



MUSHROOM GROWING E-BOOK



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INTRODUCTION

Mushrooms are part of an organism, that belong to the kingdom Fungi. They are characterized by their fleshy, spore-bearing fruiting bodies, which can vary widely in size, shape, colour, and texture. The most recognizable part of a mushroom is the cap, which is often dome-shaped and can be smooth or covered in scales or warts. The cap is supported by a stalk, or stem, which is often thicker at the base. Some mushrooms also have a veil, a thin membrane that covers the gills or pores on the underside of the cap.

Mushrooms play an important ecological role in breaking down dead organic matter, and many species form symbiotic relationships with other plants. They are also valued for their nutritional and medicinal properties and are used in a wide range of dishes and traditional medicines around the world.

However, it is important to note that not all mushrooms are edible, and some species can be toxic or even deadly if ingested. It is important to have a good understanding of mushroom identification and safety before consuming wild mushrooms or attempting to cultivate them.

Mushroom growing, also known as mushroom cultivation, is the process of cultivating edible or medicinal mushrooms for consumption or commercial purposes. Mushrooms are a type of fungus that have been used for centuries for their medicinal and nutritional properties. They are rich in protein, vitamins, and minerals and can be incorporated into a wide range of dishes, making them a popular ingredient in many cuisines around the world.

Mushroom cultivation involves creating the ideal conditions for mushroom growth, which typically include a controlled environment, proper substrate (such as sawdust or straw), and the right level of moisture and temperature. Depending on the type of mushroom being grown, different cultivation techniques may be required.

Mushroom cultivation can be done on a small scale for personal consumption or on a larger scale for commercial purposes. It is a growing industry, with many new techniques and innovations being developed to increase efficiency and yield.

Overall, mushroom growing offers a fascinating and rewarding opportunity to produce a nutritious and delicious food source while exploring the fascinating world of fungi.

The Basic Life Cycle of a Mushroom

The lifecycle of a mushroom can be divided into six main stages: spore germination, mycelium formation, primordia formation, fruiting body formation, spore production, and spore dispersal.

1.Spore germination: The lifecycle of a mushroom begins when a spore lands on a suitable substrate, such as soil, wood, or decaying matter. Under favourable conditions, the spore germinates and begins to grow a filamentous structure called a hypha.

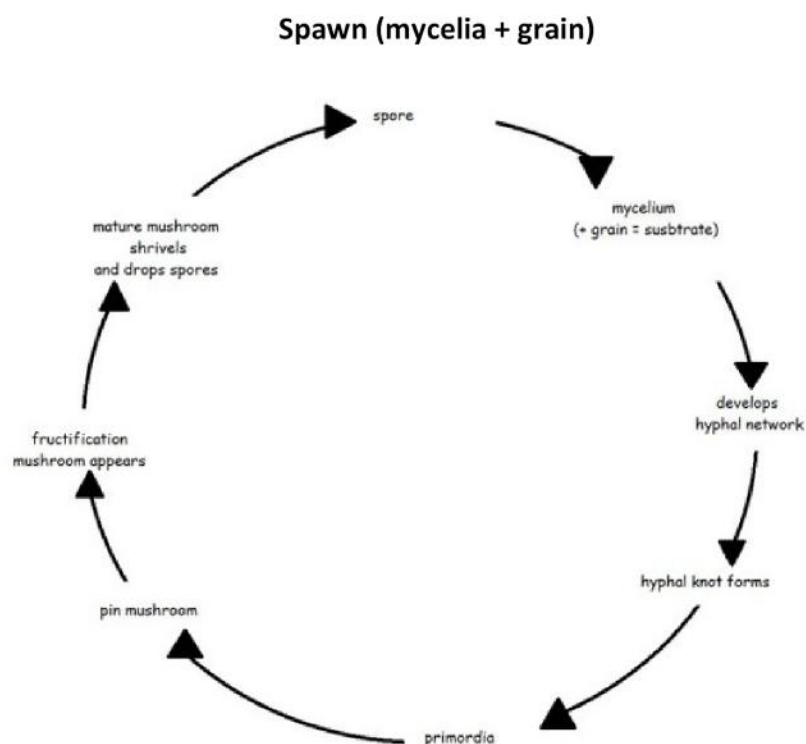
2.Mycelium formation: As the hyphae grow, they branch out and fuse together to form a network called mycelium. The mycelium absorbs nutrients from the substrate and grows in size and complexity.

3.Primordia formation: When the mycelium has accumulated enough nutrients and environmental conditions are favourable, it begins to produce small, pin-like structures called primordia. These structures will eventually develop into mature fruiting bodies.

4.Fruiting body formation: As the primordia continue to develop, they form mature fruiting bodies, which are the familiar mushroom caps and stems. The caps and stems are made of tightly packed hyphae and are often covered in a layer of tissue called a veil.

5.Spore production: Inside the mushroom cap, gills or pores develop that are lined with reproductive structures called basidia. The basidia produce spores, which are released from the fruiting body when the veil breaks open.

6.Spore dispersal: Once the spores are released, they are dispersed by wind, water, or other means. If conditions are favourable, the spores can germinate and start the lifecycle over again. The lifecycle of a mushroom is complex and can vary depending on the species, environmental conditions, and other factors. However, understanding the basic stages can help in cultivating or identifying different types of mushrooms.



Essential Terminology

When it comes to discussing Mycology, there is a whole new language out there. Have a look at this glossary below to get you started:

Inoculated: Inoculation is the process wherein a living organism is introduced to a new material. For example, when the mycelium is mixed into a substrate, then it has been inoculated.

Mushrooms: A mushroom is the reproductive fruiting body of the fungi. Imagine it is an apple, with the mycelium as the tree.

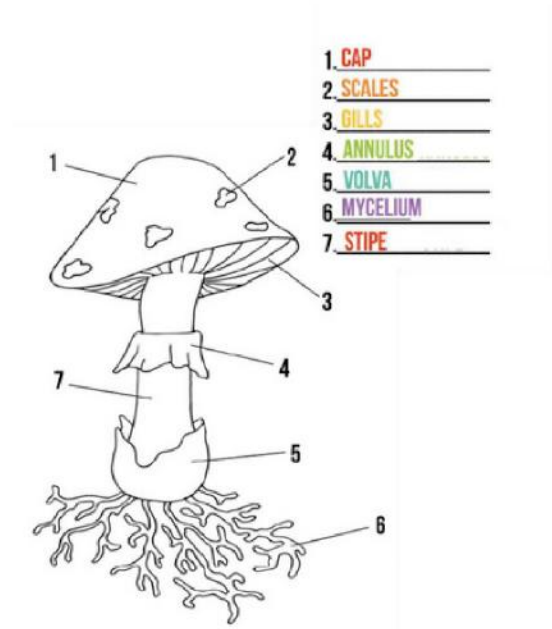
Mushroom Cap: The top of the mushroom

Mycelium: The mycelium is the body of the fungi; a mass of branching threads of hyphae all coming together as one network.

Stipe: The Stipe is the 'stalk' of the mushroom, which supports the cap and anchors the fruiting body to the ground.

Substrate: The substrate is the material from which an organism (in this case the mushrooms) grow and feed off. The substrate offers the nutrition, moisture, and energy that mycelium requires to grow and fruit.

