

The complete
manual of growing
mushrooms at home



The best e-book for beginners

*The complete manual of growing
mushrooms at home*

TYPES OF MYCELIUM

FRESH LIVE AND BIOLOGICALLY DRIED MYCELIUM – THE MOST APPROPRIATE TYPES OF MYCELIUM TO GROW

People say, “One spring day can provide you with food for whole year”. Moreover, we tell you that one summer or autumn day will provide you with fresh forest mushrooms for next 5-6 years! Yes, it's truth! Forest mushrooms sown out in the period from the middle of July up to the end of December, beginning of January (even during winter if more than 7 days thaw occurs) will have young growth in early spring and will provide you with new portions of mushrooms 4-5 times per year – 2 times during spring and 3 times during autumn. Isn't it amazing to go to your personal garden for mushrooms instead of inspecting nearest forest?!

You can sow out mushrooms in your smallholding any time when there's no natural obstacles for it (like frozen or swamped ground).

If you plan to grow mushrooms indoor, it can be easily done any time during the year.

Previously we could cultivate (and only indoor) only oyster and shiitake mushrooms! Some people were extremely lucky to grow wine cap stropharia mushrooms (*Stropharia rugosoannulata*) or shaggy ink cap / lawyer's wig mushrooms (*Coprinus comatus*). Moreover, widely available today shiitake mushrooms was a delicacy! In addition, people were only talking about truffles without knowing its real taste! Now you can grow in your smallholding not only these mushrooms, but dozens of other types! Some of them (mycorrhizal fungi - porcini, yellow and gray chanterelle, lactarius, brown cap boletus, red-capped scaber stalk, slippery jack, saffron milk cap and even truffles) should be grown under any trees, because they must grow in symbiosis. Champignons (now we have more than 10 varieties of them) can be grown in any shady place.

Variety of oyster mushroom strains will blow your mind. You can grow it in any shady area of your smallholding on wood (the easiest way) – you can use both sawed stumps and

roots; it can be freshly sawn or stale. Please, remember one thing – stumps must be deciduous and not moldering!

All mushrooms are not only tasty, but also very healthy! You can also find that many of them are healing, e.g. common stinkhorn (*Phallus impudicus*), that can be easily grown in your smallholding.

Manufacturers of mycelium are developing day by day. Nowadays they produce not only many sorts of mushrooms, but great amount of strains of each sort. There are 5 types of mycelium these days: live grain mycelium, biologically dried grain mycelium, dry powdered mycelium, live mycelium on bricks, and dry mycelium on bricks.

The best sorts are **live grain** and **biologically dried grain** mycelium.

Live grain mycelium is recommended for those mushroom growers who are going to sow it during 1 month after purchase (mycelium should be stored in normal conditions with temperature around +22 C°). Moreover, live grain mycelium can be stored for 6 months with average temperature not exceeding +7 C°. Violation of the conditions of transportation and storage results in low (reduced) germination and deformation of mushrooms. Live grain mycelium is fantastic planting material, but it requires observation of some transportation and storage conditions. We recommend ordering this type of mycelium in the period from the middle of September until the beginning of May. It is available all year round!

Biologically dried grain mycelium – it is an overgrown live grain mycelium, which was dried using special technique and modern equipment resulting in **almost** the same germination characteristics (it's still reduced, but not dramatically), but storage life is almost unlimited in any temperature and normal humidity. You can easily ship or transport it. We recommend ordering this type of mycelium during warm season from the beginning of May until the middle of September. It is available all year round!

Dry powdered mycelium is made from biologically dried grain mycelium using special grinding technique and final drying. It has the very same parameters as biologically dried mycelium, but considered as more concentrated one. This mycelium has reduced

productivity and germination due to additional stages of complex technological processing. You can find it often in retail shops thanks to its long storage life and small package size (they recommend to use 10 grams for every square meter).

Mycelium on oaken or beech bricks is made only for wood destroying mushrooms intended to grow in wood (stumps) and rarely in crop residues (usually 1 brick with 0.5 cm diameter and 2.5-4.0 cm length is used for 1 kg of wood, but your consumption can be different depending on size and other parameters). Dried bricks have practically unlimited storage and usage life. They have normal productivity and germination. This mycelium is popular when someone wants to remove old tree from the garden without rush, after some time (up to 5 years) tree will die, giving all the cellulose to mushrooms. Please note that germination of this mycelium is lower than one of live grain mycelium, but higher than one of biologically dried and powdered.

Furthermore, there is another form of mycelium, called *compost mycelium*. It is not widely used due to some reasons, but it has some future too.

DETAILED DIRECTIONS FOR GROWING OYSTER MUSHROOMS, HONEY MUSHROOMS (*Armillaria*), SHIITAKE MUSHROOMS, CHAGA MUSHROOMS, BRACKET MUSHROOMS, AGROCYBE MUSHROOMS, REISHI MUSHROOMS, MAITAKE MUSHROOMS, CLOUD EAR MUSHROOMS AND OTHER WOOD DESTROYING MUSHROOMS ON WOOD (EXTENSIVE METHOD) AT HOME

Extensive method of growing means that growing is reached by quantitative increase and propagation without use of any technique of qualitative change in conditions of growing.

One can use extensive method indoor or outdoor.

- **1-st stage. Preparation of wood**

For mushrooms growing you can use next types of wood: poplar, alder, aspen, birch, oak, hornbeam, beech, black locust, linden, maple, elm, ash-tree, walnut tree, wild cherry, elderberry, mountain ash, plum, apple, cherry, pear, apricot and many others, both agrestic and wild trees, thus any type of deciduous trees.

