

1 Antibiotics

1.1 Definition:

Antibiotic is a drug that kills or slows the growth of bacteria.

1.2 Introduction:

They have no effect against viruses, fungi, or parasites. Antibiotics are one class of antimicrobials, a larger group which also includes anti-viral, anti-fungal, and anti-parasitic drugs. They are relatively harmless to the host, and therefore can be used to treat infections. Antibiotics, also known as antibacterial, are medications that destroy or slow down the growth of bacteria. They include a range of powerful drugs and are used to treat diseases caused by bacteria. Antibiotics cannot treat viral infections, such as cold, flu, and most coughs.

1.3 History:

Many ancient cultures, including the ancient Egyptians, ancient Greeks and ancient Chinese, already used moulds and plants to treat infections. This worked because some moulds produce antibiotic substances. However, they couldn't distinguish or distil the active component in the moulds.

1.4 DISCOVERIES:

Modern research on antibiotics began with the discovery of Penicillin in 1928 by Alexander Fleming. More than ten years later, Ernst Chain and Howard Florey became interested in his work, and came up with the purified form of penicillin. The three shared the 1945 Nobel Prize in Medicine. "Antibiotic" .

1.5 Classes of antibiotics:

1. Bactericidal:

Bactericidal kills bacteria.

2. Bacteriostatic:

Bacteriostatic prevent them dividing. However, these classifications are based on laboratory behavior; in practice, both of these will end a bacterial infection

1.6 Side effects:

Possible side effects are varied, and range from fever and nausea to major allergic reactions. One of the more common side effects is diarrhea, which results from the antibiotic disrupting the normal balance of intestinal flora. Other side effects can result from interaction with other drugs.

1.7 Antibiotic misuse:

Common forms of antibiotic misuse include failure to take the entire prescribed course of the antibiotic, usually because the patient feels better, but before the infecting organism is completely eradicated. In addition to treatment failure, these practices can result in antibiotic resistance in the bacteria that survive the abbreviated treatment. Taking antibiotics in inappropriate situations is another common form of antibiotic misuse. Common examples of this would be the use of antibacterial for viral infections such as the common cold.

2 Vaccines

2.1 Definition:

A vaccine is a biological preparation that provides active acquired immunity to a particular infectious disease.

2.2 Introduction:

The terms vaccine and vaccination are derived from Variolae vaccinae (smallpox of the cow), the term devised by Edward Jenner to denote cowpox. He used it in 1798 in the long title of his Inquiry into the Variolae vaccinae Known as the Cow Pox, in which he described the protective effect of cowpox against smallpox. [

How vaccines are made?

A vaccine typically contains an agent that resembles a disease-causing microorganism and is often made from weakened or killed forms of the microbe, its toxins, or one of its surface proteins. The agent stimulates the body's immune system to recognize the agent as a threat, destroy it, and to further recognize and destroy any of the microorganisms associated with that agent that it may encounter in the future.

2.3 Vaccination:

The administration of vaccines is called vaccination.

2.4 Explanation:

Vaccination is the most effective method of preventing infectious diseases. Widespread immunity due to vaccination is largely responsible for the worldwide eradication of smallpox and the restriction of diseases such as polio, measles, and

tetanus from much of the world. The effectiveness of vaccination has been widely studied and verified

For example:

Vaccines that have proven effective include the influenza vaccine the HPV vaccine and the chicken pox vaccine. The World Health Organization (WHO) reports that licensed vaccines are currently available for twenty-five different preventable infections.

Side Effects:

Vaccination given during childhood is generally safe. Adverse effects, if any, are generally mild. The rate of side effects depends on the vaccine .Some common side effects include fever, pain around the injection site, and muscle aches. Additionally, some individuals may be allergic to ingredients in the vaccine. MMR vaccine is rarely associated with febrile seizures.

3 Pesticides

3.1 Definition:

A pesticide may be a chemical substance or biological agent (such as a virus or bacteria) used against pests including insects, plant pathogens, weeds, mollusks, birds, mammals, fish, roundworms and microbes that compete with humans for food, destroy property, spread disease.

3.2 History:

Since before 500 BC, humans have used pesticides to prevent damage to their crops. The first known pesticide was sulfur. 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 as an insecticide. The 19th century saw the introduction of two more natural pesticides, pyrethrum and rotenone.