Spores: Mushroom spores are microscopic and produced in the gills that can be described as the "seeds" of a mushroom. The gills of a mushroom are like manufacturing powerhouses – producing incredibly large numbers of spores to spread into the external environment. In some species, mushroom spores can be produced in numbers of up to forty million per hour!



GROWING MUSHROOMS ON LOGS

Growing mushrooms on logs is one of the oldest forms of cultivation. Records of its use date back over one thousand years in Japan but have been practiced for far longer. A log grow is the best method of sustainable growing and an even better way to learn from natural processes.

Shiitake Mushrooms, or *Lentinula edodes*, are one of the most popular edible fungi around today. In Japanese, the name breaks down to read *take*, meaning mushroom and *shii*. *Shii* refers to the *Castanopsis cuspidate* tree, a hardwood evergreen tree typically found in Japan. In this in-depth guide, we are going to be taking you through how to grow shiitake mushrooms on logs. You may not have access to the *Castanopsis cuspidate* tree to grow them on, but you do have access to a whole wealth of Urban Farm-It knowledge.

Shiitake mushroom fact file

Common name(s): shiitake mushroom

Latin name: lentinula edodes

Best growing location: dead hardwood trees

In the wild: woodland areas, normally in japan or south korea

Spawn storage temperature: no higher than 5 oc

Fruiting/growing temperature: 14oc - 17oc

Time period: circa 1 year for first harvest

Best time to start: late autumn – spring

Who can grow these: anybody who is patient although a log grow may take a long time to begin, it can continue to produce for up to 6 years!

Qualities of shiitake mushrooms

Shiitake mushrooms are prized for their high quality and velvety caps. They are dark brown, with an earthy flavour, velvety texture and versatile abilities in the kitchen. It can take up to a year to see your first harvest flourish. However, this low-intensity method of growing can see you harvesting shiitake mushrooms for up to six years. In recent years they have become very popular to use as a meat replacement and historically as a star feature in simpler meals such as ramen.

Materials

You will need the following for your Shiitake mushroom log grow...

Log: Recently cut

Electric Drill: Using an 8mm Drill Bit

Spawn: Bag of Mycelium Plugs (see below for quantities)

Mallet: Wooden or Rubber

Cover: Shade or cloth for incubation

Wax: For sealing the log

Spawn

Traditionally, logs for inoculation would be placed adjacent to one another, and the spores would settle and colonise the fresh logs naturally. With the development of the mushroom farming industry over the last one hundred years, we have now developed means of directly inoculating a log with mycelium, giving you a head start on the natural method and more promise of a good harvest. The most effective and natural way to grow these mushrooms is on hardwood logs using mushroom dowels or plugs, which inoculate the log directly with the spawn.

Spawn is the mixture of mycelium with a grain. At Urban Farm-It, our spawn is a grain blend that includes millet and wheat. The grain allows it to feed and thrive until it is ready to be mixed with the substrate. Our plugs are spawn mixed with hardwood dowels, making it easy too inoculate a log with.

How Many Plugs do I Need?

Common plug rates are outlined below. If you wish to increase the speed at which the mycelium colonises (also known as the inoculation rate), or if you are using a particularly thick piece log, the number of plugs can be increased proportionally.

Material Diameter Plugs Required

Material	Diameter	Plugs Required
Log	> 30cm diameter	50 plugs per 50cm
Log	< 30cm diameter	40 plugs per 50cm
Tree Trunk/round	< 30cm diameter	40 plugs
Tree Trunk/round	for every additional 30cm in diameter on a tree trunk	plus 40 plugs

What is the Best Wood to Use?

Mushrooms which break down woods causing them to decompose are known as lignicolous mushrooms. They grow well on a wide range of hardwood logs, often the boughs or limbs which have fallen to the forest floor. However, when growing your own mushrooms on logs you can use discs cut from the main trunk (rounds), or any log cut to the size you need. At Urban Farm-It we recommend using limbs or branches of trees as they are often the ideal size.

How Old Should the Wood Be?

Deciduous trees store a sugar within the wood that provide the best nutrients for mushroom growth. Making sure the tree is young and disease free is essential. Meaning it is less likely to contain any competing fungi or infections that will derail your shiitake growth. Leaving the section of wood for two weeks after cutting it from the main tree means that the natural fungicides that the tree has against foreign bodies will have broken down, this makes the wood more receptive to inoculation by the shiitake mycelium. Older cuts of trees tend to be dryer which means there is significantly less nutrition for the shiitake to grow from.

An effective way to check whether there is infection in your log is by checking the area or tree it came from. Large dead sections on the living tree, unusual growths or other funguses are normally a

red flag. For the two-week seasoning period make sure your log is out of direct sunlight, off the ground and out of the wind. Leaving your chopped log laying around for is an open invite for other fungi to inoculate or for rot to set in!

Direct sunlight can dry the log out, and the wind can blow competing fungi spores onto the log. A tell-tale sign that your log has dried out is peeling of the bark or cracked ends.

What Type of Wood Should I Use?

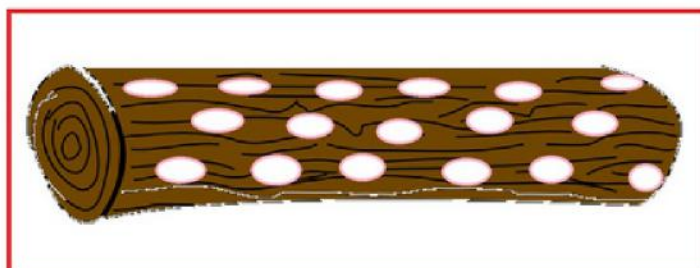
Soft woods such as pine do not offer the best growing environment and should be avoided. Similarly, wood which contains a high content resin or oil is not suitable. This is to do with the pH levels that shiitake mushrooms need to grow. So do not use eucalyptus, oleander, or any tropical hardwoods! We recommend using Oak, Hornbeam, Alder, or Beech for a log grow.

What Size Should my Log be?

Take a freshly chopped (2-6 weeks old) and disease-free log of between 10-35cm in diameter and up to one meter in length. Remove any extra branches to leave the main body of the log. The main body of the log is the primary water reserve for mushrooms, meaning the bark is like the skin that maintains the moistures, so take care not to damage or remove any bark. Rounds of the tree trunk are also good for Oyster mushrooms, Maitake, or Chicken of the Woods. Wide logs or tree trunk sections will typically be 30-100cm in diameter and up to 30cm deep

Preparation

1. It is beneficial to soak your logs overnight in untreated water so that they are well saturated.
2. Drill holes into the log, about 10-15cm apart and 8mm in diameter. They need to be roughly the depth of the plug which is about 4cm.
3. For a log <50cm in length start 2.5cm from the end.
4. For a log >50cm in length start 5cm from the end.
5. When drilling the holes, follow the diamond pattern on the diagram below.
6. The rows should be roughly 6 inches apart.



A top tip is to mark the drill bit with chalk or something like help you measure the correct depth. There is no need to drill into the end of the log.

7. The amount of inoculation holes on the log depends on the type of wood you use, the thickness of the log and the number of dowels you have! Harder wood, thicker logs and colder temperatures all require more closely spaced inoculation points.