Wood can be freshly sawn or stale for couple of years, with or without bark, but REMEMBER that it must be NOT moldering, and come without lichen and moss (it can be removed from surface using metal brush).

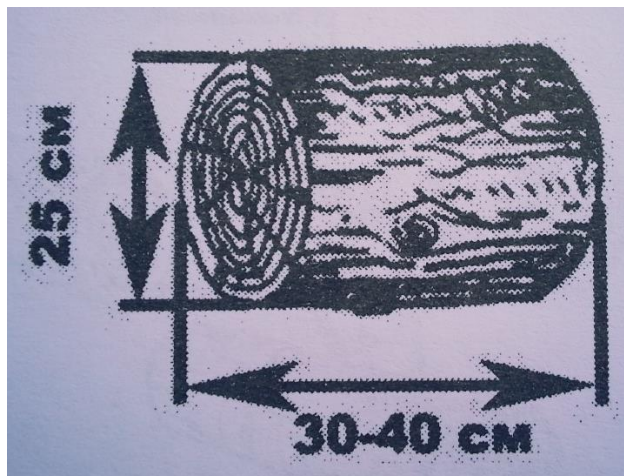


Figure 1

Bricks, logs or cuts can have any size, but we recommend using material with length around 3-40 cm and diameter around 25 cm (see Fig. 1). You need to macerate wood in water for one week. For freshly sawn wood 2-3 days in water is more than enough.

- 2-nd stage. Bringing the mycelium into the wood

For every 40 kg of wood, you need to bring in 100 grams of mycelium. There is no problem at all if you make calculations by eye and will err on 2-2.5 kilograms up or down.

How to bring in the mycelium:

- 1) Drill or saw holes, bring the mycelium in and then seal all holes with adhesive tape, close with the straw (you can also use any other crop residues), caulk with cotton or paper swab or use any other way of sealing (see Fig. 2 and Fig. 3).
- 2) Saw off a wooden disk with 1.5-2.0 cm thick, pour the mycelium on it and fix the disk with nails (see Fig. 3)
- 3) Put all the bricks or logs on each other and pour the mycelium on the butt of each brick or log (see Fig. 4).

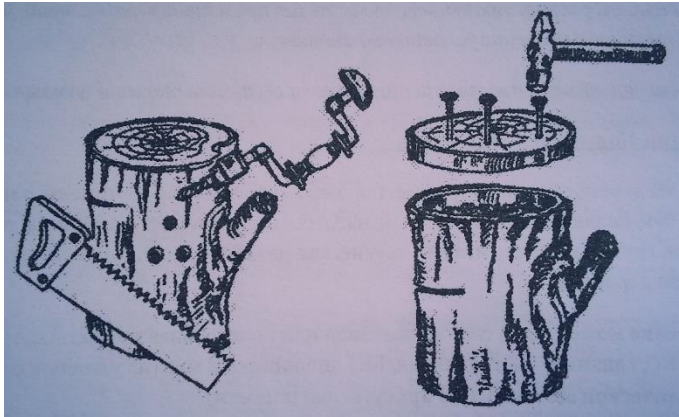


Figure 2

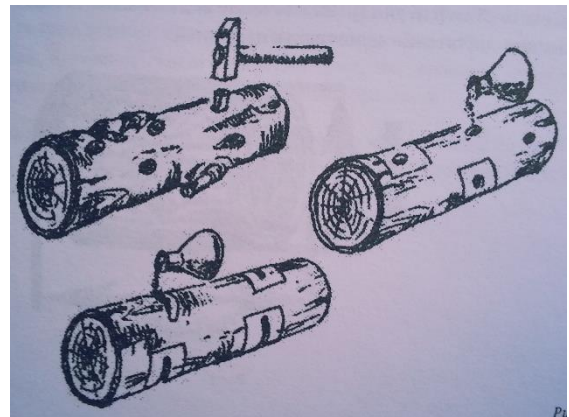


Figure 3



Figure 4

- **3-rd stage. Wood overgrowing period**

This period lasts for 2-3 months.

After bringing the mycelium in, one should take logs into any premises where temperature is stable and not exceeding +15-20 C°. You can use any shed, cellar, basement or garage.

During overgrowing period, you can also put logs somewhere in the garden in any shady area under the trees or canopy. It can be done during spring, summer and autumn seasons. In this case, overgrowing period will take around 4-6 months.

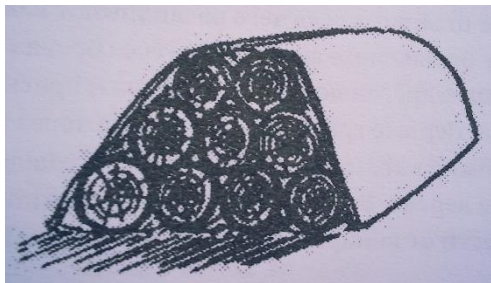


Figure 5

In any situation, you have to pour water on the logs periodically to prevent desiccation. For the same reason it is necessary to cover logs with perforated polyethylene film (only for first and second ways of bringing the mycelium into the wood). See fig. 5.

If you use third way of bringing the mycelium into the wood, you have to make columns from the logs, wrap them with polyethylene film and pour wet sawdust or straw on the top of it. You have to put wet sawdust or straw between columns too (see Fig. 4).

You can say that third stage is over only when logs are full of mycelium and ready to fruit, and white foamy mycelium layer appears on the surface of the wood.

