Uses and Concerns of Pesticides

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What are pesticides...

Substances used to control pests are described as pesticides. There are different definitions for pest in different countries and agencies but for the purpose of regulation of pesticides in Sri Lanka the pest is defined in the Control of Pesticides Act as follows;

> *Any insect, rodent, birds, fish, mollusc, nematode, fungus, weed, micro-organism, virus or other kind of plant or animal life which is injurious, troublesome or undesirable to crops, stored products, processed foods, wood, cloth, fabrics or inanimate objects or which are objectionable from the view point of public health and hygiene and shall also include ectoparasites of man and domestic animals other than any pest which may be specifically included or excluded by regulations made under this Act.*

Pesticides are found in number of sectors even though their uses were mainly limited to public health and agricultural activities in the past. Such fields consists

- Household
- Veterinary (poultry, pet-care etc)
- Industrial (wood, paint, building construction etc.)
- Food wrappings
- Clothing/garment industry

Need for Pesticides

There are number of reasons for continued uses of pesticides. Easy handling, superior efficacy and ability to reach the target, quick action, less sophisticated handling techniques are some of the striking features of pesticides compared to those of alternative pest control options. A significant quantity of pesticides are used in agriculture and some of the obvious factors that are often quoted to justify its continued use in agriculture include ever increasing population and limited land availability to feed the population associated with significant crop losses due to pest damages. (Figure 1).

One of the effective options to control pest damages in agriculture is the use of chemical pesticides. It is reported that there are 14%, 13% and 15% pre-harvest losses of crops due to weed, pathogen and insect damages respectively, while estimated 15% loss occur due to during post harvest pest

damage. (Major Crops considered: Rice, wheat, barley, maize, potatoes, soybeans, cotton, coffee which cover ca. 50% of crop area worldwide). It is estimated that 1.5 billion ha. have been utilized to produce the required food-stuff, in the year 2000. However it is also estimated that if pesticides were not used for the food production that year nearly 4.0 billion ha would have been required to produce the same amount of food. The area then would cover the entire arable land and nearly 90% of the grassland of the world (Ref. Pflanzenenschutz Nachrichten, Bayer Crop Science, 2004,1, Vol,57).

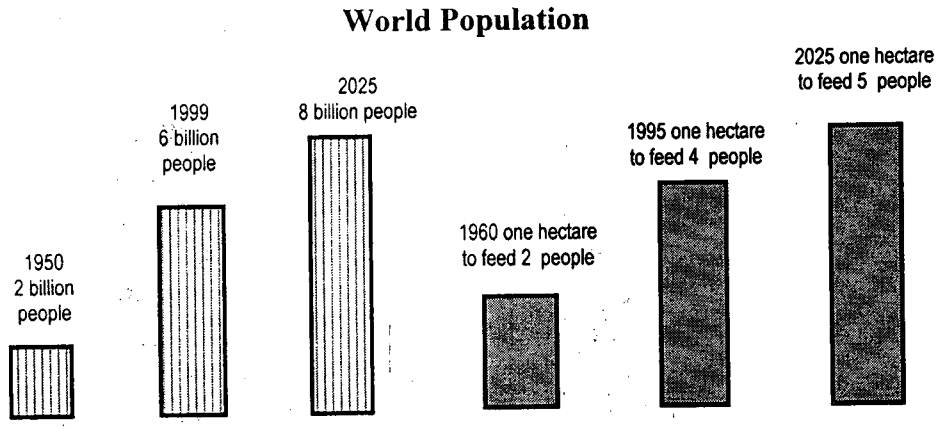

Figure 1: Demand for Food
(Curtsey: Syngenta, UK)

Health and Environmental Hazards

Pesticides are different from other chemicals because they are designed to be toxic and are intentionally dispersed in the environment. The problems associated with pesticides are mainly three fold;

- **Acute toxicity**: Toxic effects resulted from short-term exposure to pesticides
- **Chronic toxicity**: Toxic effects resulted from long-term exposure to pesticides
- **Environmental damage**

Acute Toxicity

It is reported that there are 3 million poisonings and 20 000 deaths occur each year worldwide. The exposure to pesticides may be oral, dermal or inhaled. The casualties include, those working with pesticides, accidental exposure, children, suicides. The major cause for exposure is lack of understanding, training and protection.