Inoculation

1. Insert a plug into each hole. The plug should be a little too tight to knock into the hole by hand, but only require a gentle tap with a mallet to push it into the hole you drilled. A snug fit helps the mycelium to move from the plug into the main piece of wood

2. OPTIONAL WAX SEALING STEP – It is good practice to seal the drill holes with wax. It does aid moisture retention and prevents any competing mould or fungi from entering the hole in the logs defence system the bark). If you are using grain spawn, an older log or older spawn then make sure you seal the drill holes. Additionally, if you live in a dryer environment, waxing the holes shut AND sealing the chopped ends of the log with wax can prevent any moisture from evaporating. If you do choose to do this, here is how to do it.

i) Choose your wax. It needs to have a low melting point so that it does not kill the mycelium by being too hot and be non-scented and natural. We recommend soy or bee wax.

ii) Using a sponge or brush dab the wax on to the drill hole to form a sturdy layer of wax.

iii) Allow it to dry.

Incubation

Now that you have successfully inoculated your logs, it is time to let them incubate. During this period, the spawn will work its way into the log and start to digest the nutrients. The aim of this stage is to create the perfect conditions for the spawn to fully colonise the log. When the log is fully colonised and the external conditions are right, the organism will be triggered to produce a flush of mushrooms.

Incubation time is impacted by many factors, such as temperature and species of mushroom. It typically takes between 6 and 12 months of incubation for the first flush of mushrooms – at least one spring/summer season. This is very dependent on seasonal variables.

Positioning your Logs

To ensure consistent healthy development, the log location must be selected carefully. Put the logs in a warm place that is free of direct sunlight and wind which could dry the log out. Some people even put them in a plastic bag that is not sealed. This helps to regulate humidity and temperature, although is not essential.

Log stacking is suitable for all oyster, shiitake and enoki mushrooms. It is a useful technique as it creates space efficiency, allows fresh air flow, and keeps the logs off the ground and away from contamination. The most common method for logs <1m is crib stacking. The logs should be raised off the ground on blocks or a pallet. Crib stacking involved using a criss-cross formation.



Varied species may be stacked together. However, there should be separators in place to avoid cross contamination.

Temperature and Moisture

An ideal temperature is around 22°C, hence why it is common to see fastest development in summer months and almost no growth throughout winter. If you have the space and wish to speed up this process, you can store the logs inside (e.g. shed, stable) over winter to maintain a higher temperature.

If you do move them inside it must be to an unheated space, otherwise the risk of drying out is high. The stacks can also be covered with shade netting to prevent drying out if you wish to keep them outside. For long term use plastic should be avoided as this may encourage the growth of mould.

Competing Plants and Vegetation

Initially after plugging (<9 months) the log will be susceptible to invasion from competing fungus and micro flora. For this period, it is important that it is kept free from contact with the soil. After this period, the mycelium should be established enough to fend off the competition. Vegetation may grow around the stack as this provides humidity. Before fruiting season this must be cut back to avoid slugs and other pests from enjoying your harvest!

Watering Logs

If there has been hot dry weather for a week or more, you may need to consider watering your logs. This is a judgement call. If the logs are still fairly damp, then drenching the cut ends will be sufficient (in a bucket). However, if there are obvious signs of drying out then a maintenance soak may be required. This involves fully submerging the logs for 12 hours. In some species (particularly oysters) this can be a trigger to begin fruiting. So, for the next couple of weeks keep an eye out for primordia (immature fruits developing).

End of Incubation

As you draw to the end of incubation you will need to move the logs outside (if they have been under cover to this point).

As before, you are looking for a warm, shaded and wind free space. The conditions required are like those of a shade loving plant. Mushrooms grown outside in natural light will have a richer colour and flavour as well as a higher vitamin content.

Towards the end of the incubation, you can check for signs of colonisation. If the ends of the logs are unsealed, you will see the white mycelium developing (an exception to this is chicken of the woods which has a dark mycelium). You may also see white mycelium developing in cracks or plug holes within the log. On the cut ends this will usually start in a star shape and overtime will join up so that most of the end is covered. If after 12-18months there are no signs of mycelium, then the chances are that your mushroom species has been outcompeted and perished.

Fructification

Once the log is fully colonised, the final piece of the puzzle is to ensure that the log is in the right conditions to trigger fruiting. Fruiting is usually triggered by fluctuating temperatures or the period after a heavy rainfall. Once these conditions are in place, it is time to shock your shiitake into growing.

Shocking shiitakes into fruiting is a peculiar process. Following a 24hour soak period, you will need to bash the log with your mallet or hammer a few times. This movement replicates the shock of a falling tree and triggers the mushrooms into fruiting. The best times of the year to shock are Spring or Autumn – the heat of the summer may be too warm for mushrooms to fruit and the cold of the winter means that the mycelium will be dormant.

Once these conditions are forthcoming it is worth checking the logs every couple of days for signs of growth. Once the fruits start to develop, they can double in size each day. If they fruit in the Spring or Summer, then the chance of the actual mushroom fruits drying out is quite high. One way to prevent this from occurring is misting the area with a handheld mister to increase moisture in the area. Make sure you do not do this if your log grows are in direct sunlight however as this can cause the mushrooms to burn!

Harvest

When you have fruiting mushrooms, it is time to harvest. The best time to harvest them is when the gills on the underside of the cap are visible and the outer edge of the cap is slightly turned up. To harvest them from the log, hold the mushroom at the base of the stipe and twist it away from the log. Using a tool such as a knife can leave behind waste mushroom that rots, so make sure that if you leave any mushroom behind to remove it!

Future Flushes

A log grow should produce a minimum of one flush a year, for up to six years. The limit of this is determined by the size and density of the log. After they have expired, they are perfectly safe to leave in a natural environment to allow them to decompose.

MUSHROOM BED GROW

Introduction

In 1740 Voltaire wrote, 'a dish of mushrooms changed the destiny of Europe'. Thankfully you won't be facing the fate of King Charles VI of Hapsburg who died at the hands of a death cap mushroom; instead, you are set to have a dish of mushrooms change the way you approach grow your own gardening, supported every step of the way by a wealth of Urban Farm-It knowledge. Growing mushrooms in beds can open a new door to anybody. It cuts waste from your supermarket basket, introduces you to new flavours and varieties of mushrooms and is an uncomplicated way to work with the environment around you.

Evidence from the Palaeolithic age suggests that humans have been collecting mushrooms for over 10,000 years. By building a mushroom bed, you can replicate these ancient natural processes in any space, from the urban to rural. Mushrooms beds are an adaptable growing method perfect for growing winecap mushrooms. Winecap are an easy and abundant variety.

Our in-depth guide will take you through how to work alongside nature and make sure you achieve the best possible harvest of mushrooms, as well as the best possible experience beyond the day of your foraging course. A bed grow is an option open to many varieties of mushroom. In this guide we will be talking about using Winecaps or *Stropharia Rugoso-annulata*, a trusty and tasty mushroom.

Qualities of the Mushrooms

Winecaps are robust and woody mushrooms, good to grow in most environments and excellent as a candidate for a bed grow.

Winecaps are often used as an alternative to portobello mushrooms. We think this means that their unique tastes and properties are often overlooked. They're a desirable choice in their own right as they have the unusual ability to weather mild heat, making them perfect for a vegetable garden or allotment. Whereas other varieties may struggle over Spring and Summer, the winecap thrives, bringing you a plentiful harvest within the first 2-11 months.

