

Vertical Farming

The practice of growing crops in vertically stacked layers in controlled-environments to optimize plant growth. It is normally coupled with soilless farming techniques such as hydroponics, aquaponics, and aeroponics. Some common choices of structures to house vertical farming systems include buildings, shipping containers, tunnels, and abandoned mine shafts. As of 2020, there is the equivalent of about 74 acres of operational vertical farmland in the world.

Using vertical farming can be expensive depending on the size of the operation and what is being grown. However, vertical farming can also be done simply to save money.

To create a vertical farm you will need crops (seed), a growing medium, water system, piping system, vertical structure system, lighting, and proper temperature control.

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Aquaculture



The controlled cultivation of aquatic organisms such as fish, crustaceans, mollusks, algae and other organisms of value such as aquatic plants. Aquaculture involves cultivating freshwater and saltwater populations under controlled or semi-natural conditions, and can be contrasted with commercial fishing, which is the harvesting of wild fish.

Aquaculture can be expensive depending on the size of the operation and the fish that are being raised. In order to create an aquaculture farm you need an indoor space, large tanks, water, water pump, filtration system, and temperature control.



Since the whole process is controlled from the amount of water, food given to the fish, nutrients within the water, lighting, and temperature this is a type of precision agriculture.

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Aquaponics

A food production system that couples aquaculture (raising aquatic animals such as fish, crayfish, snails or shrimp in tanks) with hydroponics (cultivating plants in water) whereby the nutrient-rich aquaculture water is fed to hydroponically-grown plants, and nitrogen fixing bacteria convert ammonia into nitrates for the plants to use.

The process to start an aquaponics system can be simple or complex. Some systems are as small as a 20 gallon fish tank, where others use larger tanks. This growing method is done in doors where all aspects are strictly controlled so that healthy product is grown.

To create an aquaponics system you will need fish, tanks, water, plants, an aeration system, lighting, and a water pumping system.

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Aeroponics

The process of growing plants in an air or mist environment without the use of soil or rocks to hold plants. Unlike hydroponics, which uses a liquid nutrient solution as a growing medium, or aquaponics, which uses water and fish waste, aeroponics is conducted without a growing medium. It is sometimes considered a type of hydroponics, since water is used in aeroponics to transmit nutrients, however, aeroponics reduces the amount of water needed to grow. .

These systems can occur horizontally or be transitioned easily to a vertical space. Growing vertically saves space, but can limit the types of plants that can be grown. Normally grasses, lettuce, and other leafy plants do well in an aeroponics system.

For building an aeroponics farm you will need a building such as a green house or a well lit area, a system to provide support for the plants, nutrient rich mist, plants, and misting system.

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Hydroponics

Involves growing plants without soil, by using mineral nutrient solutions in a liquid such as water. Plants may grow with their roots exposed to the liquid, or the roots may be supported by perlite, gravel, or sand. These help root growth and still encourage root plant processes such as rhizomes and nitrogen fixation.

This process is normally grown vertically to reduce the need for structural support. Hydroponics will sometimes have a drip system where water is given to the roots of plants on a set timer, or some are built using the submerging method. In the submerging method plants float on the top of a tank of water.

The overall cost of hydroponics systems can be expensive depending on the water system used. However, they are normally used in greenhouses that focus on leafy vegetables and herbs.

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