- **4-th stage. Putting your logs to the permanent place**

Permanent place can be:

- 1) Any shady places are in the garden, under the canopy, behind any household buildings or near the fence. You have to unearth 2/3 of the length of your logs to prevent drying and create increased yield. If dry weather occurs, it is necessary to pour water on the ground around logs. You will be able to harvest mushrooms 1-2

times during spring and 1-2 times during autumn. It is possible to have one additional harvest during summer, but only in adequate climate conditions (see Fig. 6).

- 2) Any special premises intended for mushrooms growing. You will collect harvest during summer in cold premises and during winter in heated buildings (see fig. 7).



Figure 6

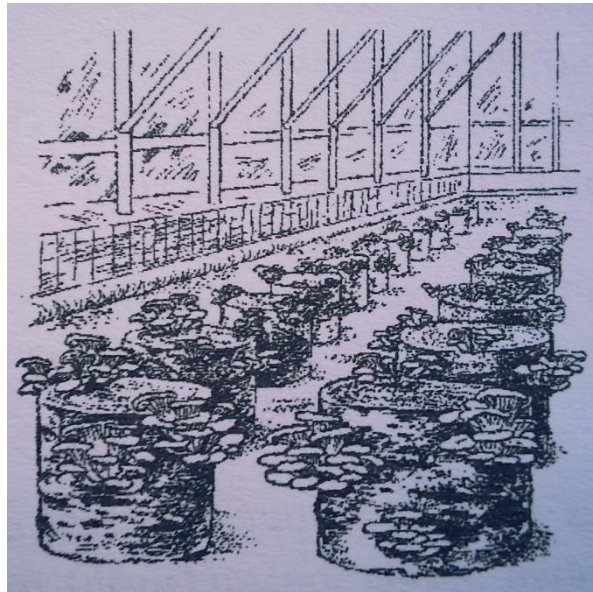


Figure 7

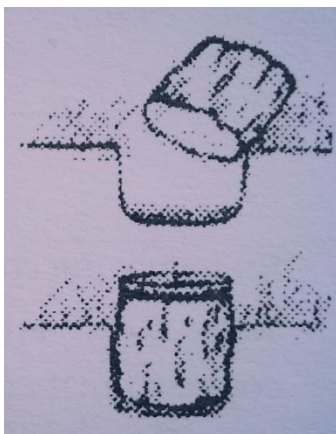


Figure 8

Ways of bringing the mycelium in and mushrooms growing directly on permanent place:

1. You can bring the mycelium into the logs directly on the permanent place of growth. In this case you have to put your logs into small holes with depth around 20-25 cm. Before putting the log, you need to tamp the bottom of the hole and put around 100

grams of mycelium there. After that, you can put your log with freshly sawn side down, fill the hole with ground and tamp the ground around the log. First harvest can be expected in 4-6 months (see Fig. 8).

2. You can also make mushroom garden beds. Take long log; saw it into smaller pieces with length around one meter. Saw each piece in half lengthwise. Unearth one half, put the mycelium evenly onto the fresh cut and cover with second half of the log and cover it with sawdust. You can expect first mushrooms in 4-6 months.
3. You can also bring the mycelium into the stub of a tree or into the dry and dead tree. In this case, you can expect first harvest from 8 months to 2 years. Actual result depends on conditions of your territory.

The mycelium can be brought into the wood all year round.

You can grow mushrooms outdoors using extensive method seasonally and all year round if indoor.

Oyster and honey mushrooms grow at temperatures between +5 C° and +26 C°, optimal range is from +8 C° up to +20 C°. Golden needle mushrooms (*Flammulina velutipes*) can grow even at temperature that is equal to zero C°.

Shiitake grows at temperatures from +14 C° to +27 C°, optimal range is from +12 C° up to +22 C°.

You will collect harvest from stubs 4-8 years until they will give all the nutrients to mushrooms and convert into the rot.

I have to mention that there are some difference in growing of oyster mushrooms, shiitake or honey mushrooms and between strains of each of them. You will not find that information here, because:

- ✓ These differences are not important when you use extensive method.

- ✓ When you grow mushrooms AT HOME, you will not see the decrease of productivity by 5-7% by your eye.
- ✓ It is difficult to create ideal conditions for mushrooms in your smallholding. Many commercial suppliers are not able to create such conditions during years of work.
- ✓ You cannot predict weather factors in full when we are talking about open spaces.

This manual contains information about growing of oyster, honey and shiitake mushrooms on wood for private customers in smallholdings, on the assumption of THE REAL conditions and the FEASIBILITY.

You can grow some other wood destroying mushrooms similarly, e.g. chaga mushrooms, bracket mushrooms, agrocybe mushrooms, reishi mushrooms, maitake mushrooms and cloud ear mushrooms.