Winecap fact file

COMMON NAME: The King Stropharia, Wine Cap, Garden Giant, Godzilla Mushroom

LATIN NAME: Stropharia Rugoso-annulata

STRAIN WE USE AT URBAN FARM-IT: Stropharia Rugo-annulata M5012

BEST GROWING LOCATION: An area with easy accessibility for you to visit. Preferably near water or in a damp area, and with lots of shade.

GROWING TEMPERATURE: An ambient temperature that isn't in direct sun or blisteringly hot.

IN THE WILD: Winecaps often grow in areas where there are lots of dead leaves and wood. In garden settings they normally appear where there are damp woodchip paths or compost areas.

SPAWN STORAGE TEMPERATURE: 20C

FRUITING TEMPERATURE: 10-20oC

GROWING SEASONS: Spring, Summer, early Autumn

TIME PERIOD: 2 to 10 months for the first flush of fruit. Planting in Spring gets you ready for a first flush in Autumn; planting in Autumn means you will most likely be able to have your first harvest in Spring of the next year.

BEST TIME TO PLANT: Springtime, when frost is no longer a regular occurrence OR early Autumn before the first frost.

WHO CAN GROW THESE: Anybody! They are an easy strain to start with if you are growing outdoors for the first time.

Identifying Winecap Mushrooms

Young Winecaps

We recommend harvesting wine cap mushrooms whilst they are still in the young button stage of growth. Winecaps contain chitin, the same polymer that helps harden crabs' shells. It is easy to spot a more mature Winecap; as the levels of chitin in the fruiting body increase, the cap of the mushroom tends to flatten and crack. Chitin is extremely good for you – it's a source of insoluble fibre that will help your gut and encourage probiotic growth, however in higher concentrations it can make the mushroom fruit a bit leathery to taste.

Young Winecaps are the iconic deep port shade that gives them their name. It's normally a strong convex shape, much like a button mushroom you may see in the shop. An iconic feature of the Winecap is the thick white ring or 'crown' that grows towards the upper half of the mushroom. It has upward facing radial gills which are the same colour as the stipe. The crown feature is very fragile and is often knocked off by heavy handed foragers or wildlife, meaning you don't always see it on a more mature mushroom. Don't depend on looking for the crown alone if you're identifying Winecaps whilst foraging.

Mature Winecaps

The stipe of the mature Winecap tends to have a more bulbous base. Winecaps are known for their thick and fleshy stipes. More mature Winecaps have a darker brown cap – imagine you've tried to scrub a port wine stain from a white carpet. The gills on the older mushroom are very tightly packed but are dark purple in colour, sometimes fading to black. Younger fruits have the same tightly packed appearance but fresher, white coloured gills. On all Winecaps the gills are attached to the stipe. At any age the flesh of the mushroom does not change colour when cut or bruised.

Materials

Bag of mycelium: Head on over to the Urban Farm-It website and have a look for our Wine cap grain spawn! Just type the code 5012 into the search bar of our shop section. The size of bed that you are preparing changes the quantity of spawn you will need. At Urban Farm-It we work with the baseline ratio of one 5l bag of mycelium per 4-6m² bed. The heavier you sow the bed, the faster the harvest.

Substrate: This will be either wood chip or straw. See the 'Materials' section of the guide to help you make this decision. Some people also use substrates such as manure or sawdust.

Cardboard

Rake

Choosing Your Substrate

Woodchip

Woodchip beds can last up to three years. Always make sure you use a hardwood wood chip. Soft woods such as conifers, pine, cedar, or fir are unsuitable for mushrooms to grow from. Hardwoods like oak are ideal. Softer hardwoods such as magnolia or willow are also perfect. Always make sure you saturate the chips with water if they are dry prior to starting! It is also key to ensure there is a variety of particle size amongst your woodchips. Having a range of sizes (for example sawdust up to a larger wood chip) means the mycelium will colonise better. To keep your bed producing year after year, you need to keep it topped up with fresh materials.

Straw

Straw beds have a shorter lifespan but are often chosen because they offer such ease. Substrates with a larger particle size like straw require more watering, so if you choose a straw bed make sure to keep an eye on it and prevent it drying out. Make sure the straw has been heavily watered or soaked and drained before use. The straw needs to be clean and free from any pesticides or weeds. Oat or wheat straws are the most common, and perfect for a bed grow. We recommend using a mixture of chopped and long straw so that the mycelium have something to bind to when it develops its hyphal network.

Which Spawn Shall I Choose?

Spawn is the mixture of mycelium and grain or sawdust. When choosing your spawn for a bed grow you will be presented with two primary choices. There are benefits to both options and we are here to help you choose.

Grain Spawn offers strong nutrition to the Mycelium, keeping it alive and thriving for longer. However, as the grain is wheat based it is likely to attract rodents, such as rats and pigeons. This shouldn't detract from the many properties that grain spawn does offer. If you aren't in an area rampant with rodents, we would recommend using a grain-based spawn as opposed to a sawdust one. Grain releases a high concentration of nitrogen, which will help you grow a bountiful crop of mushrooms.

Sawdust based spawn offers an alternative that, put simply, Winecaps love. Many people choose to use sawdust as a final substrate, so a sawdust-based spawn means the mycelium is already acclimatised to the enzyme processes and will prosper once in the bed. It's great if you are looking a short-term mushroom bed because it is easy to remove as well as quick and easy when first building your bed.

Cardboard

How can cardboard help a bed grow? Whatever you choose as your substrate, placing a layer of damp cardboard down beforehand helps generate the ideal growing conditions for your mushrooms. Cardboard is a tool familiar to those with a no dig approach to permaculture. The cardboard helps to prevent weeds and grass growing up through your mushroom bed and disturbing the mycelium. It also protects the mushrooms come the warmer months; as the ground grows dry, the cardboard doesn't. When you put your cardboard down, we have a few top tips to make sure that it brings the best to your bed.

You don't want the cardboard to be too thick. Put it across the bed like a thin layer of paper mache. Softly ripping it into strips when it has been soaked means you can expose the ridges that make dry cardboard strong. Lay the ridges facing upwards as the rough texture is a good surface for the mycelium to bind to. Always make sure that the cardboard is ink and plastic free. And most importantly, whilst it is key that the cardboard is damp, make sure it is not over saturated! Over saturation can encourage rot.

Creating a Growing Space

The next step in creating the perfect bed for your mushrooms. There are four top types of mushroom bed that you can create, all of which are suitable for any substrate. You can even take elements of one and combine them with another to make the best bed for your environment!

The depth of the bed is up to you, but normally becomes naturally apparent as you start to distribute your materials. When filling the bed with substrate, the lasagne method will bring you the best results. Have a look at the section of the guide where we describe the process of bringing your bed together to learn more about this method. Have a look below to see what types of bed we recommend.

Log style bed

Many people construct their beds out of four logs placed in a square. This is a great option as it is cheap, easy and the logs can be cut to fit the size of bed you want. You can either lay the logs next to each other or explore basic joining techniques if you want to make a more permanent fixture of your bed. The logs also provide you with a good depth guide for your substrate. Often this style of bed is used if you are choosing to grow in a woodland or more rural area, but always looks good in a back garden. You don't just have to use logs, however. Other options include stones, bricks, planks, or railway sleepers.

