

Reading #4

Fertilizers

A fertilizer is a substance that provides one or more nutrients 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 and can only take up nutrients that are dissolved in water regardless of whether their source is organic or commercial fertilizer. Some differences and similarities between these two types of fertilizers are described below.

Organic Fertilizers

Organic fertilizers are anything that an organic farming certification system considers to be acceptable for organic farming. Usually, these fertilizers originate from living organisms and go through 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, and 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.

There are some disadvantages to organic fertilizers. Some have a disagreeable smell and can be very labor and cost intensive to apply on large fields. Since their nutrient concentrations are low, large quantities may be needed to supply sufficient nutrients for crops. If manures are not composted before being used as a fertilizer, they can be a source of weed seeds and can damage plants if the manure has high salt content. Also, the exact nutrient content of organic fertilizers is usually not guaranteed which makes it more difficult for the farmer to know just how much should be applied to the crop.

Inorganic (Commercial) Fertilizers

Commercial fertilizers are fertilizers that have been produced 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 converted to a special form to be used by plants. Inorganic nitrogen fertilizer is made by combining hydrogen from natural gas and nitrogen from the air. The scientific discovery of capturing nitrogen from the air to make fertilizer is called the Haber-Bosch process. It has often been called the most important invention of the 20th century and is responsible for feeding billions of people worldwide.

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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. Potassium is usually obtained by mining from deep within the Earth. 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 once existed and have since evaporated, leaving the salt behind. One example of a brine salt deposit is the salt flat 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 they are available 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. Farmers work closely with scientists and certified crop advisors 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 of California Cooperative Extension offices.