

# Answers to Commonly Asked Questions

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## What is fertilizer?

A fertilizer is a substance that provides one or more chemical elements necessary for plant growth and development. There are two classes of fertilizers: organic fertilizer and inorganic, or commercial, fertilizer. Either type can be used by farmers and home gardeners to replace nutrients removed from the soil by previously harvested crops or to add nutrients that may be naturally lacking in the soil. Plants do not have a preference for either type. Some differences and similarities between these two types of fertilizers are described below.

Organic fertilizers are fertilizers that originate from living organisms and go through very little processing before being used on crops. Some organic fertilizers include fish and seaweed emulsions that are made by liquefying seaweed and fish. Other examples include compost, worm castings, bone meal, ground oyster shells, and steer and chicken manure. Organic fertilizers usually contain many different nutrients in low concentrations. Their nutrients are often in forms that must be broken down by microorganisms before they can be used by plants. The release of nutrients takes time, especially in cold weather when microorganisms in the soil are less active. In addition to adding nutrients to the soil, organic fertilizers also add organic matter that improves soil structure by increasing pore spaces, air circulation, and water holding capacity.

Some organic fertilizers can be labor and cost intensive to apply on large fields; with their low nutrient concentrations, large quantities may be needed to supply sufficient nutrients for growing crops. If manures are not composted before being used as a fertilizer, they can be a source of weed seeds or can damage plants if the manure has high salt content.

Inorganic or commercial fertilizers are fertilizers that are refined in factories from nitrogen gas from the atmosphere and other natural materials like rocks, minerals, petroleum, and animal products. Commercial fertilizers are prepared to contain exact amounts of nutrients in forms that can be immediately used by plants. They generally contain nitrogen, phosphorus, potassium, and a few trace minerals at concentrated levels. Some examples of commercial fertilizers are potassium sulfate and ammonium phosphate.

Nitrogen is the most abundant element in the Earth's atmosphere, but plants cannot absorb atmospheric nitrogen gas from the air. It must be

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in a special form to be used by plants. Inorganic nitrogen fertilizer is made by combining hydrogen and nitrogen from the air.

Inorganic phosphorus is made by mixing phosphate rock, mined from the earth, with sulfuric acid and water.

Potassium fertilizer is commonly called potash (pronounced “pot ash”). This name comes from the fact that the ashes left over from a campfire contain potassium and were, throughout history, put into fields. Inorganic potassium is usually obtained by mining. Potash is mined in New Mexico, Utah, and parts of Canada. Potassium can also be obtained from brine (salt) deposits on the Earth’s crust. Brine deposits are places where large bodies of salt water used to exist and evaporated, leaving the salt behind. One example of a brine salt deposit are the salt flats near the Great Salt Lake in Utah.

Inorganic fertilizers are used by many farmers for a variety of reasons. They are easy to transport, store, and apply, and exist in a variety of formulas to meet the specific nutrient requirements of crops. Some of these fertilizers are formulated to be high in nitrogen while others are high in phosphorus or potassium.

Whether using organic or commercial fertilizer, farmers and home gardeners must take care to use fertilizers appropriately. Applying too much of either organic or commercial fertilizer can damage plants, waste money, and impact the environment. Farmers work closely with scientists to determine the best types of fertilizers for their crops, when to apply, how much to apply, and how to protect the environment. Home gardeners can take courses or obtain information about proper use of fertilizers from local garden clubs and university cooperative extension offices.

## **Why do plants need fertilizer?**

Just like humans, plants require certain nutrients for survival. Plants require 17 chemical elements. These nutrients are used to build different plant components. For example, carbon, hydrogen, and oxygen are used to build plant foods of sugars and starches. Nitrogen is needed to make chlorophyll and plant proteins. Phosphorus provides energy for plants to grow and is important in root growth. Potassium helps plants fight stress and disease, and grow strong stems. If the necessary elements are available to the plants, fertilizers do not need to be added to the soil.

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As crops grow, they take up nutrients from the soil. When harvested, those crops take those absorbed nutrients with them. When nutrients are lacking in the soil, fertilizers are added to replenish the nutrients removed by previously grown crops.