Major oral routes of exposures include:
–eating contaminated food
–contacting or ingesting contaminated soil
–drinking contaminated water

–contaminated irrigation water
–deliberate and accidental ingestion

Dermal routes are:
–spillage and splashes
–working with pesticides
–touching contaminated objects

Inhalation to pesticide can occur if one handles:
–vapours
–dusts
–sprays

Chronic Toxicity

Chronic toxicity to pesticides are mainly associated with cancer, neurological effects, reproductive toxicity, developmental toxicity, endocrine disruption, and organic disorders. They are mostly resulted from continuous or frequent exposure at low doses/concentrations to pesticide for a long period of time. The exposure levels of pesticides for these types of health effects generally would not show any effect at the time of exposure mainly because of the low level, exposed. It is normally described that a person should be exposed to the chemical for a duration of 10% of his life time in order to consider long-term exposure scenario.

Environmental Damage

In the environment pesticides can have direct toxicity to non-target organisms. The food sources can be contaminated with pesticides or destroyed by their adverse effects. In some cases the habitat could be destructed leaving the animal and other environmental life forms disrupted. Pesticides in the environment could undergo bioaccumulation to critical levels and when exposed they could reduce reproductive success. Further there could be suppression of immune systems of the life forms in the environment.

The environment could be exposed through number of different routes. Some of the major routes are leaching through soil, surface runoff, spillage into water, wind dispersion, evaporation, and food contamination.

Status of Pesticides Today

In the Global context, there are nearly 118 pesticide active ingredients, available worldwide, are identified as endocrine-disruptors. Sixty pesticides are classified as carcinogenic to some degree while 129 pesticides are defined as extremely of highly hazardous. There are 111 pesticides which can be

considered as organic pollutants. However in Sri Lanka, most of those pesticides are not available, including all extremely and highly hazardous products.

Management of Pesticides

Its important that proper management of pesticides is carried out in order to avoid adverse effects discussed above. Information associated with the nature of the chemical and its potential adverse effects are key to successful management. There are number of ways information on pesticides could be useful.

- To understand the hazards we are working with
- To know how to protect ourselves and others
- To know how to deal with fires, poisoning, spills and other events
- To know how to package and transport products
- To know how to store them

There are number of different types of information available;

- Health risks
- Environmental risks
- Physical/chemical behaviour
- Handling/storage precautions
- Protective equipment needed
- Emergency procedures
- Where to find out more

The sources where one can find information on pesticides are;

- Labels – every product must be labeled
- Material safety data sheet (MSDS) from manufacturers – every order should have a new MSDS
- WHO classification of pesticide hazard
- The Pesticide manual- a comprehensive compilation of pesticide related basic information
- Manufacturers – directly or via the Global federation of the manufacturers
- Internet – many sources
- Academia

The type of information provided in the label is described in the laws governing on pesticides in Sri Lanka (Figure 2). It should contain all the vital information required for safe and effective sue of the product. The information provided in the label should appear in Sinhala, Tamil and English and the size of the characters used are also regulated by the legal provisions. Among the important information provided, the label carries at the bottom of it a colour band depicting the hazard class of the products so that the user can observe precautions accordingly.

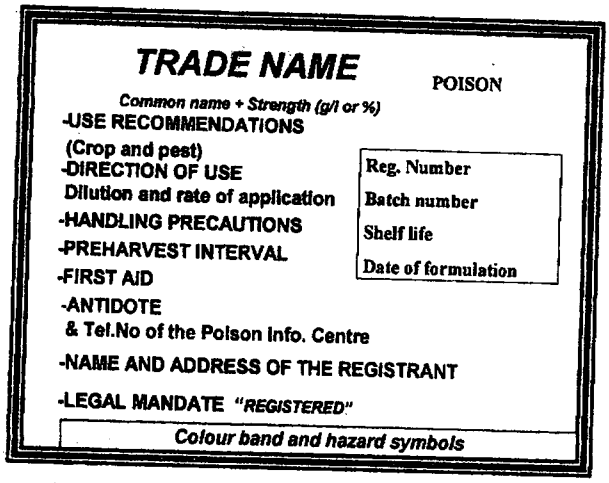

Figure 2: Typical layout of agro-pesticide label in Sri Lanka

International Regulating Instruments

The Stockholm Convention on Persistent Organic Pollutants (POPs) has identified a group of chemicals with unique environmental and health hazards for Global action. It includes 8 pesticides along with 4 other industrial chemicals and unintended by products. The major characteristics of the POPs are;

- Persistence – POPs resist degradation in air, water, sediments, and organisms
- Bio-accumulation – they accumulate in living tissues
- Potential for long-range transport – potential to travel great distances

Among the number of health effects associated with these chemicals, damage to the central nervous system, birth defects and damage to the immune system can be identified as most promising. There are 12 chemicals identified under the convention, casually called as "Dirty Dozen";

1 Aldrin
2 Chlordane
3 DDT
4 Dieldrin
5 Dioxin
6 Endrin
7 Furans
8 Heptachlor
9 Hexachlorobenzene
10 Mirex
11 Polychlorinated byphenyls (PCBs)
12 Toxaphen