

Shiitake Mushroom Log Kit

Pronounced *she-taah-kee*—the Japanese name for this gourmet mushroom—it was first cultivated in Asia thousands of years ago. 'Shii' originates from the Asian *Shii* tree, whilst 'take' translates as mushroom. Shiitake possesses a distinctive smokey flavour, making it a great addition to casseroles, soups and stir fries.

Background

Growing mushrooms using cut logs has been perfected over millennia. The earliest written record of mushrooms cultivated this way, dates back to China, 1313, during the Yuan Dynasty. These early mushroom growers found that by placing freshly cut logs near logs that were already naturally producing mushrooms, the mushroom's spores would, after many years, eventually 'spread' to the purposely cut logs. In doing so, a rudimentary system of cultivation was discovered.

Over the last 50 years mushroom growing using logs has been refined and is now much quicker and more reliable. Rather than using spores to begin cultivation, mushroom plug spawn is reproduced from the living tissue of select strains. These strains have been rigorously assessed for both quality and productivity.

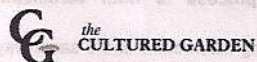
Plug Spawn is made using spiral-grooved birch-wood dowels. Under sterile controlled laboratory conditions, mushroom mycelium (*my-see-je-um*) is mixed with the plugs. The mycelium can be clearly seen growing through and around the wood. Mycelium can be thought of as like the mushroom's root system, which is 'planted' or inoculated into suitable timber. The spiral groove is important as it speeds up growth, prevents the mycelium from rubbing off, and it also helps to trap in beneficial oxygen.

The following instructions will guide you through the process of selecting the right timber, the plugging (or inoculation) procedure, and the subsequent production of mushrooms. Please keep these instructions safe for future reference. *We hope you enjoy making your mushroom log(s), and that you find mushroom growing a worthwhile experience.*

Additional items that may be required to safely inoculate suitable timber:

- | | | |
|-------------------------------|------------------------------|-----------------------------------|
| 1) power drill (min 1000 rpm) | 4) 8 mm HSS drill bit | 7) handsaw |
| 2) lopping tool | 5) workbench or sturdy table | 8) permanent marker / plant label |
| 3) tape measure | 6) chalk or wax crayon | 9) rubber mallet or hammer |

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— PLEASE HANDLE WITH CARE AT ALL TIMES —
Plug Spawn contains MYCELIUM—a living organism

DO NOT OPEN THE BAG UNTIL DIRECTLY BEFORE USE

This mushroom spawn is guaranteed viable until the Use-by-date

Storage Guidelines

If you are planning using the plugs within the next 8 weeks, leave in the packaging and store in a cool, dry place away from direct sunlight.

The spawn can be kept up until the use-by-date by placing the filter bag in a household fridge. Remember to take out of the fridge 24 hours prior to use, allowing the mycelium to acclimatise.

As the plugs age, they will slowly turn brown, some liquid will be produced and small white bumps will appear. This is perfectly normal, and should be expected.

Quality Assurance

Due to the myriad of factors involved: quality, sugar content, age, species of timber, environmental conditions; etc., it is impossible to accurately predict the quantity and longevity of the mushroom crop.

The plug spawn is guaranteed to be of sufficient quality to produce a mushroom crop given the correct conditions as described in these instructions. *After a reasonable length of time has elapsed, if you are not satisfied with the performance of this product, you can request a full refund.*

ALL mushroom species listed originate from wild specimens. Some species are foreign strains of species that are native to the British Isles, whilst others are classified as 'exotic' species non-native to the British Isles.

Each strain has been positively screened for: productivity; quality of fruit-body; speed of growth; and ability to adapt to different timber species.

Disclaimer

By purchasing this product and reading and understanding this instruction leaflet, I agree to hereby release the company, the company's employees, and associated suppliers / distributors, from all liability associated with the use of this product. In doing so, I am fully aware of the consequences thereof.

Getting Started

Preparing a mushroom log from green timber is undertaken in 3 stages, over a period of around 4 or 5 weeks.

Stage 1: Selection and Cutting

Successful growing requires a source of recently cut, disease free green timber. Logs can be either cut directly from healthy living trees, or from healthy trees which have been felled within the previous 6 months. Logs which are older than 6 months are not suitable due to problems with weed mushrooms, and drying out. Old dead wood, and logs which are losing their bark should be avoided.

Suitable Tree Species

Shiitake prefers dense hardwood timber which has a thick, rough bark. However, it is very adaptable and the vast majority of commonly available hardwoods can be utilised.