DETAILED DIRECTIONS FOR GROWING OYSTER MUSHROOMS, HONEY MUSHROOMS (*Armillaria*), SHIITAKE MUSHROOMS, CHAGA MUSHROOMS, BRACKET MUSHROOMS, AGROCYBE MUSHROOMS, REISHI MUSHROOMS, MAITAKE MUSHROOMS, CLOUD EAR MUSHROOMS AND OTHER WOOD DESTROYING MUSHROOMS ON CROP RESIDUES (*INTENSIVE METHOD*) AT HOME

To grow mushrooms on crop residues, or as people say "in sacks" you have to provide next materials and conditions:

- 1) **Grain mycelium of mushrooms.** Consumption rate is 100 grams for every 40 kg of prepared substrate.
- 2) **Packing materials** – thick transparent bags to put inside contaminated substrate. Size can be different, but usually we recommend using: 80×40, 85×40, 90×45, 100×45 or 100×50 cm.
- 3) You can use any crop residues to make **substrate**: straw, hay, seeds husk, sawdust or shavings of deciduous trees, leaves, reed, heads of maize, fruits or vegetables residues and many others. Dry crop residues should be shredded into pieces smaller than 5-10 cm.
- 4) **Place to grow** – enclosed spaces like basements, attics, storage rooms, balconies, windowsills, bathrooms, sheds, garages, etc.
- 5) **Temperatures**: germination – from +15 C° to +20 C°; growing – from +7 C° to +27 C°, but it's recommended to keep it in the range from +12 C° to +22 C°.
- 6) **Humidity**. Pour water when it is necessary during dry seasons. You can put some vessel with water near your mushrooms plant if indoor or you can use some mechanical devices to pour water. During fruiting time, humidity should be more than 90%.
- 7) **Lighting**. Prevent contact with direct sunlight. Outdoor – observe day- and nighttime, indoor – same principle if windows are available. In premises without natural light, one should use fluorescent lamps with cold blue light (F-7 type); one lamp should cover 15-20 square meters. You can also use different types of daylight lamps. It is

more than enough to create 150 lx lighting for 8-10 hours per day after first rudiments appear and until the formation of mushroom of full value.

When lighting is insufficient ratio of mushroom cap and leg sizes changes. The reason is that leg grows anytime with or without light, but the most precious part of mushroom as we know is its cap. If you see that mushroom legs are too long, it should be a signal for you and you must immediately change lighting or increase its time. When light is not enough, oyster mushroom forms ugly (abortive) fruiting bodies.

8) Ventilation and aeration. If you put too many mushroom blocks into one building, you should provide adequate ventilation – that means 2-3 air volumes of the building must change every hour. You can use any ventilator on the entrance. Do not forget to create air outlet to remove old air. The best variant is to provide fresh air from above and remove it from the lowest part of the building. Remember that there must be no drafts.

If you have spacious building and there are not too much mushroom blocks, you can just open the entrance door for one-hour couple of times per day. Main signs of insufficient ventilation are deformed mushrooms having unmarketable appearance without any mushroom aroma. Improve your situation by changing ventilation structure and timings.

In short: if you have dry crop residues, free premises and you are full of energy, then you can buy the mycelium without any doubts and grow mushrooms at home, maybe not for selling, but for your own pleasure and to surprise your family and friends!

Now, let's discuss how to plant and grow mushrooms:

1. Homogenous substrate (e.g. only straw) or combined substrate of any proportion between two or more components (e.g. straw + hay + sawdust) should be put in a reservoir with boiling water. You need to make it to remove any mold fungus, soften and moisten the substrate (see Fig. 9).

2. Let the substrate cool down in natural way, until its temperature becomes lower than +20 C° or +30 C°.
3. Wring your substrate very diligently. As a result, when you squeeze it in your hand you should see 1-2 drops of water instead of intensive flows.
4. Thoroughly mix dry and cool substrate with the mycelium.
5. Put it into transparent polyethylene bag, gently trampling it with your hand (see fig. 10).
6. Tie the bag (see Fig. 11).



Figure 9



Figure 10

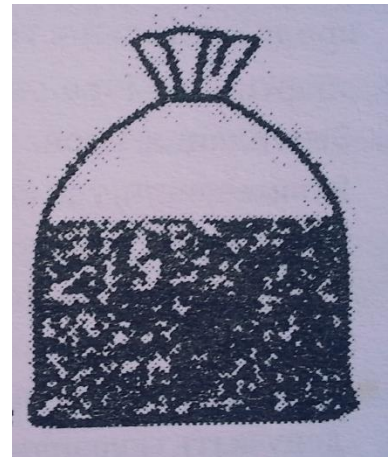


Figure 11

7. Create 3-5 cm incisions all over the bag surface to create sufficient air exchange (see Fig. 12).
8. Now you have your mushroom block ready to use (see Fig. 13).
9. Put your block in any premises using any desired structure and methods, but the best way is to hang blocks (see Fig. 14).
10. During germination period light is not necessary for mushroom blocks. Germination takes 3-4 weeks. First, you will notice visible fluff, then the substrate will change its color to white or light yellow and will transform into solid block.
11. When the mycelium will cover all the substrate, you need to wait 1.5-2 weeks more. During this period, the block will create nutrient reserve. In couple of days, rudiments

of fruiting bodies will appear. For normal growth, you need to provide sufficient lighting.

12. Make new incisions of film in all places where rudiments of fruiting bodies are located (see Fig. 14). Fruiting will happen like waves with 2-3 weeks intervals between them. You will collect the biggest harvest during first and second waves (see Fig. 15).

