



New Start Community Garden
Garden Curriculum

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NEW START COMMUNITY GARDEN

GARDEN CURRICULUM

The purpose of this curriculum is to provide educational materials to support student and community visitors to the New Start Community Garden, aka the Shark Garden. It is designed for ages 10 and up and many lessons and activities can be used at home as well as in the garden. Our goal is to create inclusive curriculum that encourages sustainable organic gardening, environmental stewardship, and multicultural appreciation for food. For more information about the Shark Garden, contact info@sharkgarden.org

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The Importance & Purpose of Mushrooms

What speaks for the trees, has been used for medicinal purposes, and is delicious? Mushrooms!

While it may seem unassuming growing on a fallen tree in the woods, most of a mushroom's structure is hidden underground. Below the surface is a network of microscopic fungal threads, known as mycelium, which are vital to ecosystems around the world. Through mycelium, mushrooms help other plants share nutrients and communicate through chemical signals.



The Importance & Purpose of Mushrooms



What are Mushrooms and Why are they Important?

A mushroom is the reproductive structure produced by some fungi. It is somewhat like the fruit of a plant, except that the "seeds" it produces are in fact millions of microscopic spores that form in the gills or pores underneath the mushroom's cap. The spores blow away into the wind, or are spread by other means, such as animal feeding. If they land on a suitable substrate (such as wood or soil) spores will germinate to form a network of microscopic rooting threads (mycelium) which penetrate into their new food source. Unlike the mushroom, which pops up then passes away quickly, the mycelium persists, often for many years, extracting nutrients and sending up its annual crop of mushrooms.

Mushrooms are fungi. They belong in a kingdom of their own, separate from plants and animals. Fungi differ from plants and animals in the way they obtain their nutrients. Generally, plants make their food using the sun's energy (photosynthesis), while animals eat, then internally digest, their food. Fungi do neither: their mycelium grows into or around the food source, secretes enzymes that digest the food externally, and the mycelium then absorbs the digested nutrients. There are exceptions to these generalizations; some organisms are placed into their respective kingdoms based on characteristics other than their feeding habits.

The Importance & Purpose of Mushrooms



Mushrooms are Recyclers

Some mushrooms are capable of digesting wood, breaking it down into the primary components of forest soils. They also decay other dead plant and animal matter. A forest in which nothing rotted would soon be choked with accumulating dead leaves and woody material, and starved for essential minerals and other nutrients bound up in the undecomposed debris.

Mushrooms are Tree-Helpers

Many mushrooms form partnerships with roots of living trees, and the resulting fungus-root is called a mycorrhiza. The mushroom's mycelium weaves itself around the root and actually alters the shape of the root. The mushroom absorbs water and minerals for the tree, but in return the tree gives the mushroom nutrients, too. Since both partners benefit from each other, their alliance is considered a symbiotic relationship. Mycorrhizal mushrooms are often seen under trees, growing in lines or rings, following the progress of root growth under the duff.

The Importance & Purpose of Mushrooms



Mushrooms are Beneficial Foods & May Lower Risks of Cancer

Many forests support a multi-million-dollar industry based on the commercial picking of edible wild mushrooms, many of which are exported to Japan and Europe. In some of our forests the mushroom crops are more valuable than the tree crops. The most common mushrooms picked for profit in the fall are the pine mushrooms (*Tricholoma magnivelare*), and chanterelles (*Cantharellus cibarius*); in the spring, the morels (*Morchella* species) are picked.

Many animals also rely on mushrooms for food, especially squirrels and other rodents. Slugs also dine on mushrooms, and certain types of flies spend their whole lives on, and in, mushrooms.

A review of 17 cancer studies from 1966 to 2020 shows that eating just 18 grams of mushrooms (equal to about a 1/8-cup or two medium mushrooms) a day may lower your risk of cancer by as much as 45%. Mushrooms are a powerful source of ergothioneine, an amino acid and antioxidant that prevents or slows cellular damage.

Some mushroom varieties (such as shiitake, oyster, maitake and king oyster) have higher amounts of ergothioneine. But researchers found that incorporating any variety of mushrooms into your daily diet will lower your risk of cancer.

