LIME

Soil from different places differ in pH. In many places, the soil is neutral (pH7). In others, it may be acidic or alkaline.

In testing soil pH, different soil samples are shaked with distilled water in separate test tubes. It is allowed to settle and is the aqueous mixture/supernatant liquid is tested with pH paper.

Certain species of plants only grow in acidic/basic soil but not in the other.

Soils grow best in neutral pH. Basic soils restrict plant growth and cause yellowing. Acidic soils however reduce soil nutrient supply to the soil.

To increase soil pH, lime is added. The reactions which occur are:

Ca (OH) 2 + 2H+ 🡪 Ca++ + 2H2O

2H+ + CaCO3 🡪 Ca++ + CO2 + H2O

Lime also has a chemical action on clay causing the particles to come together forming loose crumbs.

LIME AND AMMONIUM FERTILIZERS

Lime must not be used with ammonium fertilizers because the base, lime, caused nitrogen to be lost as ammonia by the reaction with the ammonium salts.

2OH- + NH4+ 🡪 NH3 + H2O

CHEMICAL AND BIOLOGICAL CONTROL OF PESTS

Chemical used to destroy pests (insects, rodents and molluscs) are called pesticides.

There are a number of effects the use of pesticides has caused. Some are:

* The chemicals are toxic.
* Crops build resistance when heavy amounts of pesticide is used.
* The natural enemies of the pests are destroyed as well.
* Beneficial insects like bees are destroyed.
* Birds and other wildlife are killed.
* Water is contaminated.
* Substantial death of fish and small invertebrates which are an important source of food for the fish.

Pesticides have greatly reduced agricultural pests and contribute to disease control.

Biological control does not require the use of toxic chemicals. It is more cheap and safe than pesticides. Some biological control examples are:

* The use of ladybirds to feed on aphids and mealy bugs.
* Some parasitic wasps destroy mealy bugs.
* Bacillus thuringiensis, a naturally occurring bacterium kills the caterpillar of butterflies and moths.
* Ducks, chickens and geese are used to rid fields of both insect pests and weeds.

Biological organisms can self-reproduce.

* A few praying mantises or ladybugs released in a garden will keep reproducing and protect the fruits and vegetables from many pests.
* Insect repelling plants such as garlic and marigolds will keep insect pests from crops.
* Genetically improved plant varieties with built-in pest resistance are more resistant to pests.
* Releasing sterile males to mate with female pests prevents the production of offspring.

HERBICIDES

Herbicides are plant-killing chemicals. It is mainly used to kill weeds that compete with crops. Herbicides can be either selective (kill undesired weeds) or non-selectively (toxic to all crops). Selective herbicides are used widely in agriculture while non-selective herbicides are used to clear areas of all vegetation.

Herbicides are grouped into two categories, plant growth substances and substances that are designed to selectively disrupt the photosynthesis process.

Weeds are generally broad-leaved and have a different biochemistry than crops like grains. 2, 4-D (2, 4-dichlorophenoxyacetic acid) is a plant hormone, stimulates rapid growth in broad-leaved plants thus killing them in the process.

Paraquat and its stronger derivatives are used to interfere with photosynthesis and is generally practiced when reduced or no-tillage farming is present. It is applied directly to the leaves by spraying.

Careful tillage, cultivation, seeding and fertilizing are still better long term alternatives to biological controls. Uninhibited use of herbicides eventually gives harmful effects such as the development of weed resistance and chemical build up.

SOIL

The soil provides a variety of minerals and water to plants and also supports them. It mainly consists of minerals, organic matter, water and air. The quality of the soil is crucial to growing successful plants. It should not be easily water-logged when holding air and moisture.

Soils are classified as either sandy, clay, or loam. Gardens generally are mixtures of all, varying the proportions of each soil. Sandy soils are loose and drainage is prevalent. Clay soils are compact and has poor drainage and is easily water-logged. Loam is a mixture of sand and clay soils but also contains large amounts of humus. Humus provides nutrients to the soil.

The nutrients enter the plant through the root and root hairs where ions are interchanged between the soil and the soil solution. However, the soil solution is replenished again from the soil fragments.