## The Food Chain

The food chain starts with energy from the sun, which is captured by plants and converted into fuel through photosynthesis. Primary consumers eat plants, and secondary and tertiary consumers feed on primary consumers. At the end of the chain, decomposers act as the “clean-up crew” – they consume dead animal carcasses, decaying plant material and waste products from other members of the ecosystem. Earthworms, for example, take in soil and microorganisms and excrete waste filled with nutrients, which are added to the soil. Fungi absorb nutrients from the plants and animals they consume while releasing enzymes that break down dead organic matter.

# Nutrient cycling in soil

Microorganisms are essential for the majority of soil ecosystem functions and services. They play a central and essential role in the biogeochemical cycling of soil nutrients. This ensures the turnover and supply of nutrients that are essential for plant and crop growth, through the inter-conversion of different forms of nitrogen, sulphur and phosphorus, interlinked with the carbon cycle. Microorganisms are responsible for the degradation of organic matter, which controls the release of plant nutrients, but is also important for the maintenance of soil structure and sustainability of soil quality for plant growth. Microbial activity in soil is also responsible for carbon losses to the atmosphere through respiration and methanogenesis, and microorganisms are required for remediation, through degradation of organic pollutants and immobilisation of heavy metals, providing obvious examples of improving soil quality.Thus all microbiological activity in soil contributes to cycling of nutrients and other ecosystem functions and all soil functions contribute to ecosystem services. There is therefore a need to focus studies and, in this programme, emphasis is placed on two nitrogen cycle processes: nitrification and denitrification.There are five different types of soil **microbes**: **bacteria**, actinomycetes, fungi, protozoa and nematodes. Each of these **microbe** types has a different job to boost soil and plant health.

## Nitrogen Fixation

Nitrogen is an essential nutrient for an ecosystem. Bacteria are responsible for a process called nitrogen fixation, which turns nitrogen into a form that can be used by other living things in the food chain. In this process, bacteria turn gaseous nitrogen in the atmosphere into ammonia, nitrate and nitrite, which makes nitrogen biologically available to plants. Some plants, such as legumes, have symbiotic relationships with a type of bacteria called rhizobium; the bacteria live in nodules in the roots of these plants, and in return, the bacteria fix nitrogen that the legumes can consume .