

# 1.1 Case Study

## Pesticides

You studied the effect of fertilizers on ecosystems in lesson 1.10. Here you will explore the impact of another chemical introduced by humans.

**Pesticides** are chemicals designed to kill pests. A pest is an organism that people consider harmful or inconvenient.

As much as 30% of the annual crop in Canada is lost to pests such as weeds, fungi (rusts, moulds), insects, birds, and small animals (**Figures 1** and **2**). Pest control measures can reduce the cost of food crops to consumers.

Pesticides are also used to control diseases such as malaria, which is spread by a mosquito-borne bacteria. Malaria causes fever and may lead to death.

- (a) List three possible short-term benefits of pesticides.

### Types of Pesticides

Thousands of pesticides have been developed since early farmers applied arsenic, lead, and mercury to crops. These elements were not only deadly for insects but also poisonous for people.

Today, approximately 2.3 million tonnes of pesticides are used yearly worldwide, or about 0.4 kg for every person on Earth. Pesticides are not just used in agriculture. They are also added to shampoo, carpets, mattresses, paints, and even the protective wax on produce.

Pesticides can be grouped into four categories (**Table 1**).

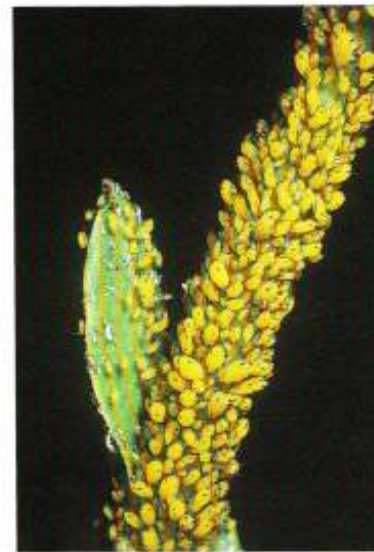
**Table 1** Classification of Pesticides

Type of pesticide	Target	Examples	Persistence
insecticide	insects	DDT	high (2–15 years)
		Malathion	moderate (1–12 weeks)
herbicide	weeds	2,4-D, Silvex, Roundup	mostly low (days to weeks)
fungicide	moulds and other fungi	Captan	low (days)
bactericides	bacteria	penicillin, vancomycin	mostly low



**Figure 1**

Stem rust, a fungus, is a consumer. In a wheat field it is also a pest.



**Figure 2**

Aphids suck sap from the leaves and soft stems of plants.

- (b) Which pesticides decompose rapidly, and which pesticides stay in the ecosystem for years?

### Bioaccumulation

Pesticides that contain chlorine, such as DDT, are soluble (dissolve) in fat but not in water. These toxins cannot be released in urine or sweat, so they accumulate in the fatty tissue of animals. When there is a small amount of pesticide in the