Re-purposed or custom-built bed/raised planter

Repurposing or custom building a planter to create your mushroom bed is an easy method that always provides a stylish and sturdy outcome. Make sure that the bed isn't too deep, or you will be layering substrate and spawn for a good while! A deep bed doesn't guarantee a more fruitful harvest either. The ideal depth is around 10inches.

Mulch

Perhaps you have a vegetable patch in your allotment with plenty of space between plants? Or maybe you have flowerpots of perennial flowers on the balcony? These are just two examples of places you could do a mulch style mushroom bed. By laying down substrate at the base of other plants and neatly mixing in the spawn via the lasagne method (explained later in the guide) you can companion grow mushrooms.

You can use any substrate for this method although straw is the most popular choice as it is easy to remove and breaks down fast. Straw as a mulch is a great insulator and produces a small amount of heat. Mushrooms are exothermic, so they excrete heat. Combined this means that once matured slightly, the centre of the bed ought to be resilient to any spring cold snaps, should you choose to get growing in spring. A straw mulch will also help protect your other plants from any early frost. Using a grain spawn means that the other plants can capitalise on the nitrogen released from the breakdown of the grain, helping them stay healthy. Mushrooms are most compatible to be grown alongside brassicas, root vegetables, fruit trees and perennial flowers that thrive in shade. These plants will help you get the most out of your mushroom grow, bringing you a double harvest of plants and allowing you to use any space you have to its full potential.

Selecting a Location

After you have decided on which bed to create, you need to select a location to place it. You can grow anywhere you have access to; many videos you will find online choose a woodland style area. Search the Urban Farm-It YouTube channel to watch Elliot create a mushroom bed in an allotment planter as inspiration.

When planting mushrooms in mulch, make sure you don't choose a south facing place looking at a wall. Mosses and other fungi growing is always a good sign, just make sure you remove them before planting your mushrooms as to remove any competition.

Choose an area free from any grass or competing plants, such as other mushrooms or weeds. A shady area is always best as choosing to grow in an area of direct sunlight can be tricky. Shady areas come hand in hand with the cool and damp, which are ideal for mushroom growth. However, make sure the area isn't waterlogged.

Preparing and inoculating the bed

We recommend using the lasagne method to prepare your bed. When starting, make sure you have water to hand. You will need to water the bed lightly and evenly, so a hose set to the light spray setting, or watering can with a rose on is ideal. A direct stream of water onto the bed may disrupt the substrate. The substrate needs to be damp as opposed to wet.

Winecap mushrooms are never designated to one traditional growing space, they are a wandering mushroom so be prepared to see them appearing all around your garden or growing environment.

1. Pull out any giant weeds and shake off excess material such as soil before putting them into compost or something similar.
2. Give the area a rake, pulling out any tiny weeds, evening the area out and removing material like dead leaves. This reduces competition in the area which equals better production of mushrooms.
3. The next step is to soak your cardboard. You don't want the cardboard to be too thick. Don't forget to lay it into the bed rough side up!
4. Now it's time to layer your substrate and spawn like a lasagne. This method essentially does what it says on the tin. On top of the cardboard layer, place your first layer of substrate. If you are using a woodchip substrate, begin with any larger chunks of woodchip you have to hand. If you are using straw, begin with the longer straw as opposed to chopped. Starting off with a rough base gives the mycelium something to bind to. Wet the substrate gently.
5. Now sprinkle a layer of spawn on top of the substrate. It does not need to be a thick layer, just evenly spread. There is no real technique to this step but making sure it is evenly spread out means the mycelium can occupy the space prior to anything else that grows in the bed.
6. After this, layer with some chopped straw or more woodchip. Water again. If you are creating a mulch bed, make sure you don't stifle any of the companion plants.
7. Keep layering until you have achieved your desired depth/used up all your spawn. Don't forget to wet the substrate between layers, and if you are using straw, to cycle the chopped and longer straw to create texture.
8. Very little mushroom farming is neat and precise. Enjoy working with natural processes!

Monitor and Grow

Keep an eye on your mushrooms because they can fruit for the first time at any point between 2 and 11 months after inoculation. Here's our check list of things to look out for.

1. Is your bed dry?

Make sure you are watering regularly if your bed looks dry. If you are growing in a dryer area, loosely place a tarpaulin over your bed. Secure it very lightly and keep an eye on it. This will help create humid growing conditions with good moisture levels.

2. Can you see a fine white layer of a 'mould' looking material?

Good! This is the hyphal network developing. *Hyphae* are the fine white filaments that develop from the mycelium. They can be likened to the roots of fungi (mushrooms). To the eye it would look like a fine white mesh or web. A more condensed area of these filaments may be a *Hypahl Knot*. This is a knot of *mycelium*, which is one step away from becoming a *primordial* (baby) mushroom.

3. Does something look wrong?

If you need any advice or think something does not look right, give us a shout at hello@urban-farm-it.com and send us a picture of your bed. An example of something not looking right would be perhaps a green coloured mould growing. This may suggest contamination in your bed.

4. If your mushroom bed looks brown and watery

it may be too soggy. It is likely going to just be natural rainwater or something similar.

5. Has a cat or a fox had a dig about in your substrate?

Don't panic. If they have disrupted your substrate to a point where there is not enough, consider topping it up. Your mushrooms will most likely still grow. If they have left you a little gift, you can remove it, however if you don't, the mushrooms should feed from it and break it down eventually. Rats on the other hand can burrow all the way down, disrupting the hyphal networks and eating away at the sources of nutrition the mushrooms need. They can also bring contamination, so do keep your eyes peeled!

Fructification

In Botany, *fructification* is the part of the growing process when a spore bearing or fruiting structure, namely in a fungus. An Urban Farm-It top tip to remember is that mushrooms tend to fruit after a rainy period. If you look out of your window and see it is damp outside, it might be worth having a look at your mushroom bed. Use this table to help guide you on when your mushrooms might be ready.

Fruiting

Mushroom/Spawn Type	Time Period of Growing Process	Fruiting Temperature
WINECAP (<i>Stropharia Rugoso-annulata</i>)	2 to 11 months	12°C - 25°C
LIONS MANE (<i>Hericium erinaceus</i>)	2 to 4 weeks	22°C - 30°C
GOLD-YELLOW OYSTER (<i>Pleurotus citrinopileatus</i>)	3 to 5 weeks	15°C - 22°C
BLUE-GREY OYSTER (<i>Pleurotus ostreatus</i>)	2 to 5 weeks	10°C - 20°C
PINK OYSTER (<i>Pleurotus Djamor</i>)	3 to 5 weeks	18°C - 28°C
WHITE ELM OYSTER (<i>Pleurotus ostreatus var. Florida</i>)	3 to 5 weeks	16°C - 22°C
SHIITAKE MUSHROOM (<i>Lentinula edodes</i>)	6 to 12 months	14°C - 17°C

Harvesting

You've finally got mushrooms growing in your bed! Congratulations! Winecap mushrooms taste best when younger, so picking them when they are still in the youngest button form guarantees a good flavour. Young wine cap mushrooms often have a slightly sticky cap which helps indicate they are ready to harvest. Alternatively, you can leave them for 1-3 days for the caps to open and flatten out. Flatter caps make them perfect for a burger style meal, whereas younger mushrooms are great for things like ramen.