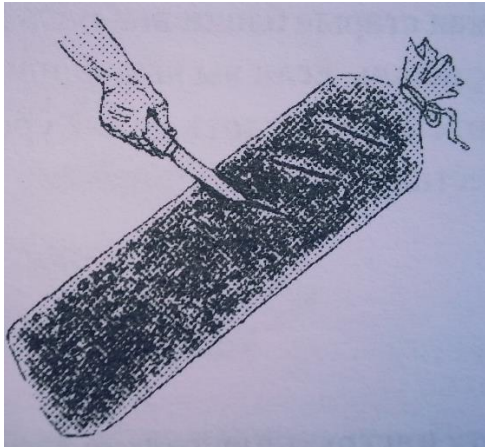


Figure 12

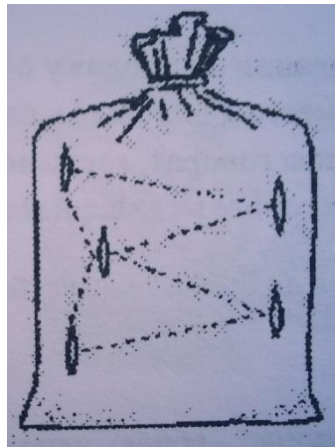


Figure 13

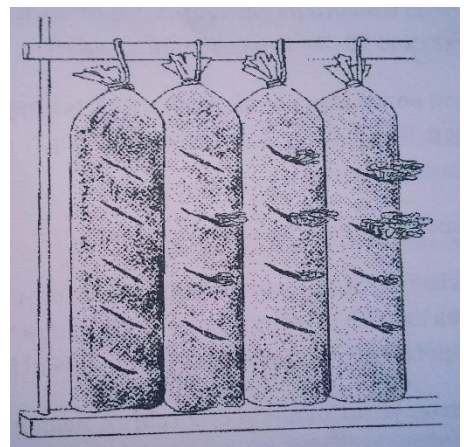


Figure 14

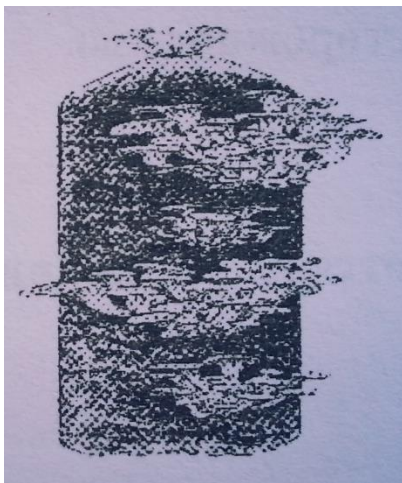


Figure 15

Usually, when people grow mushrooms for sale, they throw away old blocks after two harvests to free place for new blocks and get income faster. If you plan to grow mushrooms for yourself and you have available premises, you can keep blocks up to 6-7 harvests. Each harvest will be smaller than previous until your block stops to provide mushrooms.

Harvest weight can be up to 50% of the substrate weight.

You can also grow mushrooms using the same method, but without need to steam and boil your substrate. Here is the way to make it:

1. Grind dry crop residues without signs of mold into pieces with size from 4 to 10 cm.
2. Put ground crop residues into any container and evenly add quicklime equal to 0.5-1% of total substrate weight, e.g. 50-100 grams of quicklime for every 10 kg of dry crop residues.
3. Pour cold or room temperature water and check that all substrate is under the water. You can also put something above to press the substrate, but it should be very light object.
4. Leave it for 48 hours in current state.
5. Wring all straw thoroughly and put it into polyethylene bags, hardly tamping and making 3-5 holes in each bag for ventilation and moisture removal. Do not forget to make one hole in the upper part of your bag and one – in the lower.
6. Put bags with moist substrate to any convenient place for 3-4 days.
7. During this period, the substrate will decompose and its temperature is going to be increase up to 60 C°.
8. Check temperature changes using thermometer once a day during first two days and 2-3 times during next days.
9. When temperature will fall down to 27 C°, take the substrate out of the bag and mix it with the mycelium, using 100 grams of grain mycelium for every 40 kg of the substrate. Put this mix back to bag.

If you plan to use this method, please note that there's a high risk of substrate contamination with mold spores in any stage of preparation and productivity (even if you will try to get everything from each block) is going to be reduced to 30-35% of substrate weight.

This method is easier and less time and funds consuming, but one should use it carefully, remembering all risks mentioned above.

You can plant and grow mushrooms indoor all year round!

Of course, there are some differences in growing process of oyster mushrooms, honey mushrooms, shiitake and their strains and we cannot observe all of them here. However, this manual is created for people who plan to grow mushrooms for their families and friends in HOME CONDITIONS. If you use this manual for that, you will be amazed with real practical results.

You can grow any other wood destroying mushrooms similarly, e.g. maitake, reishi, cloud ear, shiitake, chaga, agrocybe, bracket, honey and other mushrooms.

DETAILED DIRECTIONS FOR GROWING CHAMPIGNONS AND LAWYER'S WIG MUSHROOMS IN SMALLHOLDING OR INDOOR

Growing champignons in your smallholding

In open spaces, champignons grow in shady areas, in penumbras – under trees or bushes, in raspberry bushes or strawberry patches, in shady areas behind buildings or fences, anywhere where direct sunlight can't hurt their structure.

First, you have to make ground fluffy. In addition, there is no need to remove weed plants or roots if they do not disturb other plants. Pour the mycelium on loosening soil. Next, put compost above as uniform layer with thickness around 12-15 cm.

Mycelium will start fruiting in 2-2.5 months. You will not notice any visible changes before that time. Fruiting takes place from the beginning of spring until the end of autumn. You can sow champignons during mentioned period too. However, it is recommended to sow them in period from the beginning of September until the beginning of December and from the end of February until the middle of May. Productivity of cultivated champignons is very high and you can collect up to 12 kg from every square meter during one month.

You have to collect mushrooms by twisting and not cutting, because remaining fruiting bodies will decay and attract various insects. By twisting mushrooms, you do not affect the mycelium. In 1.5-2 weeks after collecting harvest, new mushrooms will grow and fill empty spaces.

