chronic toxicity is the ability of a substance to cause adverse health effects as a result of long-term exposure to the substance. There is a great range in the toxicity of pesticides to humans. The relative hazard of a pesticide is dependent upon the toxicity of the pesticide, the dose received and the length of time exposed. A hazard can be defined as a source of danger. The hazard in using a pesticide is related to the likelihood of exposure to harmful amounts of the pesticide. Exposure can be influenced by the amount of pesticide used, concentration of the pesticide and how the pesticide and application equipment are handled. A pesticide can be highly toxic as a concentrate, but pose little hazard to the user if: used in a very dilute formulation, used in a formulation not readily absorbed through the skin or inhaled, used only under conditions of no human exposure, or Used by experienced applicators who are equipped to handle the pesticide safely. In contrast, a pesticide may have a relatively low toxicity but present a hazard because it is used in the concentrated form which may be readily absorbed or inhaled.

Pesticide Toxicity

The toxicity of a pesticide can be measured several ways, but generally human toxicity is estimated based on test results on rats and other animals. Toxicity studies are only guidelines. A pesticide that is poisonous to rats is not necessarily equally poisonous to people or other animals. Some

pesticides are dangerous after one large dose (acute toxicity). Others can be dangerous after small, repeated doses (chronic toxicity).

Measuring Chronic Toxicity

Chronic toxicity refers to the effects of long-term or repeated lower level exposures to a toxic substance, such as when a pesticide applicator is frequently wetted with spray during unsafe spray practices. The effects of chronic exposure do not appear immediately after first exposure and may take years to produce symptoms. Pesticides which have a tendency to accumulate, or which break down slowly in body tissues, usually represent the greatest chronic exposure hazard. Someone who is frequently exposed to low doses of such pesticides may develop symptoms of poisoning long after the first exposure. Chronic exposure may include chronic oral, chronic dermal or chronic inhalation poisoning. The symptoms of chronic toxicity develop slowly and persist for a long time after exposure. Such symptoms may occur in three ways: As a complication of acute poisoning. For example, a severe exposure to a pesticide may cause acute effects such as nausea, chest pain and vomiting as well as chronic effects resulting from kidney, liver and lung damage. As a slowly progressive condition, without any incident of acute poisoning. For example, increased breathing difficulty or skin sensitization (allergy) after repeated use of a pesticide. As the occurrence of a disease or condition initiated by previous exposure. For example, the development of cancer years after a period of exposure. Very few pesticides now in use are known to cause chronic effects, if used according to label directions. However, a few pesticides are suspected or known to cause

chronic illness in test animals or humans when exposure levels are high. The registration of some pesticides has been cancelled because the suspected or identified chronic effects represented a significant health hazard. Evidence of chronic effects is usually associated with long-term exposure of test animals to relatively high doses. Thus people who run the greatest risk of developing any chronic effects are workers involved in the manufacture of chemicals or applicators exposed to high levels of pesticides over many years. Chronic toxicity symptoms may not always be recognized as having been caused by exposure to a toxic chemical months or years in the past. The levels of exposure which might cause chronic effects in a human individual are very difficult to predict. Thus anyone handling pesticides should attempt to minimize their exposure and eliminate the possibility of chronic effects.

Tomato Cultivation in Mauritius

Tomato (*Lycopersicon esculentum*) is one of the various vegetable that is mainly consumed by Mauritian on a daily basis either in main dishes (cooked or raw) or as salad. Tomato demand has been on a constant increase during the past few decades, resulting in a large increase in the use of agrochemicals including pesticides to control pest as well as diseases in order to increase productivity. Tomato is easily grown all over the island in Mauritius due to its favorable climate and its fertile volcanic soil. These are mainly grown in open field. Three types of tomatoes are commonly grown. These are 1. Cooking Tomato 2. Salad Tomato 3. Cherry Tomato Harvesting begins about 2 months after transplantation, at regular intervals when the tomatoes are well shaped and when they have turned from dark green to

light green. These are allowed to ripen in a shady and cool place. When the tomato begins to mature, it has a pink or yellow coloration, which turns to red eventually. The tomato industry is estimated at a value of around Rs 300 M with an annual production of 14, 700 t over an area of 935 ha and at a market price of Rs 13. 00 to 105. 00 / Kg. The production of salad tomato crop is estimated to be around 2000 t yearly. In 2006, the production and area harvested has peaked up as compared to a lower production in 2005. The local production of tomato should be increased to some 28, 000 t by 2015 to meet the increasing demand of the growing population and the boost of the tourist industry taking into account our requirements for fresh consumption as well as raw materials for processing.

Year**2001****2002****2003****2004****2005****2006****2010****2015****Area****harvested****(ha)**

934. 09471, 044. 3953. 2918. 593511121644

Production/t

12, 39511, 73813, 24714, 40012, 84014 67117, 50028, 000

Pesticide commonly used in Tomato Cultivation

A large number of pesticides are sprayed on tomatoes. " Fresh" tomatoes are for slicing and salads. Tomatoes are also grown for processing into a wide variety of different products. The pesticides used on tomatoes include insect-killers, weed-killers, plant growth regulators and other types of pesticides.