BEST > Oak, Beech, Alder, Chestnut, Hazel, Hornbeam

GOOD > Willow, Birch, Poplar, Maple

NOT Suitable > Sycamore, Ash, Conifer, Fir and Fruit trees

Before cutting logs from standing trees, first check the tree for signs of disease, such as unusual growths, prominent dead branches, and competitor 'weed' mushrooms. If any of these are found, then do not use this timber.

Timing

Logs can be cut and plugged through March to December. Spring and autumn are generally considered good times of year to cut back trees. Trees felled during their dormant season also have a higher sugar content which is beneficial to mushroom growth.

Selection and Cutting

Shiitake prefers narrow logs between 12 and 20 cm (or 5" to 8") in diameter. Select straight sections with a uniform diameter. Try to avoid odd shaped logs, and—as much as possible—avoid knots, wounds, and small branches.

Handle the timber with care throughout; particular attention is to be paid to the bark—especially thin barked trees such as birch. Any damage can have a detrimental effect on the eventual mushroom crop. It may help to think of your log as a 'moisture bank'—at all times keep in mind to limit the loss of moisture from the timber.

The length of the log is dictated by the number of plugs in your kit:

30 plugs	60 plugs	120 plugs
1 log 50 cm in length (2 ft)	1 log 100 cm in length (3 ft)	2 logs 100 cm in length (3 ft)
	or	or
	2 logs 50 cm in length (2 ft)	4 logs 50 cm in length (2 ft)

Using the appropriate tools, carefully remove any twigs and branches, ensuring branches are cut close to the bark. A pressure washer is very good at easily 'cleaning' up timber as it does little damage to the bark.

Stage 2: Seasoning the Timber

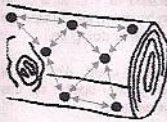
Freshly cut green timber requires a seasoning period of 4 weeks prior to plugging. This allows for the protective anti-fungal compounds which are naturally present within the wood, to dissipate. If your log is already a month old or more, then further seasoning is unnecessary and the log can be plugged straight away (see below).

To season the timber, it should be stored off the ground and sheltered from strong winds and direct sunlight. For example, indoors in a shed or outhouse. Or outdoors raised on bricks and covered with a tarpaulin.

Stage 3: Drilling and Plugging

Using an 8mm HSS drill bit (5/16"), drill logs at roughly waist height on a flat stable surface, such as a table, workbench, or sawhorse. Set the drill depth gauge to 1.5 times the depth of the plug. In place of a depth gauge a piece of electricians tape wrapped around the drill bit will work OK. Take care when drilling; accuracy is more important than speed. Ensure the drill bit 'bites' at right-angles to the log, so that a straight hole is drilled.

Drill holes around the entire circumference of the log only—there is no need to drill holes in the cut ends of the log. Holes should be evenly spaced and each row should be off-set to make a diamond pattern, as pictured left.



Using a tape measure, record the circumference of the log. Divide the result by four. Use this number as the distance between the rows. Mark each row at each cut end accordingly (as pictured right). Divide the number of plugs by four, to give the number of plugs per row.



With the log positioned horizontally, start drilling the first row 4 cm from the left-hand cut end. Space holes 6 cm apart in each row. Then, start the second row 4 cm from the opposite cut end. Repeat for the next 2 rows. It may help to mark out the pattern with chalk prior to drilling.

Regularly check the drill bit for signs of rot and disease. If the drill clearance is anything other than white to yellow in colour, and has a musty odour then the log is showing sign of disease. It should not be used, and the rest of the logs carefully monitored.

Plug the holes immediately after drilling. *Your log(s) will quickly dry out if left unplugged.* Prior to opening the bag(s), squeeze the contents to break up and loosen the plugs. Plug spawn bags should not be left open for extended periods of time as mushroom mycelium is prone to drying.

With clean hands, insert the plug so it stands up by itself, then whack it in, preferably—with a rubber mallet—or a hammer will do, taking care not to damage the bark. Occasionally, a plug may not sit entirely flush with the bark. This is fine, as the mycelium will still be in contact with the timber. When drilling and plugging is finished, using a permanent marker and plant label, record: the mushroom, the tree species, the date the log was inoculated, and attach to the log.

Now the timber has been inoculated with the mushroom mycelium, the log needs to be cared for in a way that will help the mycelium quickly grow throughout, or colonise, the timber. This stage is known as the **Spawn Run**.