There is no need to prepare your plantation for winter. Spore will stay alive even at very low temperature. They will just stop developing and will "sleep". You will see how they "wake up" in spring by observing enormous harvest.

Once per year one need to pour thick (7-10 cm) layer of humus or dry crop residues to fertilize your mushroom block. The best time to do so is the end of autumn, when fruiting is almost over. It is strictly prohibited to use chemical fertilizers!

You can construct some coverings to control fruiting process in open spaces, e.g. like on Fig. 16.

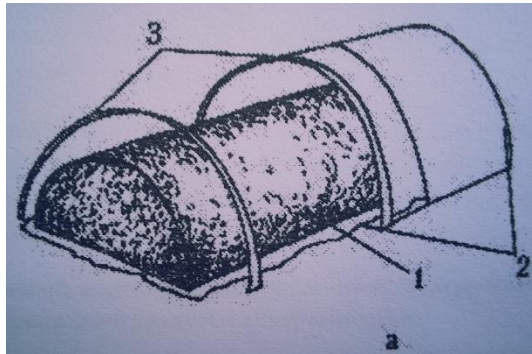


Figure 16 (a)

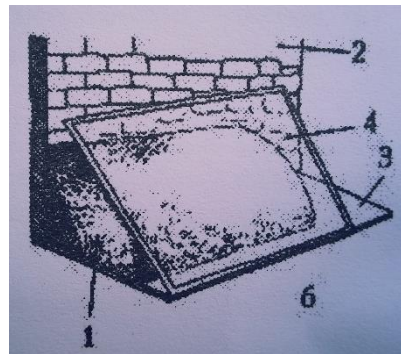


Figure 16 (b)

Fig. 16. Coverings intended to improve fruiting of champignons in open ground: (a) Covering of beds, created on ground surface (1 – compost, 2 – polyethylene film, 3 – arcs). (b) Covering, mounted near any wall, situated on the northern part of the building (1 – compost, 2 – brick wall, 3 – concrete riprap, 4 – frame covered with film).

Your mycelium will be alive from 4 to 6 years, insignificantly growing and extending its surface every year.

Growing champignons indoor

You can use any suitable building, e.g. basements, attics, storage rooms, balconies, windowsills, bathrooms, sheds, garages etc. The main benefit of growing champignons indoor is the possibility to get fresh mushrooms all year round!

Champignons can be grown in boxes (Fig. 17), in polyethylene bags (Fig. 18), etc. You have to put 10-12 cm of soil first, pour the mycelium then and cover it with 7-10 cm layer of compost or humus. First mushrooms will appear in 2-2.5 months. Unlike in open space, this mycelium will fruit 4-5 times, reducing volume of harvest with each new wave. You need to control humidity without creating a swamp. You can put any vessel with water close to your

mushrooms and water will evaporate slowly, increasing humidity. If this measure is not enough, you can add water using watering can or use any mechanical device to do so.

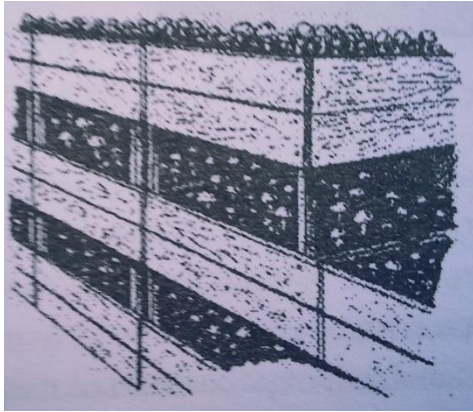


Figure 17



Figure 18

Keep temperature in your premises between +19 C° and +26 C°. Lighting is not obligatory, but it will not make any harm. I am not going to talk too much about the cleanliness of your premises, just remember that it has to be clean, fresh and washed up!

Consumption rate: 100 grams of mycelium for every 2.5 square meters.

Productivity for 1 month – up to 10 kg of mushrooms for 1 square meter during all the time.

The technology of growing of the lawyer's wig mushroom looks similar to the technology of champignons growing. It concerns premises, timings, mycelium consumption rate for 1 square meter and compost choice. Like the champignons, lawyer's wig mushrooms can grow in box, garden-bed or on shelving.

You can use waste compost in your garden to fertilize ground or as a humus. Do not be surprised if you see mushrooms somewhere in your garden during next seasons ☺.

We have just offered you the simplest way of mushroom growing without need to create special compost, so anyone can do it! As you can see we are not promising you millions of mushrooms, but we guarantee that you will get more than enough for your family. We wish you to have amazing harvests!

DETAILED DIRECTIONS FOR GROWING WINE CAP STROPHARIA (STROPHARIA RUGOSOANNULATA) IN OPEN SPACE OR INDOOR

One can grow wine cap stropharia in glasshouses, plastic greenhouses, basement premises and in garden-beds in open ground. You have to choose warm and not windy areas in your garden or smallholding.

To grow this mushroom you can use regular cereal straw (winter wheat or rye); linen boon, ground corn stems or mixes of these materials. Substrate must have humidity around 70-75%. Straw must be wet, and when you squeeze it with hand, drops of water have to appear in your hand. You can also use waste compost from champignon mixed with new portion of straw (with 1:1 ratio).