The Importance & Purpose of Mushrooms



Mushrooms help Reduce Sodium, Minimize Calories & Assist with Cognitive Impairment

Sodium and high blood pressure often go hand in hand. Sodium causes the body to retain excess fluid, which can increase blood pressure. To decrease your sodium intake, consider adding mushrooms to your meals.

Mushrooms are naturally low in sodium - an entire cup of white button mushrooms has just five milligrams of sodium. They offer savory flavor that reduces the need for added salt to keep your blood pressure low. A study from the Culinary Institute of American and UC Davis shows that swapping half of the meat for mushrooms in a traditional ground beef recipe can maintain flavor while reducing sodium intake by 25%.

Mushrooms make an excellent substitute for red meat while minimizing calories, fat and cholesterol. Research shows that shiitake mushrooms, in particular, help to keep cholesterol levels low. They contain compounds that inhibit the production of cholesterol, block cholesterol from being absorbed and lower the overall amount of cholesterol in your blood.

Researchers continue to study the effects of eating mushrooms on mild cognitive impairment (MCI). MCI causes memory and language difficulties and is often a precursor to Alzheimer's disease.

In a study in Singapore, participants who ate more than two cups of mushrooms a week had a 50% lower risk of developing MCI. Even those who ate only one cup saw some benefit. The mushrooms eaten by participants included golden, oyster, shiitake and white button mushrooms.

The Importance & Purpose of Mushrooms



Mushrooms Contain Vitamin D

Vitamin D helps your body absorb calcium to maintain and build strong bones. Many people rely on supplements or sunshine to get vitamin D, but if you're looking to get this nutrient through your diet, mushrooms may be the answer. They are the only type of produce that is a source of vitamin D.

Like humans, certain mushrooms exposed to UV light or sunlight can increase their vitamin D amounts. White button, portabella and cremini mushrooms provide the most vitamin D after exposure to UV light or sunlight. To get the recommended daily amount, slice three mushrooms (or one portabella), expose them to sunlight for at least 15 minutes and enjoy. Eating a little more than one cup of maitake mushrooms achieves the same goal without the need for sun exposure.

The Importance & Purpose of Mushrooms



Mushrooms May Cause Root Disease

Mushroom Root Rot is a common disease of many trees and shrubs caused by the fungus *Armillaria* spp. This fungus spreads through root-to-root contact of infected and healthy plants, as well as through airborne spores. The disease causes decline and eventually death of infected plants. There is no effective preventive or curative fungicide treatment for this disease.

Plants that are susceptible to Mushroom Root Rot disease include most trees, shrubs, and many groundcovers. Infected plants often do not show decline symptoms for months to years following infection. At some point the infected plant “gives up”, resulting in what appears as sudden decline or death of a portion or the entire plant.

The easiest way to identify Mushroom Root Rot is by its distinctive mushrooms. Short-lived Yellow to brown mushrooms that grow in clusters in close proximity to trees or shrubs are likely those of the *Armillaria* spp. pathogen. The mere presence of the mushrooms, however, does not necessarily indicate infection. Likewise, the lack of mushrooms does not exclude the possibility of disease. Infection can be confirmed by observation of the fungus (white mycelia) under the bark of a diseased plant.

The Three Roles of Mushrooms in Nature

Unlike plants, mushrooms cannot synthesize their own food from the sun's energy. They lack chlorophyll - the substance which permits plants to use sunlight to form sugars from the water and carbon dioxide in the air. Mushrooms therefore had to develop special methods of living: symbiosis, saprophytism and parasitism.

Symbiosis



(Mushroom Pine Cone Symbiosis)

Most of the mushrooms growing on the forest floor are intimately linked to trees by symbiosis. This association, called mycorrhiza, occurs between the root ends of a tree and the vegetative system of a mushroom. Mycorrhiza benefits both organisms: there is an exchange of nutrients, one providing to other what it cannot synthesize or extract from the soil by itself. In general, the mushroom helps the tree extract minerals and water from the soil; in exchange, the tree supplies the mushroom with sugar compounds (carbohydrates).