How to Harvest

1. When you pick the mushrooms, simply use your hands, and gently twist from the base of the fruit, then pull upwards.
2. Using a tool to slice or cut them can encourage rot to grow. If there is any material left in the ground, we recommend taking that out as well.
3. When harvesting your mushrooms, don't pick them all. In fact, as some of them age, give their caps a gentle flick to help spores spread. By leaving a few mushrooms to mature and drop spores, the bed will rejuvenate itself for next year through being inoculated by the spores. It may also mean that you have new patches of winecaps pop up around your garden or growing area!

How to Prepare your Bed for Next Year

Depending on the type of bed you have, there are different ways to get your bed ready for next year.

Wood chip beds have a longevity of about three years, but the wood chip needs to be topped up year to year. By adding a layer of woodchip onto the top of your bed, you do not guarantee rejuvenation, but you stand a good chance of the mushrooms colonising the new material.

Straw Beds last about a year. Winecaps mushrooms are an aggressive strain that eat away at the material they grow on. Combined with natural factors such as the weather, straw beds tend to break down after a year. However, they are very easy to build so are brilliant for the mushroom grower who is on the move or is testing things out.

GROWING OYSTER MUSHROOMS IN BAGS

When we talk about oyster mushrooms, most people will default to thinking about the blue-grey oyster mushroom – also known as *Pleurotus Ostreatus*. However, there are many varieties of oyster mushrooms, all with different benefits, as well as colours!

The name of the mushroom comes from the Latin ‘pleurotus,’ meaning sideways, and ‘ostreatus’, meaning oyster. The first records of oyster mushrooms being actively cultivated for food are from German soldiers during World War One. The dense woodland environment of battlefields across Russia and Bavaria created the perfect place for oysters to grow. Particularly resistant to competitive strains, oyster mushrooms quickly colonise dead wood and fallen trees before growing abundantly and offering a nutritious food source.

Humans have been harvesting mushrooms since the Palaeolithic age and we can now mimic these natural processes in our own homes and gardens. This in-depth guide seeks to share a wealth of Urban Farm-It knowledge on growing the White Elm variety of oyster mushrooms in bags.

A bag grow offers ease to urban farmers of any experience. It can be moved from location to location, has a high success rate and is a great introduction to the world of growing your own mushrooms. When timed correctly, you can make sure you have a constant supply of mushrooms straight to your kitchen, reducing supermarket waste and saving you money.

The type of oyster mushroom you choose will dictate certain aspects of your growing environment, including temperature, time to harvest and placement. Oyster Mushrooms always provide a trusty harvest. Depending on the season or your level of experience, you may want to choose to grow a slightly different strain. For example, White Elm and Blue-Grey strains are more resilient to cold weather whilst pink oysters do better in the Spring. Take a look at the list of strains we stock and the fruiting guide below to help you make this decision. If you need any further help, drop us an email at hello@urban-farm-it.com.

Mushroom Name	Growing Season	Fruiting Temperature	Length of Growing Process	UFI CODE
GOLD-YELLOW OYSTER (<i>Pleurotus citrinopileatus</i>)	April - September	15°C - 22°C	3 to 5 weeks	2502
BLUE-GREY OYSTER (<i>Pleurotus ostreatus</i>)	February - November	10°C - 20°C	2 to 5 weeks	2191
PINK OYSTER (<i>Pleurotus Djamar</i>)	April - September	18°C - 28°C	3 to 5 weeks	2708
WHITE ELM OYSTER (<i>Pleurotus ostreatus var. Florida</i>)	February - November	16°C - 22°C	3 to 5 weeks	2125
KING OYSTER (<i>Pleurotus eryngii</i>)	March - October	12°C - 15°C	3 to 5 weeks	2603

*Note: Oyster mushrooms fruit all year round, but flourish better during particular seasons.

White elm oyster mushroom fact file

COMMON NAME(S): White Elm Oyster Mushroom, Tree Oyster

LATIN NAME: Pleurotus ostreatus var. Florida

BEST GROWING LOCATION: On deciduous trees, grow bags, logs

IN THE WILD: Broadleaf woodland

SPAWN STORAGE TEMPERATURE: 5 oC

FRUITING/GROWING TEMPERATURE: 16oC - 22oC

TIME PERIOD: 3 to 5 weeks

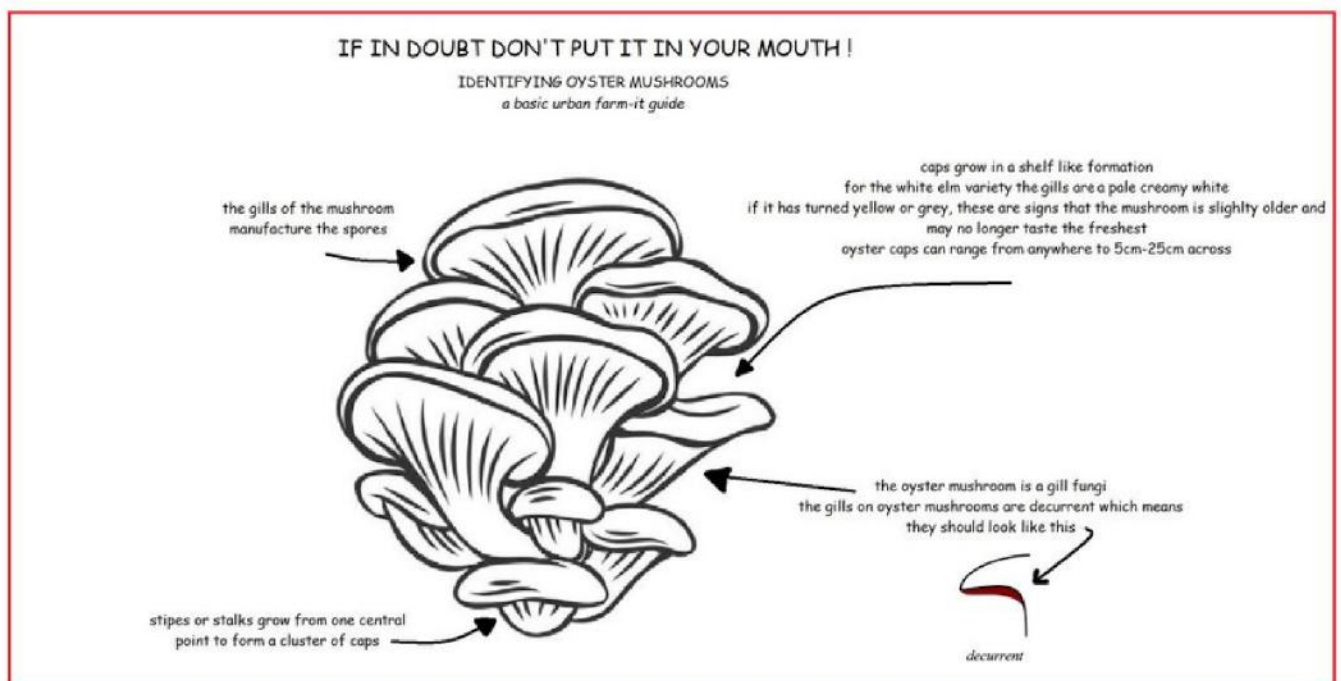
BEST TIME TO PLANT: March

WHO CAN GROW THESE: Anybody! Any variety of oysters are an aggressive strain of mushroom, meaning they are extremely easy to grow.