The substrate preparation and mycelium planting takes place from the end of April until the beginning of June. Straw should have golden color, without any signs of mold or decay, and have to be ground to small pieces not exceeding 3-5 cm (size is not obligatory, because it does not significantly affect harvest). You have to use 15-25 kg of dry straw or any other substrate for every square meter of plants. If you want to prepare significant amount of it, then put the straw (or any other substrate) on the clean and solid surface (made from concrete or asphalt or dense soil) and evenly wet it using garden hose with sprayer or watering can 2-3 times per day during 6-10 days. To create homogenous substrate one can mix the substrate 3-4 times during mentioned period using pitchfork, always checking absence of self-heating.

To moist small amounts of the substrate one can use available in garden barrels, baths or pools, etc. Check water every day to prevent substrate fermentation.

Put prepared substrate with 20-25 cm layer on the ground (on film) or with 25-30 cm layer in boxes of any size or into polyethylene bags with diameter around 40 cm and height around 50-60 cm. Slightly inearth your bags. To prevent drying of the substrate, tamp it hardly making it layer by layer.

After putting the substrate into the box, bag or creating a garden-bed plant the mycelium, using 100 grams for every 2.5 square meters. Put pieces of the mycelium equal to the size of the walnut all around the surface and dig by depth of 5-8 cm. Use one hand to pull up the straw or any other substrate, and second hand to put the mycelium under the substrate. There is another way when the mycelium planting and substrate tamping are combined. In this case, during the substrate tamping put the mycelium on penultimate layer of the substrate and cover everything with 5-8 cm layer of the substrate, finishing everything with hard tamping. In both methods, final layer of the substrate has to be flatten and slightly moisturized.

Surface should be immediately covered with water-resistant breathing material (clean sackcloth or thick paper) which should be wet all the time. Pour it, preventing water from reaching the straw.

If you plan to grow lawyer's wigs in polyethylene bags, tie them immediately after the mycelium planting, inserting cotton or foam plug with diameter around 5 cm into the bag neck to create air intake hole.

Mycelium will grow from 3 to 6 week in dependence with the air temperature. Optimal temperature for this period is around 25-28 C°.

When the mycelium will have normal size (you can check it by pulling upper layer of the straw; in some places the mycelium will go out of the straw), you have to remove sackcloth or paper and cover the substrate with 4-5 cm layer of special cover mix. If upper layer is dry when you remove sackcloth and there is no mycelium in it, you have to remove it gently and cover last layer with mycelium with mentioned cover mix.

Cover mix consists from peat and garden or forest soil. Ratio of mentioned ingredients is 1:1. Consumption rate is around one bucket of mix for every square meter of surface.

During next periods, all you have to do is to control humidity of the cover mix around 70-75%. Each time you have to pour around 1-1.5 liters of water for every square meter,

preventing the water to get into the substrate. We recommend using garden hose with sprayer or watering can with small sprayer.

In case if you grow mushrooms indoor, air temperature after making the covering mix should be around 25-28 C° for 2-3 weeks. After that period, it have to be reduced to 15-20 C° providing adequate ventilation. First mushrooms can appear in 1-2 weeks after putting covering mix. It takes 7-10 days from rudiment appearance to the formation of mushroom of full value (term depends of air temperatures inside).

You can collect lawyer's wigs when its overlay (thin film that covers lamellas) is broken through, but the cap is not fully open and has bell form. Collect mushroom by slowly twisting it from the soil. Put the covering layer into the hole after collecting your mushrooms.

Productivity of lawyer's wig can vary: usually it is around 3-4 kg per square meter, but it can reach 15-30 kg, depending on quality characteristics of the substrate and mycelium, observance of agrotechnics rules, type of the mushrooms and experience of mushroom grower.

Lawyer's wig planted in May will fruit until the end of the autumn. If your mycelium was planted later than May, it can harvest even next year.

In this case to prevent the mycelium from frost and excess moisture, in autumn, after collecting all mushrooms, glasshouses or garden-beds are covered with film, straw or dry leaves. Then this cover is removed in spring, and first harvest is expected in April or May dependently on weather conditions. Substrate waste can be used as perfect fertilizer for vegetables.

GROWING FOREST MUSHROOMS IN SMALLHOLDINGS

There are many different ways of growing forest mushrooms in smallholding. This manual will show you three of them. Difference between three methods is in the seeding materials.



Boletus edulis



Cantharellus cibarius

Method 1. From mushroom caps

You have to take old caps of mushrooms and put them in bucket. Pour water (rainwater is the best choice), add 1 gram of manganese crystals and 15 sugar cubes (people have noticed that fruiting increases after adding sugar).

Knead caps using your hands creating homogenous mass and leave it for 1 hour. During this stage, you can also use wormy mushrooms.

Mushroom planting can be done by pouring water around the trees. First you have to remove upper layer of soil around the tree (keeping distance around 50-60 cm) very carefully. This is done to bare tree roots. After that you can pour your seeding material with consumption rate around 300-400 grams for every 20-30 square centimeters.

After that, you have to cover seeding material on roots with soil mixed with humus (in ratio 1:1) and profusely pour with water with consumption rate around 4-5 buckets for every tree.

Planting should be done at the same period of year when you usually collect such mushrooms.



Boletus badius



Lactarius deliciosus



Lepista nuda



Tricholoma equestre



Leccinum scabrum

Mushrooms will appear in one year after planting during the same time when they usually appear in forests.



Boletus luridus



Cortinarius

Method 2. From the soil taken from the forest

Therefore, we go to the forest and looking for a place where desired mushrooms were or are growing. Carefully dig small portions of the soil close to trees. You have to take soil near healthy trees without any signs of drying. Soil portions should have 20-30 cm length and width and around 15 cm of depth. Then you have to divide these portions into 5-10 pieces. You should be very careful not to destroy the mycelium. These operations can take place in the middle or end of summer or in the beginning or middle of spring.