Saprophytism



(Ultimate Guide to Saprotrophic Mushrooms)

Saprophytism is another important living method for mushrooms, especially for species which grow on lawns, on rotting wood or on excrement. Here the mushroom's role is one of decomposition. It feeds itself by digesting the organic matter and at the same time returns nutrients to the soil.

Parasitism



(Parasitic Mushroom)

Finally, some mushrooms are parasites. There are several kinds of parasitism, ranging from the species which attacks a healthy host (tree, plant or insect) and lives on it without killing it, to the kind which attacks only unhealthy hosts, thereby hastening their death. The parasitic species are generally microscopic mushrooms.

What is Mushroom Mycelium?



(British Mycological Society)

Fungi play a vital role in forest ecosystems as their mycelium helps decompose dead and decaying organic matter making nutrients available for trees and plants.

Mushroom mycelium is the thread-like body of a fungus that's often hidden underground or inside rotting logs and stumps.

The mycelium is the main part or body of the fungus, and the visible mushrooms are the fruiting bodies that it forms to assist with reproduction.

Mycelium consists of thousands of delicate, thread-like hyphae that join together to form an underground network of long fibers that grow through organic matter and obtain nutrients. Like humans, fungi need to get nutrients from their surroundings to grow, but unlike humans, fungi digest their food externally.

Mushroom mycelium releases enzymes that break down the organic material around them. They then absorb the small particles through their cell walls.

Mushroom mycelium is the longest-living part of a fungus. It can remain dormant for several years, waiting for the right conditions to produce mushrooms and reproduce.

Mushrooms don't have roots. The root-like portion of the fungus found underground is not its roots. It's the main body of the fungus, consisting of an intricate network of threadlike mycelium.

Although mycelium may sometimes look like plant roots, they're not the same, but they often work together, forming mutually beneficial relationships called mycorrhizae. Plant roots and mycelium both absorb nutrients and help anchor the organism, but their other roles are very different because of how they get their nutrients.

What is Mushroom Mycelium?



(Empire)

Some fungi are mycorrhizal, meaning they have a symbiotic relationship with host plants. These fungi provide host plants with nutrients in exchange for the simple sugars the plants produce through photosynthesis.

As mushroom mycelium absorbs nutrients and grows, it creates an extensive underground network that links fungi and plants.

In fact, it's believed that the mycelial network is so important that without it, ecosystems would fail. In 1997 Prof Suzanne Simard came up with the term "Wood Wide Web" when she realized that trees were communicating with each other using mycorrhizal networks.

Mycelium networks allow plants of different species to share nutrients and warn each other about droughts, pests and diseases.

The role mushroom mycelium plays in nature is not the only reason it's important. It also has several innovative applications in our world.

Health Benefits of Mushrooms



Mushrooms have been consumed since earliest history; ancient Greeks believed that mushrooms provided strength for warriors in battle, and the Romans perceived them as the “Food of the Gods.” For centuries, the Chinese culture has treasured mushrooms as a health food, an “elixir of life.” They have been part of the human culture for thousands of years and have considerable interest in the most important civilizations in history because of their sensory characteristics; they have been recognized for their attractive culinary attributes. Nowadays, mushrooms are popular valuable foods because they are low in calories, carbohydrates, fat, and sodium: also, they are cholesterol-free. Besides, mushrooms provide important nutrients, including selenium, potassium, riboflavin, niacin, vitamin D, proteins, and fiber. All together with a long history as food source, mushrooms are important for their healing capacities and properties in traditional medicine. It has reported beneficial effects for health and treatment of some diseases. Many nutritional properties are described in mushrooms, such as prevention or treatment of Parkinson, Alzheimer, hypertension, and high risk of stroke. They are also utilized to reduce the likelihood of cancer invasion. Mushrooms act as antibacterial, immune system enhancer and cholesterol lowering agents; additionally, they are important sources of bioactive compounds. As a result of these properties, some mushroom extracts are used to promote human health and are found as dietary supplements.

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