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Growing Mushrooms on Coffee Wastes.

From: "Ken Calvert" <renertech@xtra.co.nz>
 To: "Joshua Bogart" <joshua.bogart@gmail.com>
 Subject: Re: Mushrooms a belated reply!
 Date: Tuesday, December 29, 2009 1:09 AM

Joshua, Hi!

The big problem for new chum mushroom growers is pasteurizing the coffee pulp at the beginning of the operation. and then squeezing the pulp down to the right moisture content before inoculating it with spawn.. You will need to 'hands on' try it yourself to get experience, so, I will describe for you a small scale DIY operation.

First of all you need to locate a source of commercial mushroom spawn. And what you are looking for is mushrooms that grow on dead wood. The Common Agaricus field mushroom that grows in temperate climates on stuff like horse manure is not satisfactory. Your local Dept. of Agriculture can usually help here. It is not too difficult to find local mushroom species growing in the bush and isolate growing material from them. But that is not for new chums nor for the faint hearted. Come back to me, if you can't get commercial spawn and I will give you some more details. It usually comes as a bottle of wheat or rice grains, where the grains are covered in white growth of mycelium or hypae.. You break up the solid into individual grains and then spread them thinly through the substrate to make it grow and end up like the original spawn, white all over.

The best pulp to use for a growth substrate is stuff that has been sundried and is black. That black colour is from the tannins that have locked themselves onto proteins and been deactivated. Tannins are the most toxic constituents of coffee pulp, they are

the plants answer to resist bacterial and fungal infections, and need to be taken out of the loop. O.K Caffeine is strong too, but it is for insect and animal resistance. It has no affect on mushrooms. If you want to know what a tannin tastes like try to eat an unripe persimmon. The tannins not only lock up the proteins in your saliva and make your mouth pucker up, but they also lock up the enzyme proteins, ie. the saliva in bacteria and mushroom fungi as well. So, they are not good. You want about a 50/50 mix of dried pulp and aged coffee parchment hulls, preferably ground up together into a fairly fine mix. The dirtier and more discolored the hulls are the better. In fact, the best substrate of the lot is coffee husk from a dry processing rather than a wet processing operation. However, that is not easily found in Meso-America.

The like of Pleurotus (Oyster) and Shiitake mushrooms normally grow in dead wood and so it is a woody rather than a fruity substrate that you have to make. Growing on oak logs, as in the traditional Japanese process takes around two years, but with loose pulp its only three months, so there are a lot of advantages to using coffee wastes.

For pasteurizing you need a series of bags made of cotton or jute fabric. The easiest way is to cut a bed sheet into 4 pieces and make four bags. Only half fill the bags and tie in at the top so that you can hold onto the bunched cloth handle and plunge it down in a half drum of water, at about 80°C, just a bit below boiling point. Then leave it there until the water gets back up to 80 degrees again, ie. the pulp is also up to that temperature. That's usually around 10 minutes. Then lift the bags out to drain and cool. For a village level operation it would be a 200 litre oil drum cut in half and over a fire. Two half drums and some weights, with long handles, to hold the bags down in the water and get out all the air, is a good one person operation.

This method should kill off most of the pathogenic bacteria but yet leave enough good bacteria to stop the moulds from germinating, so the mushroom spawn will not be smothered by fungi/mould growth. You can read up on the pasteurizing process on the Internet.

If you do have trouble with moulds growing over the top of the mushrooms, then you have to totally sterilize the mix. Moulds have very resistant spores which can stand 100°C no sweat. All that pasteurizing does is germinate them and start them into active growth, which they will do very quickly because they have no competition from the good bacteria also surviving the pasteurizing process. However, once germinated, moulds are just as vulnerable as bacteria. So, you plunge your bags of pulp take them out to drain and leave them for 24 hours for the moulds to germinate and then repeat the exercise a second time. From that point on, you are dealing with a much more sterile material and any floating dust and spores in the air, allowed to contaminate the material will grow like mad so further work should be kept as clean as possible.

Free drained pulp is still far too wet to grow mushrooms. You now have to squeeze the pulp to get out as much of the water as you can. Young people can do it in their hands, squeezing a clutched double handful at a time, but old codgers like me with arthritis setting in need something like a cider press. You can do it with a frame and a car jack either hydraulic or mechanical. Make the frame wide enough on the base to hold a bag made out of a quarter of a bed sheet. Depending on the length of stroke on the jack you can put from 1 to 4 bags each half full of cooked pulp mix and separated by

a piece of perforated board. Put a flat board on top of the pulp and slide the jack into the top of the frame. Don't try and squeeze the pulp all in one go or you will simply burst all the bags. One or two strokes at a time, at 5 minute intervals, will get you down to a pulp mix that is damp to the touch but has no water to be seen. You then transfer the pulp into those ubiquitous plastic shopping bags of the type Supermarkets use, mixing in the seed mushroom spawn, normally grown on wheat or rice grains, about 10 grams or a small eggcup full for each shopping bag. Then, use the handles of the plastic bag to tie it off and yet leave enough handle available to let you hang up the bag on a branch or a nail when it comes to fruiting.

For now, you are emulating the inside of a tree, so its dark anaerobic conditions which you get by pressing all the bags into a very strong cardboard carton, a 50kg white woven poly sack or a wooden box made for the job. Press down hard to exclude as much air as possible, put it in the dark, and close it up for 10 days before opening up and seeing how the spawn has grown and closing it down again until they are ready. When you can see that the balls of pulp are now white with mushroom spawn grown right through them, you can then move onto the next stage. That is when under natural conditions the spawn has grown out to hit the bark on the outside of the tree.

At this stage you have to transfer from anaerobic to aerobic conditions, and from darkness to light. Take the bags out of the box and hang them up on a frame, under a tree or in a light and airy building. No direct sunlight or wind, but well shaded, just like in the middle of a bush. Slash about 4 cuts in the plastic bag so that the spawn engulfed pulp is visible but not bulging out at all. Then every day, spray some water over the bags with a hose or a watering can. In about another 7-10 days you will have mushrooms sprouting out of the cuts in the bags. After about a week of picking, the growth will subside. However, don't stop watering them and in about 10 days you will get a second batch of mushrooms.

It is usually economical to get about 3 batches of mushrooms from one set of bags before taking them down and emptying out the pulp to use as cow or pig fodder. They will keep on growing, but numbers drop sharply by the 3rd or 4th batch of growth.

O.K. that will get you started and if your friends and neighbors like what you give them to fry in butter and eat with bread, or however they traditionally eat mushrooms, then you are in business. We have grown, Pleurotus in several varieties, Shiitake, Enoki, Woodear, Ganoderma and LinChi species. Any type that grows on trees in the bush can be grown on coffee wastes.

Good Luck. Ken C.