In 1939, Paul Müller discovered that DDT was a very effective insecticide. It quickly became the most widely-used pesticide in the world. However, in the 1960s, it was discovered that DDT was preventing many fish-eating birds from reproducing which was a huge threat to biodiversity. Rachel Carson wrote the best-selling book "Silent Spring". DDT is now banned in at least 86 countries, but it is still used in some developing nations to prevent malaria and other tropical diseases by killing mosquitos and other disease-carrying insects.

3.3 Usage of Pesticides:

Pesticide use has increased 50-fold since 1950, and 2.5 million tons of industrial pesticides are now used each year.

Why do we need Pesticides?

Today's modern agriculture produces plentiful food, at a reasonable price, all year round. Most of us take it for granted that we can buy whatever food we want, whenever we want. We rightly expect our food to be safe and nutritious and we have also become used to food, particularly fruit and vegetables, not having any blemishes or other marks. We don't tend to think about how farmers produce food or how it gets from the farm to the shops in "perfect" condition.

Farmers use pesticides to: protect crops from insect pests, weeds and fungal diseases while they are growing

- prevent rats, mice, flies and other insects from contaminating foods whilst they are being stored
- safeguard human health, by stopping food crops being contaminated by fungi

3.4 Type of pesticides:

1. Bactericides for the control of bacteria
2. Herbicides for the control of weeds
3. Fungicides for the control of fungi
4. Insecticides for the control of insects
5. Miticides for the control of mites
6. Nematicides for the control of worms
7. Rodenticides for the control of rodents
8. Virucides for the control of viruses

1. **Bactericides for the control of bacteria:**

A bacteriocide or bactericide is a substance that kills bacteria and, preferably, nothing else. Bacteriocidal antibiotics kill bacteria; bacteriostatic antibiotics only slow their growth or reproduction.

2. **Herbicides for the control of weeds:**

A herbicide is a pesticide used to kill unwanted plants. Selective herbicides kill specific targets while leaving the desired crop relatively unharmed. Some of these act by interfering with the growth of the weed and are often based on plant hormones. Herbicides used to clear waste ground are nonselective and kill all plant material with which they come into contact. Some plants produce natural herbicides, such as the genus

3. **Fungicides for the control of fungi:**

A Fungicide is one of three main methods of pest control- chemical control of fungi in this case. Fungicides are chemical compounds used to prevent the spread of fungi in gardens and crops, which can cause serious damage to the plants. Fungicides are also used to fight fungal infections. Fungicides can also indirectly be harmful to human health as the cultivated crop is consumed and it can cause irritation as well as many symptoms such as headaches, diarrhea, damaged organs as well as severe disorders and maladies related to the nervous system. It is also a hazard to ecosystems as it can run off and can contaminate water bodies and as it bio accumulates it can be increasingly toxic to living organisms in the ecosystem

4. **Insecticides for the control of insects:**

An insecticide is a pesticide used against insects in all developmental forms. They include ovicides and larvicides used against the eggs and larvae of insects. Insecticides are used in agriculture, medicine, industry and the household.

5. **Miticides for the control of mites:**

Miticides are pesticides that kill mites.

6. **Nematicides for the control of worms:**

A nematicide is a type of chemical pesticide used to kill parasitic nematodes (a phylum of worms).

7. **Rodenticides for the control of rodents:**

Rat poisons are a category of pest control chemicals intended to kill rats. Single feed baits are chemicals sufficiently dangerous that the first dose is sufficient to kill. Rats and certain other vermin are difficult to kill with poisons because their feeding habits reflect their place as scavengers. They will eat a small bit of something and wait, and if they don't get sick, they continue. An effective rat poison must be tasteless and odorless in lethal concentrations, and have a delayed effect.

3.5 Effects of pesticides on environment:

The use of pesticides also decreases biodiversity in the soil. Not using them results in higher soil quality with the additional effect that more life in the soil allows for higher water retention. This helps increase yields for farms in drought years where there is less rain. For example, during drought years, organic farms have been found to have yields 20-40% higher than conventional farms.

4 Fertilizers

4.1 Definition:

Fertilizer adds nutrients and texture to soil that needs to support trees, vegetables, herbs, shrubs, and flowers.