The Spawn Run

The aim of the spawn run is to achieve **full colonisation** of the timber with mushroom mycelium, so that when the right weather conditions are encountered, mushroom production, or *fruiting* can begin. The spawn run takes anything from 6 to 24 months (or at least one spring/summer season). The duration is dependent upon the size of the timber and also the tree species—the larger the diameter, and the denser the timber, the longer the spawn run will take.

So, to produce a good healthy crop of mushrooms, the mycelium has a source of food and access to water; the log(s) contains plenty of nutrition—in the form of lignin and cellulose—and freshly felled timber has a good moisture content (between 35% and 65% depending upon the species). The mycelium also needs heat to grow. It grows fastest during the summer months when temperatures rise above 15°C, and almost stops when temperatures fall below 5°C.

To start and keep the mycelium growing healthily, a suitable location needs to be found, either indoors or outdoors, which will benefit the spawn run. At all times, the timber needs to be sheltered from strong winds and direct sunlight, thereby preventing moisture through evaporation. **If the log(s) dry out, the mycelium will almost certainly die, and no mushrooms will be produced.**

Indoor Spawn Run

The log(s) can be kept indoors in a shed or outhouse, or similar out-building. Polytunnels and greenhouses are fine during the cooler months, but should be used with caution during the summer months as the high temperatures can cause moisture loss from the timber. **The timber should not come into contact with soil.** Shiitake logs should be sited vertically on a dry, free draining base, and supported if necessary. For example: sand, gravel, concrete, stone(s), tiles, etc.

Outdoor Spawn Run

A sheltered garden should provide many places to home the log(s). Anywhere that is normally damp, shaded from the sun, and sheltered from strong winds is ideal for your log(s). It may help to think of your log(s) as like a **shade loving plant**. Again, the timber should not come into contact with soil. Shiitake logs should be sited vertically on a dry, free draining base, and supported if necessary. For example: sand, gravel, concrete, stone(s), tiles, etc.

First Signs of Growth

Several weeks after plugging a white to off-white ring can be observed around the plug site (left), indicating that the mycelium has begun to grow through the timber. Six months to a year later, white, 'cottony' mycelium should also begin to appear in star shaped patches at the cut ends of the log(s), as pictured below, right.

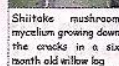
Plug site close-up

By the end of the first summer growing season, mycelium should be clearly visible running along cracks and fissures in the bark, and also just under the bark (left).



Keeping the Mycelium Healthy and Growing

During dry summer months water your log(s) along with the rest of your garden plants. Two minutes in the morning and evening will help keep moisture levels topped up. Wet top and sides using a watering can, making sure your log(s) get a good drenching.



As long as the log(s) are prevented from drying out by watering in dry spells, the mycelium should spread throughout and fully colonise the timber. Feeding upon the lignin and cellulose as it grows, the mycelium is building up energy ready to begin fruiting.

Only a competitor 'weed' mushroom will prevent this happening. If, after 6 months of spawn running, there are no visible signs of mycelium, then a competitor has most likely put a stop to things. Please get in touch via email or website to request replacement plugs.

Picking & Preserving



First, make sure it is the right mushrooms that you are picking. Shiitake is very easy to identify because it is not native to Europe, and there are no native mushrooms which look similar that grow on timber. The photos throughout this booklet should suffice, but you may also want to cross-reference with photos online.

The ideal size to pick shiitake is between 4 and 10 cm (2 to 5 inches). Some mushrooms will be larger whilst others will be smaller. **The best visual guide to picking is the degree of flatness of the cap.** Shiitake begin life button shaped, and flatten with age. Pick when the cap is still slightly rounded.

Picking is a quick and simple task which is best undertaken with a knife having a short, sharp blade. Care must be taken—**fresh mushrooms can bruise easily.** Cut at the stem as close to the bark as possible. Baskets are best at carrying your crop. Use plastic bags only if no other means are available.

Clean off any remaining stem from the log using the back of the knife. Keep site clear of mushroom debris, discouraging the unwanted interests from pests.

If required, wipe clean with a slightly damp cloth. Trim stem debris and store refrigerated at 1°C to 5°C, in cardboard or paper, for a maximum of 14 days after picking. Fresh mushrooms can be compared in storage times to fish. Mushrooms can be frozen, however the texture can be altered in the process of doing so.

Dried mushrooms can be preserved for up to 18 months providing an air tight container is used. Air dried at 70–80°F (20°C to 26°C) for 24 to 48 hours. Tearing the mushrooms into strips will greatly speed up the drying process. Mushrooms can also be pickled in vinegar, much the same way as vegetables.