## **What do the three numbers on a fertilizer label mean?**

The three numbers on a fertilizer label stand for the percentages of nitrogen, phosphorus, and potassium in that particular fertilizer. These three elements are the major nutrients required by plants for growth and reproduction. For standardization, nitrogen (N) is always listed first, followed by phosphorus (P) and then potassium (K). When buying a fertilizer, one should consider the nutrients their plants need and buy a fertilizer containing the proper nutrient combination.

## **Why do some fertilizers require people to wear protective clothing such as masks or gloves?**

Most commercial fertilizers are more concentrated than natural manures and composts. They are also applied in salt form. Large quantities of salt draw water out from cells and cause them to dehydrate. This can cause irritation to skin cells, eyes and lungs. For most household fertilizers, rinsing exposed areas with generous amounts of water will prevent damage. However, it is always better to be cautious when applying chemicals of any type.

## **Why do plants die if they get too much fertilizer?**

Most fertilizers are applied as salts. Any type of salt is water-loving and attracts water. Fertilizers draw water from plant cells. If too much fertilizer is applied to a plant, the plant cells dehydrate and become brittle and sometimes discolored. This is called burning plants. The plants don't actually catch on fire, this term simply means that the plants lose moisture.

## **In what ways do manures benefit plant growth?**

Manures are animal excrements. Manures contain nutrients that can be used by plants as well as organic matter that improves soil texture. Plants must not only have nutrients but must also grow in soil that has good aeration and can hold water. Animal manures vary in nutrient composition depending on the type of animal and the diet of the animal.

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## How are fertilizers made?

Fertilizers can be natural or man-made. Natural fertilizers are substances such as manures and composts. Nitrogen can be made available to plants by the natural process of nitrification, where bacteria convert atmospheric nitrogen to nitrogen that can be used by plants. Many fertilizers are manufactured in factories using materials from the earth and atmosphere.

- ▶ Nitrogen gas makes up approximately 78% of our atmosphere. Nitrogen gas can be combined with natural gas in a complex factory process to change it into a form that plants can utilize.
- ▶ Phosphorus is usually made into fertilizer by mining phosphate rock and combining it with sulfuric acid (which comes from fossil fuels).
- ▶ Potassium often is obtained from salt deposits throughout the world like those of the Great Salt Lake in Utah.

## What is hydroponics?

Hydroponics is a process in which plants are grown in water instead of soil. This is possible when the required nutrients are available in the water and the plants have some sort of support system to hold them up.

## Why does manure smell?

Bacteria and other organisms decompose manure converting it to organic matter. During this process the bacteria release different gases as their waste products. Some of these gases smell. Ammonia substances are commonly given off as bacterial decomposition by-products.

## Why do plants yellow if they do not have enough nutrients?

Yellowing is a sign of an unhealthy plant. There are many causes of yellowing, but generally it means that the process of chlorophyll formation is interrupted. Chlorophyll is the green substance in plants that absorbs energy from the sun and is used to convert carbon dioxide and water into sugars and starches. Certain elements are needed to build the chlorophyll molecule. If they are not available, chlorophyll cannot be produced and the plant turns yellow and eventually dies.

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## **What would happen to food prices without fertilizer?**

A fertilizer is a substance that provides one or more chemical elements necessary for plant growth and development. This could include pre-packaged fertilizers bought from your local garden center, compost from kitchen waste, or animal manure. Both conventional and organic farmers use fertilizer to provide crops with the nutrients essential to supply consumers with nutritious, affordable food.

The United Nations projects that the world's human population will increase by at least two billion in the next 40 years. While the human population is growing, the amount of available farmland is not. Fertilizers make it possible to grow more food on less land. As crops grow, they take up nutrients from the soil and assimilate them into plant parts that people and livestock eat. These nutrients must be replaced back into the soil to maintain fertile farmland that is capable of producing crops year after year.

Without fertilizer, soil fertility and productivity drop. Prices go up when food is in short supply. People in the U.S. spend less on food than any other country in the world. U.S. farmers use science and technology to make the most efficient use of resources possible which helps keep food prices down while supplying safe, abundant, and nutritious food.

## **Is fertilizer harmful to the environment?**

Fertilizers are an important tool in helping farmers produce enough food for our growing world population. Advances in science and agriculture techniques allow farmers to use a very high level of accuracy when applying nutrients to the soil in order to protect water, soil, and air resources.

With the use of fertilizer, farmers are able to grow more food on less land. This is important because the amount of available farmland decreases as cities and towns continue to grow with our increasing population.

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