Then you have to dry seeding material. You have to dry it to kill all other microorganisms. Thus, you will increase quality of seeding material and your mycelium is not going to be affected because it is more resistant to drying.

To do this you have to put seeding material into any container – bucket, basins, barrels (you can also use bags, making sufficient air intake) and keep it in any cool premises like basement or cellar. Seeding material can be kept until next year. During this period, soil will become dry and prepared for sowing procedure.



Marasmius



Lactarius pubescens



Leccinum aurantiacum

Next stage of indoor growing is sowing. It takes place in the end of June. First, dig some holes around trees. Diameter should be around 10 cm and depth – around 20 cm. Please note that you should plant mushrooms under the same type of trees that were in forest where you took the soil to create seeding material.

Tamp seeding material into the holes and pour water carefully. The best choice is to take watering can. You should use 1 liter for each hole. After that, you have to cover the soil around the tree with mix of humus and garden soil (with 1:1 ratio), dry leaves and cuts.

First harvest can be expected next year after sowing. Mushrooms will appear during the same period as in forest.

You have to control humidity during the summer if dry weather happens.

In good conditions, you can get stable harvest each year during long time, collecting around one bucket under each tree.



Suillus luteus



Cantharellus cinereus

Both above-mentioned methods were described only for general information. They are extremely ineffective and their productivity is almost near zero. Of course, sometimes miracle can happen and your attempts can give you amazing results.

Method 3. Using grain mycelium for sowing

This method is the most reliable. Germination chances aim to 85% (except stinkhorn – 60%).

Consumption rate is 100 grams of grain mycelium for every 2-2.5 square meters.

First, you have to make soil fluffy, creating 5-15 cm deepening in dependence with roots depth.

Pour the mycelium evenly all around the fluffy surface.

Cover it with garden (or forest) soil mixed with any humus in 1:1 ratio.

Pour water using watering can, using 10 liters for every square meter if soil looks dry. Do not create swamp!

Cover everything with the soil that was created during fluffing procedure. Planting can take place all year round and under any sort of trees.

During dry season, you should pour water often, using 15-20 liters for every square meter, but only when temperature is below 27 C° (it is just useless if temperature is higher).

Mushrooms will appear 4 times per year – 2 times in spring and 2 times in autumn, but first harvest can be expected in about 2.5 months after planting.

First harvest will give you 350-500 grams from 1 square meter, increasing up to 3.5-4.5 kg during next harvest.

The mycelium will grow during long time, until tree is alive.

Every year, when there is no mushrooms (during hot or cold season), you should evenly pour humus on the place of growing, using 5-10 kg for 1 square meter.



Phallus impudicus



Tricholoma columbetta

You can try to grow mushrooms indoor using same methods as for champignons, seeding next perennial grasses, bushes, field flowers, etc. (to create root system for mycorrhizal mushrooms). In any case, your results are going to be worse than open space growing and germination is going to reduce significantly.

Amateurish growing of mycorrhizal and other soil mushrooms will not give you guaranteed results, because productivity depends on many weather and other conditions. Even though, if you can obtain enough experience in growing mycorrhizal mushrooms, have enough power and time for that you can obtain significant results.

This manual is intended to help in growing mushrooms in home, smallholdings and gardens.

GROWING OF TRUFFLES

Truffle (*Truffel* in German; *Tuber* in Latin) – is the fruiting body of a subterranean Ascomycete fungus with fleshy tuberous underground fruiting bodies from *Pezizales*. Real truffles are edible mushrooms considered as precious delicacy. They have mushroom taste with aftertaste of deeply fried sunflower seeds or walnuts and strong aroma.



They have round or tuberous form, fleshy or gristly structure, various size from pea to big potato and weight sometimes exceeding 1 kg. All fruiting bodies are covered with skinny layer, which can be smooth, cracked or covered with warts. This layer is called peridium. There is also spore-containing tissue, which has specific marble pattern on cut from light and dark streaks.

White truffles (*Tuber magnatum*, *Choiromyces meandriformis*) – create symbiosis with birch, poplar, elm, linden, willow, rowan and hawthorn.

Black truffles (*Tuber melanosporum*, *Tuber aestivum*) – create symbiosis with oak, beech, hornbeam, and hazel. Sometimes truffles can make mycorrhiza with coniferous trees.

Black and white truffles created from the mycelium can grow also with traditional garden trees and bushes.

Growing technology

To grow truffles you have to make proper planting and to identify harvest place in future. Process of growing takes place at a depth 30-40 cm under the ground and takes from

2 to 5 years to first harvest appearance. Next harvests will appear 2 times per year: 1) In spring – from the end of March until the beginning of May; 2) In autumn – from the middle of September until the end of November.

You can plant it all year round. The mycelium should be brought in under the roots of trees and bushes, or during the planting of seedlings.

How to identify place of your harvest: 1) Soil is expanded and elevated; 2) Strong aroma of mushrooms will attract many insects; 3) Dogs and other animals will insist to dig the place and you will note that; 4) You will not be able to ignore mushrooms aroma even if you want.

You should carefully dig mushrooms out using hands or small garden inventory, taking out all the tubers. After that, do not forget to bring all the soil back.

You can keep fresh mushrooms for 7-8 days at temperature from +7 C° up to +13 C°.

You can also freeze, dry, pickle or marinate truffles.

100 grams of uterine grain mycelium are enough for one adult tree or two seedlings.