The Next Flushes of Mushrooms

The log(s) are capable of producing 3 flushes per year, for up to 7 years. The lifespan of the log(s) is dictated by the size of the timber, and also the tree species.

Tree Species

Log Diameter: 12 to 20 cm or 5 to 8 inches

Oak, Hornbeam, Alder

5 to 7 years

Beech, Birch, Chestnut, Hazel, Maple, Poplar, Willow

3 to 5 years

Dense hardwood tree species, like oak, alder or hornbeam, flush for longer when compared to softer hardwood species like willow, poplar, or birch. Also, the wider the log(s) are, the longer flushes will be sustained for. However, it is very difficult to predict the longevity of the flushes as there are a myriad of factors which have influence of this.

After you have finished picking the first flush of mushrooms, your log(s) should be returned to their spawn run location and left for around a month. This gives the mycelium a rest, allowing it to build-up enough energy to produce another flush.

To stimulate another flush the log(s) are '**shocked**' into production by completely immersing in clean water for 48 hours. The shock comes from suddenly lowering the internal temperature of the log. This temperature drop is the natural trigger which stimulates the mycelium into production, as it mimics the seasons changing as previously described. The shock is only effective when the difference between air and water temperatures is in the region of 8 and 10°C. This means that logs can be soaked until September, then rested till the following spring.

Logs can be submerged horizontally or vertically up to 3 times a year. They should be forced completely under the water and weighted down if necessary. Post-soaking, return to usual location, and check for signs of primordia forming within 2 weeks of soaking. If no primordia form, rest the logs till next summer season.

Fruiting—1st Flush of Mushrooms

Once the log(s) are fully colonised with mycelium that is clearly visible around plugs sites, at the cut ends, and running down the bark, the mycelium now has enough resources to produce the first crop, or **flush**, of mushrooms, and is waiting for a natural signal to begin fruiting.

Fruiting is triggered by fluctuations in ambient temperatures, accompanied by heavy and prolonged rainfall. These weather conditions are normally encountered when the seasons change; *Spring to Summer, Summer to Autumn, Autumn to Winter, Winter to Spring.*

The mycelium is looking for a prolonged period of settled warm weather, followed by a period of unsettled colder, rainy, weather. For example; a 12 cm diameter log inoculated in March, fully colonised by August—the autumn weather change will most likely trigger the first flush.

Please note: if the log(s) have been colonised indoors, then they will have to be moved outdoors for the mycelium to properly feel the effects of the weather changes.

What to Look Out For



Shiitake mushrooms emerging from the bark. The larger primordia (1.5 cm in diameter) is about 36 hours old. Note the highlighted primordia just breaking

Check the log(s) daily (morning and evening if possible) after the aforementioned weather conditions have been encountered. *Primordia*, the term used for minute immature mushrooms, form overnight (pictured left). These miniature mushrooms start life hidden in the timber's thin layer between the sapwood and the bark. They then force their way through the bark, and emerge resembling off-white pinheads measuring just a few millimetres in diameter. Doubling in size daily, they darken to a light burgundy in colour in a day.

Primordia form in groups of 1 to 4; around plug sites, and in the cracks and fissures in the bark, and sometimes on the cut-ends.

Caring for the Primordia

Primordia are vulnerable to warm, dry weather and to climbing pests. Check the timber morning and evening. If warm dry weather is encountered during primordia growth, spray 2-3 times a day with a household plant mister, or water lightly with a watering can. If wet weather is encountered slugs and snails will most likely be a problem, and are capable of spoiling an otherwise healthy crop. To protect against slugs and snails, insects, and also rodents, logs can be moved to a patio, or an indoor location such as a shed or conservatory, but do ensure it is somewhere there is enough daylight to read these instructions.



Shiitake growing under unfavourable dry conditions

Caring for the Growing Mushrooms

Primordia mature into small mushrooms in 2 to 3 days. Mushrooms then reach maturity in another 3 to 5 days. Observing the growth process is both fascinating and rewarding.

Care for the developing mushrooms in the same way as for the primordia. Compare the two photographs (left) of shiitake mushrooms ready for cropping; a) has been tended daily, whilst, b) has been left to nature.



Enjoying Shiitake Mushrooms...delicious recipes

The log(s) are capable of producing 125g to 225g of mushrooms (1/4 to 1/2 lb.) per 30 cm (1 ft) length of hardwood log with a 15 cm (6 inch) diameter. Drying your excess mushrooms is the best way to preserve them over longer periods.

