

Sunlight

The sun provides light, energy, and warmth. In addition, it also affects the weather on Earth.

Sunlight is vital on a farm because the growing plants require the sun or a source of light energy to make their own food. This process is called photosynthesis. The glucose (simple sugar) made within the plant is used for growth and reproduction. The energy within the plant is then

transferred to animals that eat the plants. Once a plant or animal dies, any stored energy can be transferred to decomposers. The sun is the first part of any food chain.

The sun's role in weather is also crucial on a farm. Farmers choose crops and animals that survive in the climate they live. If the temperature or amount of rain or snow changes from what is expected, the farmer may not be able to produce food.



Air

Air is necessary for most living things on Earth to survive.

The air in the atmosphere is made up mostly of nitrogen, oxygen, and water vapor, with small amounts of other gases such as carbon dioxide.

Plants take in carbon dioxide during photosynthesis and will release oxygen, the gas that animals need to survive, back into the air.

Plants will also use the nitrogen in the air for growth once it makes its way into the soil. The nitrogen is also passed on to animals by way of proteins.

Air quality is important to farmers, especially when caring for animals in enclosed spaces. Farmers work to make sure air can move through barns to reduce odors from animal waste.



Water

Water is essential for all life on Earth, whether or not it is on a farm.

Water falls to the earth as rain, hail, or snow (precipitation). Some water filters into the soil for growing plants, and some water runs along slopes in the land to run into streams, ponds, lakes, and rivers. Water will return to the air as water vapor through evaporation or transpiration (water vapor leaving plants), and the water cycle continues.

When there is not enough rain for crops to grow, farmers may irrigate their fields by pumping water from local reservoirs, lakes, rivers, or underground wells. Animals also drink water from these sources.

Keeping the water supply clean is very important. Farmers are required by law to use methods that will limit waste, nutrients, and soil from entering waterways. They use trees and cover crops to keep soil in place and filter moving water. They also keep animals out of streams and keep animal waste contained.



Insects

There are thousands of insects living on a farm. Some are helpful, and some are harmful.

The honey bee is helpful because it pollinates the farmer's crops while gathering its food. Plants create their seeds through pollination. If pollination does not occur, the plant will not produce the edible fruits and nuts that protect the seeds. Spiders, ladybugs, wasps, dragonflies, and praying mantises are also helpful because they eat harmful insects.

Examples of harmful insects are corn earworms, aphids, locusts, spider mites, and rootworms. They can damage crops, and the farmer will have less to sell. They can also bite livestock. In addition, some young insects (larva) can live inside animals, making them less healthy. Many farmers control these harmful insects with insecticides, which can be natural or manufactured.



Soil

Some farmers consider soil to be the most important thing on their farm. Soil provides nutrients that crops need to grow. In addition, it filters wastes, produces and absorbs gases, and is home to many helpful organisms.

Soil is constantly being formed and destroyed. It takes 500 years for nature to make one inch of topsoil! Soil is created by the sun, air, water, and other environmental forces that erode rocks and decompose plants and animals. Soil is a mixture of clay, silt, sand, organic matter, and rocks. The size of the particles that make up the soil determines the soil type.

Why is it so important for farmers to know what is within their soil? First, farmers need to understand soil characteristics, such as the ratio of different particles, nutrient content, or how it holds onto water, to decide what crops will grow best on their land. The characteristics may also tell them how to make changes to the soil so their crops will grow better.

Erosion and compaction are problems farmers face. Compaction occurs when heavy tractors and equipment make the soil hard by compressing the air and water spaces in the soil, and erosion occurs when water and wind carry bits of soil away. Farmers and scientists work to find ways to reduce both of these problems.



Plants

Plants are a vital part of the farm ecosystem. Plants can make their own food by using sunlight, water, and carbon dioxide. Also known as producers, plants are the first food source in a food chain. Many animals, insects, and humans eat plants for nourishment and growth.

In addition to growing plants for food and livestock feed, farmers manage and grow plants on their farms to protect the soil, change soil structure, filter water, and feed pollinating insects. Cover crops and trees have root systems that hold soil in place. Some plant roots can grow deep into the soil and improve it to grow future crops. Farmers also keep plants in areas they are not farming to filter nutrients and soil, so they do not enter waterways during heavy rains. Feeding bees is also important. Farmers may choose to grow flowering plants to provide a food source for bees.

Plants can also produce fibers, oils, and starches that are used for textiles, fuels, medicines, health products, and building materials. Hemp and cotton fibers can be woven into fabric or rope. Corn starch and soybean oil are used in thousands of products we use every day, and wood can be used to make papers, buildings, fences, and furniture.

Plants grow well when they have the right conditions, such as climate, water supply, and soil types. The top plant crops grown in Kentucky are hardwood trees, pastures (plants used to graze livestock and poultry), hays (dried plant matter for livestock), grains (corn, wheat, barley, sorghum), soybeans, tobacco, and fruit and vegetable plants.



Animals

Livestock animals, such as cows, sheep, hogs, goats, and chickens, have many roles in the farm ecosystem. For example, they eat plant crops grown on the farm; they provide milk, eggs, wool, and meat for humans; their waste can fertilize the soil, and some animals are kept to work or herd and protect livestock.

Animal manure contains many nutrients that plants can use to grow. Some farmers collect the manure and spread it on their fields.

Wild animals are also part of the farm ecosystem and may be harmful or helpful to the farm. Deer, raccoons, and crows may eat farmers' crops, while groundhogs and moles can dig the soil, causing erosion. Predator animals such as coyotes, foxes, bobcats, and hawks will eat farmers' livestock. Skunks, frogs, and some birds may help the farmer by eating harmful insects.

Some animals work on the farm. Dogs can be used to protect or herd livestock. Some farmers still use horses and mules in place of tractors. Many cattle farmers will ride horses to check and move their herds. Donkeys and llamas are often mixed with sheep, goats, and cattle because they chase off coyotes.



Decomposers

Decomposers are an important part of any ecosystem. Organisms, such as bacteria, worms, fungi, and some insects, live in the soil and eat dead plants and animals. Their waste puts the nutrient nitrogen back into the soil that new and growing plants can use again.





The Farmer

Farmers are the most critical part of the farm ecosystem because of how they choose to manage the animals, insects, plants, water, and soil on the farm. Therefore, they need to know how these parts interact to make wise choices.

While farmers learn from experience or by going to school, they may ask other experts for help in caring for the ecosystem environment. For example, there are soil and water scientists, natural resource conservationists, and environmental planners. Insect experts are called entomologists and will help farmers find ways to care for beneficial insects or control pests with the least impact on the environment. Plant scientists help farmers learn how to care for their crops. Animal experts, such as veterinarians and nutritionists, help farmers keep livestock and poultry healthy.

Many people work in agriculture to grow food and farm products and care for the environment.