Qualities of oyster mushrooms

Aside from being easy to grow, what is so great about oyster mushrooms? They are rich in protein, cholesterol free and encourage healthy blood sugar control. Not only this, but they have elevated levels of Vitamins D, D3, D5 and A and have great antioxidant and anti-inflammatory effects. And they are great in a meal!

IDENTIFYING OYSTER MUSHROOMS



White Elm Oysters



Pink Oysters



Blue-Grey Oysters



Yellow-Gold Oysters



Materials

You will need the following for your oyster mushroom grow bag...

Mushroom spawn

White Liner: To waterproof your box and create a great growing environment

Black Substrate Bag: A heat resistant bag containing the material that the mushrooms break down and use for food. In this instance we are using straw pellets as the substrate material.

A Cardboard Box: You will need this to incubate and grow your mushrooms in.

Clothes Peg or Sticky Tape: This is used to secure the top of your substrate bag, and make sure no mess is made.

Sharp Knife or Scissors: You will need one of these to cut grow holes in your grow bag

Mist Sprayer: A mist sprayer is recommended for watering young mushrooms. It's best to get a brand new one, so there's nothing inside that can contaminate your grow.

NOTE: This method uses a different substrate to our kits (pellets rather than chopped straw). Both are suitable for growing oyster mushrooms, but chopped straw is better for a first-time grower. You can also use this method with coffee grounds, leaf mulch, cardboard and other organic materials.

If you have a kit, please stick to the instructions inside the box as they do vary slightly.

Straw pellet substrate

We recommend using straw pellets as substrate for creating your own mushroom grow bag from scratch. When pellets are created, they are pasteurised. This means that any organisms and contaminants from the straw that may inhibit your grow are already gone. Straw pellets are an easy to get hold of substrate and do not require any further pasteurisation or treatment!

Creating your grow bag

1. Thoroughly wash your hands and forearms with hot water and soap.

This step ensures that no contaminants are mixed in with your mycelium. Contaminants corrupt the growing process, leaving your project stunted or entirely unsuccessful. However, this is easily avoidable! By practicing good sterile technique when working with mushroom spawn, you decrease the chance of introducing competitors such as bacteria to your Mycelium.

2. Pasteurise & hydrate the substrate.

Pasteurization is the process of heating a substrate to temperatures between 65 and 85°C for at least 1.5 to 2 hours. It won't get rid of all the impurities, but it will reduce the general population of other bacteria to a point where the mushroom species will have an advantage. Add boiling water to your substrate to achieve this. It should be moist but not waterlogged.

Once cooled, cut the corners of the bag and allow the substrate to drain, then give it a squeeze to remove the last of the excess liquid.

3. Open the black substrate bag and crumble the spawn into the substrate.

The harder your grain spawn gets, the stronger the hyphal network it has developed is. So, if your spawn feels solid like a block of soap, use it as soon as possible. Leave it any longer and the mushrooms will try growing in the tiny bag.

The grain they are inoculated on does not hold enough nutrients to allow the mycelium to develop into fruiting mushrooms. So, make sure your spawn is always as fresh as possible!

4. Using your clean arm, mix the spawn into the substrate.

The spawn needs to be thoroughly mixed and evenly distributed throughout the bag. The even distribution of the spawn through the substrate ensures a strong colonisation of the substrate and an even harvest of mushrooms.

5. Roll the top of the bag shut.

As you do so, compress the substrate to remove air. This helps create a good growing environment. Seal the top of the bag with a strip of tape or a clothes peg.

6. Now it is time to cut the grow holes into the bag. *There are two ways to do this:*

HORIZONTALLY – cut 4-5 ‘x’ shape holes in only one face of the bag. This produces a more consistent harvest, with more wavy style mushrooms.

VERTICALLY – cut 4 to 5 ‘x’ shapes onto one face of the bag, as well as the sides. This produces flatter shaped caps, such as you would see in the wild.

Once the grow holes are cut into the bag, it is time to incubate.

7. Wrap the black substrate bag inside the white liner bag. *Place the bag into the box with the uncut face of the bag facing downwards. Pop this back inside the cardboard box and close the lid. It does not need to be sealed but closed so that it is dark.*

8. Place into a dark spot, where it is around 20-25 degrees. *Avoid placing directly alongside heat sources and be cautious when using airing cupboards as these can sometimes get too hot!*

9. Leave to incubate until the substrate is fully colonised.

10. At the 16-day mark, check the mycelium has formed and colonised a strong network. *You can check this by looking through the grow holes. There ought to be a strong white cotton wool like substance growing on the straw substrate. If there isn't, leave it in the incubation stage until this has formed. This white layer is the hyphal network developing. Hyphae are the fine white filaments that develop from the mycelium. They can be likened to the roots of fungi (mushrooms). To the eye it would look like a fine white mesh or web. A more condensed area of these filaments may be a Hypahl Knot. This is a knot of mycelium, which is one step away from becoming a primordial (baby) mushroom.*

11. Once you are confident the substrate has been colonised, it is time to move the into the light. *Do not move it into direct sunlight. Instead choose an airy but draught free area in natural light.*

12. Open the box and stand the flaps of the box up. *Take the white liner, and as if you were putting a new bin liner in, fold the white liner over the top of the box flaps, therefore lining the box with the plastic. This creates a moisture proof environment for the mushrooms to fruit in. Depending on what position you chose to cut the grow holes earlier on, either lay the black substrate bag down, or stand it horizontally within the lined box.*

13. It is important that the substrate does not dry out! *The straw pellets need to be moist but not waterlogged, which is why using a spray bottle is the best way to water. Lightly spray the plastic areas around the grow holes twice a day. Do not directly spray the holes or spray any mushrooms with water. It is also good practice to keep the lined box humid, which can be achieved by regularly misting the plastic side walls.*

14. You should now start to see your oyster mushrooms fruit!

Harvesting

Your first flush of mushrooms will be the most plentiful harvest. A grow bag set up allows for 1-5 flushes of mushrooms, with the latter flushes being slightly smaller.

You may see tiny pin mushrooms start to develop. *Pin Mushrooms* are the tiny pin like mushrooms that normally appear to the sides of a mushroom grow. As the natural substrate shrinks down, the gaps where it shrinks away from the sides of the grow bag or container create perfect conditions for mushrooms to thrive, so you will often see them in your grow.

However, *pin mushrooms* should develop into fully grown mushrooms, so if you pick them and eat them you prevent them from being able to mature into something more substantial. Additionally, it can be hard to tell whether they are going to mature, or whether they are an *aborted pin mushroom*. Aborted pin mushrooms may have something wrong with them or be a bit mouldy from being sat in the damp sides of the bag. Altogether, maybe avoid eating them.

Harvesting your mushrooms is an easy step, and when done correctly, it should encourage further growth. Holding the cluster of oysters at the base, gently twist and pull them up away from the bag. Remove any excess mushroom material that is left behind. Using a tool such as a knife or leaving in dead mushroom may encourage rot, preventing further flushes.