Roasted Rosemary Potatoes with Shiitake, caramelized onions & Swiss Gruyere cheese

Ingredients

3 tablespoons butter
1 small sweet yellow onion, sliced thinly
1 teaspoon sugar
1/2 pound (225g) fresh sliced Shiitake
2 pounds (1 kg) baking potatoes, peeled and cut into 1/2 inch dice
4 oz (110g) shredded Gruyere cheese
1 teaspoon chopped, dried rosemary
1/2 teaspoon salt
1/4 teaspoon freshly ground black pepper

Preparation

Preheat oven to 425°F. In a frying pan, over moderate heat, melt 1 tablespoon of the butter. Add onion and sugar. Cover and cook until onion is softened about 10 minutes. Remove cover and cook until onion slices are golden brown, about 5 minutes longer. Scrape into bowl and set aside. In the same pan, over moderate heat, melt remaining 2 tablespoons of butter. Cook mushrooms until tender, 5-6 minutes. Scrape into bowl with onions. In same iron pan, toss potatoes with olive oil, rosemary, salt and pepper. Transfer to an oven-proof dish preferably with a lid. Using a preheated oven roast until potatoes are golden brown and tender, about 35 minutes. Remove from oven, spread evenly with mushroom and onion mixture. Sprinkle with cheese and return to oven. Cook until cheese is melted about 10 minutes longer. Serves up to 6.

Quick Shiitake Noodle Starter

Ingredients

10ml sesame oil
30ml vegetable oil
30ml soy sauce
200g fresh Shiitake
225g wheat or egg noodles (cooked and rinsed)
100g mangetouts
1 clove of garlic, crushed
1 teaspoon of sugar (preferably un-refined)
4 spring onions, chopped into 2 cm lengths

Preparation

Make a dressing by mixing soy sauce, sugar and sesame oil and put to one side. Stir fry spring onions in vegetable oil with the garlic until the garlic starts to brown. Add shiitake and mangetout and stir-fry for another 10 minutes. Add the pre-cooked noodles and mix until they are heated through. Remove from heat and mix with the dressing and serve. Serves up to 4.

Shiitake Hot & Sour Soup

Ingredients

100 to 200g of fresh Shiitake (or 4 to 5 dried Shiitake)
125g tofu
60g bamboo shoots (canned)
600 ml vegetable stock
60g peas
3 ml dark soy sauce
25 ml white wine vinegar
25 ml cornflour
Pinch of salt and lots of black pepper and a drop of sesame oil

Preparation

Cut mushrooms, bamboo and tofu into thin strips. Bring stock to boil then add mushrooms, bamboo and tofu and peas and simmer for 2 minutes. In a small bowl, mix the soy sauce, vinegar, cornflour with 25 ml of stock. Stir into the soup. Add salt and lots of pepper and simmer for a final 2 minutes. Serve hot in small bowls with 1 drop of sesame oil per bowl. Serves 4.

Shiitake & Winter Vegetable Casserole

Ingredients

1 medium parsnip
2 medium carrots
450g swede
1 large onion
250g fresh Shiitake (or 30g dried)
225g tomatoes (fresh or tinned)
2 tablespoons of vegetable oil
1 tablespoon miso (can be omitted if unavailable)
1/4 teaspoon ground ginger
1/2 teaspoon celery salt
550 ml vegetable or meat stock

Preparation

If using dried Shiitake, soak in hot water for about 30 minutes. Chop the onion finely. Peel the swede and cut into chunks. Do the same with the carrots and parsnip. If using fresh tomatoes, skin and chop them. Heat the oil in a large pan and fry the onion gently for 2 or 3 minutes. Add the root vegetables and the celery salt and continue cooking for a further 5 minutes. Tear the Shiitake into strips and add to pan. Add the chopped tomatoes and continue cooking, stirring often. Stir the miso and ginger into the boiling stock, also include soaking water if using dried mushrooms, and pour into pan. Cover pan and bake in a preheated oven at 350degF / 180degC / gas mark 4 for about 1 1/2 hours. Serve with seasonal green vegetables. Serves up to 6.

Feedback, Comments, & Photos

We're always interested in hearing about your mushroom growing experience. If you feel there is anything in these instructions that we've missed out, or should miss out, or that we haven't explained very well, please let us know. Send photos, recipes and comments to the contact details at the front.