4.2 Introduction:

The different types of fertilizer depend on whether your soil is acidic, alkaline, sandy, clay, rocky, weak, or rich. Fertilizer can be divided into organic and chemical types, those that help fruit versus leaves, and those that feed specific plants or improve the overall quality of soil. Many fertilizers are extracted and purified from natural deposits in the earth. Materials such as sulphomag, muriate of potash and triple super phosphate are all produced from naturally occurring minerals. Some materials, such as urea and ammonium nitrate are synthetic, but provide plants with the same nutrients that are found naturally in the soil.

4.3 Types of Fertilizers:

1. Inorganic fertilizers:

Inorganic fertilizer are chemical additives that are designed for plants to directly absorb, such as nitrogen, phosphorus, and potassium. These three essential elemental nutrients should naturally occur in healthy soil, but some plants require more of them.

Most inorganic, concentrated fertilizer is rated based on the percentage of nitrogen, phosphorous, and potassium, with a rubric called NPK. The amount of nitrogen will encourage growth of stems and leaves by promoting protein and chlorophyll. More flowers, larger fruits, and healthier roots and tubers will result from added phosphorus. It also helps plants resist certain diseases. Finally, potassium from potash, thickens stems and leaves by fostering protein development. This means that vegetables will prefer a different NPK ratio than would roses or an orange tree.

2. Organic fertilizers:

Organic fertilizer, like bat guano, compost, peatmoss, wood ash, and manure, are general soil amendments. They don't burn or harm plants and have long-term positive effects on the soil without damaging ground water, but have lower concentrations of nutrients.

Commonly known fertilizers, like cow manure and compost, are perfect choices for a garden that has many different plants in the same bed. Lesser known options, like bat guano, seaweed, poultry manure, and bone meal, easily mix into existing soil to improve it over a period of years. They are all rich in vitamins and minerals even if they are slightly more expensive. Gradually releasing their

nutrients allows plants' roots to pick and choose which ones benefit them best over their entire growth cycle.

4.4 TYPES OF FERTILIZER:

a) **Granular Fertilizer:**

It is the most common form of fertilizer. It is usually packed in a bag, and can be applied with a drop spreader, spin spreader or hydro seeder. One of the advantages of this type of fertilizer is that they can be made to release the nutrients into the soil over a period of time. Another advantage is low cost.

b) **Water Soluble Fertilizer:**

It is designed to dissolve in water. These often are a blue powder. These fertilizers are often a little more expensive than granular fertilizer, and usually are not a time release fertilizer. Manufacturers of these fertilizers claim that when used with a hydro seeding system the nutrients will enter the outer layer of the seed and will speed up germination.

c) **Liquid Fertilizer:**

It offers much of the same advantages and disadvantages as water soluble fertilizers. The difference is that it is already in a liquid form and to use it you dilute it with water.

d) **Organic Fertilizer:**

They are made from natural products such as bone meal, manure, dried blood, kelp and sea weed. They are popular with organic gardeners, and those who want to avoid man made chemicals and their effects on the body. Organic fertilizers are usually expensive and do not have a high level of nutrients.

4.5 WHAT THEY DO?

Any package of fertilizer will have three numbers which stand for (N) Nitrogen, (P) Phosphorus, and (K) Potassium. These are the three main ingredients that plants need, and they are always listed in that order.

- a) **NITROGEN (N):** promotes green growth. Leafy plants such as grass need plenty of nitrogen to have nice color and rapid growth. The higher the nitrogen number, the more nitrogen that will be in the fertilizer. This is an important part of fertilizers used on an established lawn.
- b) **PHOSPHORUS (P):** is very beneficial to promoting a healthy root system. Fertilizers that are designed to be used when seeding grass are usually high in phosphorus. High phosphorus fertilizers are also used with perennials, bulbs, newly planted trees and shrubs and for flowers. The most common type of fertilizers that are high in phosphorus are STARTER and FALL fertilizers.

C) POTASSIUM (K) :will improve the overall health of plants. It will also aid plants in withstanding cold and hot temperatures. Other chemicals in a fertilizer may include Magnesium which will aid in seed formation and helps plants have a dark green color. Calcium to help promote rooting, Sulfur for vigor and Iron for a dark green color. n organic dietideal for the development of antibiotic resistance.