Disposing of your grow bag

The contents of grow bags are great for the compost heap.

Cut the plastic away from the substrate, perhaps in an outdoors area so there is no mess. The substrate can then be crumbled down and spread amongst plants to provide them with extra nutrition or placed in a compost heap to break down entirely.

Cooking with oyster mushrooms

Oyster mushrooms are a fantastic addition to any kitchen and can be worked into many recipes. As they become increasingly popular (especially as a meat substitute), it is becoming easier to find them on the supermarket shelf. However, no mushroom thrives in a supermarket environment and neither does our planet from the excess plastic packaging that comes wrapped around the product. An oyster mushroom grow bag set up is the perfect way to create a sustainable source of fresh food that is good for our planet.

At Urban Farm-It, our favourite way to cook our oyster mushrooms is pan frying. Although they're also great in a ramen or stroganoff, fried up in butter and served with some toast is the best way to enjoy the fruits of your labour and really taste their iconic savoury flavour!

PROFESSIONAL CULTIVATION INFORMATION

GOLD OYSTER

Binomial nomenclature	<i>Pleurotus citrinopileatus</i>	
Old nomenclature	None	
Inoculation rate	mix with \pm 2% spawn	
Natural substrate	hardwood / (wheat) straw	
Incubation	room temperature:	22-24 °C
	substrate temperature:	27-32 °C
	duration:	12- 13 days
Primordia induction	(night time) * temperature:	15-20 °C
	relative humidity:	90- 95 %
Fruiting conditions	room temperature:	(13) 17-22 (28) °C
	relative humidity:	85%
	CO ₂ -concentration:	less than 1000 ppm
	light:	800- 1500 lux
Flushes	number:	02/mar
	interval:	ca. 8 days
	between flushes:	relative humidity increases up to 90-95 %
Total production cycle	ca. 2 months	
Average yield	150 to 200 g saleable mushrooms per kg fresh substrate†	

WHITE OYSTER

Binomial nomenclature	<i>Pleurotus ostreatus</i> var. <i>Florida</i>	
Old nomenclature	None	
Inoculation rate	mix with \pm 2% spawn	
Natural substrate	hardwood / (wheat) straw	
Incubation	room temperature:	20-22 °C
	substrate temperature:	25-30 °C
	duration:	12-14 days
Primordia induction	(night time) * temperature:	lower to 6-15 °C
	relative humidity:	90- 95 %
Fruiting conditions	room temperature:	(11) 13-20 (<u>28</u>)°C
	relative humidity:	85%
	CO ₂ -concentration:	less than 1000 ppm
	light:	800- 1500 lux
Flushes	number:	2-3
	interval:	8-10 days
	between flushes:	relative humidity increases to 90-95%%
Total production cycle	Ca. 3 months	
Average yield	200 to 250 g saleable mushrooms per kg fresh substrate†	

BLUE OYSTER

Binomial nomenclature	<i>Pleurotus ostreatus</i>	
Old nomenclature	None	
Inoculation rate	mix with \pm 2% spawn	
Natural substrate	hardwood / (wheat) straw	
Incubation	room temperature:	20-22 °C
	substrate temperature:	25-30 °C
	duration:	19- 22 days
Primordia induction	(night time) * temperature:	lower to 6-15 °C
	relative humidity	90- 95 %
Fruiting conditions	room temperature:	(5-) 10-17 (-20) °C
	relative humidity:	85%
	CO2-concentration:	less than 800 ppm
	light:	800- 1500 lux
Flushes	number:	02/mar
	interval:	1-2 weeks
	between flushes:	relative humidity increases to 90%
Total production cycle	Ca. 3 months	
Average yield	200 to 250 g saleable mushrooms per kg fresh substrate†	

PINK OYSTER

Binomial nomenclature	<i>Pleurotus djamor</i>	
Old nomenclature	<i>Pleurotus salmoneo-stramineus</i>	
Inoculation rate	mix with \pm 2% spawn	
Natural substrate	hardwood / wheat straw	
Incubation	room temperature:	20-22 °C
	substrate temperature:	25-30 °C
	duration:	13- 16 days
Primordia induction	temperature:	18-24 °C
	relative humidity	90- 95 %
Fruiting conditions	room temperature:	18-28 °C
	relative humidity:	85-90%
	CO ₂ -concentration:	less than 1000 ppm
	light:	800- 1500 lux
Flushes	number:	2-3
	interval:	10-12 days
	between flushes:	increase relative humidity to 90-95 %
Total production cycle	Ca. 2,5 months	
Average yield	150 to 200 g saleable mushrooms per kg fresh substrate†	

SHITTAKE

Binomial nomenclature	<i>Lentinula edodes</i>	
Old nomenclature	None	
Inoculation rate	mix with \pm 1% spawn	
Natural substrate	composition:	80% hardwood, mixed fine + coarse 10% cereals 10% bran
	humidity:	62-63 %
Incubation	room temperature:	23 °C
	substrate temperature:	25 °C
	duration:	13-15 days
Primordia induction	(night time) * temperature:	
	relative humidity:	
Fruiting conditions	room temperature:	14-17 °C
	relative humidity:	85%
	CO ₂ -concentration:	400-800 ppm
	light:	500-1000 lux
Flushes	number:	3-5
	interval:	14 à 16 days
	between flushes:	temperature increase up to 19-24 °C, CO ₂ up to 1500-2500 ppm, humidity down to 85%
	bud induction:	immerse or irrigate substrate for 12 hours
Average yield	200 g to 250 g saleable mushrooms per kg fresh substrate†	

LIONS MANE

Binomial nomenclature	<i>Pleurotus ostreatus</i>	
Old nomenclature	None	
Inoculation rate	mix with \pm 2% spawn	
Natural substrate	hardwood / (wheat) straw	
Incubation	room temperature:	20-22 °C
	substrate temperature:	25-30 °C
	duration:	19- 22 days
Primordia induction	(night time) * temperature:	lower to 6-15 °C
	relative humidity	90- 95 %
Fruiting conditions	room temperature:	(5-) 10-17 (-20) °C
	relative humidity:	85%
	CO2-concentration:	less than 800 ppm
	light:	800- 1500 lux
Flushes	number:	02/mar
	interval:	1-2 weeks
	between flushes:	relative humidity increases to 90%
Total production cycle	Ca. 3 months	
Average yield	200 to 250 g saleable mushrooms per kg fresh substrate†	

WINECAP

Binomial name	<i>Stropharia rugosa-annulata</i>	
Old nomenclature	None	
Inoculation rate	mix with \pm 2% spawn	
Natural substrate	straw	
Incubation	room temperature:	20-22 °C
	substrate temperature:	25-30 °C
	duration:	Ca. 4 weeks
Primordia induction	(night time)* temperature:	
	relative humidity:	
Fruiting conditions	room temperature:	10-20 °C
	relative humidity:	80- 85%
	CO2-concentration:	less than 1500 ppm
	light:	not necessary
Flushes	number:	2-3
	interval:	2- 4 weeks
	between flushes:	
Total production cycle	4- 5 months	
Average yield	150 g to 200 g saleable mushrooms per kg fresh substrate†	