

# Mycoremediation to the rescue!

Perhaps you've just brought a new piece of land and want to set up a garden, or you've had a fire come through your place. Both of these situations may involve lurking and unseen dangers, in the form of heavy metals and toxins. Most approaches to remedy these situations involve the removal of contaminated soil or building raised garden beds.

Mycoremediation may be one of the best tools on hand to actually deal with the issue. The mycelia of mushroom producing fungi produce over 120 different incredible enzymes which can transform even the most troublesome of our wastes, such as lead, cadmium, petroleum, radiation and organic pollutants in groundwater. Even the hangover from our modern world, plastic, can be broken down by oyster mushrooms.

Mycelia are the ultra-fine and dense matrix of the thread-like white hyphae that is the vegetative part of the fungi (as opposed to the sexual organs you think of as mushrooms). It is the mycelia that send out the enzymes that break down chemicals, and that also act as a filter and erosion control, among many other fantastical things.

The crucial goal of bioremediation is the splitting of contaminants to their basic components to  $N_2$ ,  $H_2O$ ,  $CO_2$ ,  $HCl$ , etc. Radiation and heavy metals cannot be decomposed fully, but they can be reduced into forms which have lower solubility. This process may occur through changes in oxidation states, rendering them less harmful in the ground, or the mushrooms can be physically harvested and disposed of safely.

**For land remediation of heavy metals and toxins, and erosion control.**



- Optional - rototill the soil and mix in 1 inch of wood chips.

1. First lay strips of cardboard and if possible add some coffee grounds and corn cobs, banana leaves. Add a layer of woodchips 6-12 inches deep.

2. Rake out the oyster mushroom spawn





3. Then mulch the landscape with the fairly fresh woodchips to a minimum depth of 6-12 inches.
4. Cover with a inch of straw
5. Water it all in.
6. When mushrooms are fully formed, if you have heavy metals or radiation, then mushrooms must be disposed of safely. |

*These images are an example from a project at the New Leaf Eco Centre funded by the Land Conservancy for Southern Chester County, PA, USA.*

#### **Extra notes:**

1. Fungi need lots of good water, but not too much. Do the squeeze test, squeeze the substrate tightly in your hand: one or 2 drops of water should appear between your knuckles. Add more water if needed.

2. Fungi need a healthy diet and fruiting surface. Oyster mushrooms will grow on most carbon based materials. Materials need to be fairly fresh – between 2 weeks to 2 months old. If they are too old, they will likely have many other competitor fungal species in them, making it hard for your mushroom to grow. I prefer deciduous white wood species such as poplar, willow, birch, beech elm, cottonwoods...Hardwoods, such as gum, or conifers contain anti-microbial substances and are high in tannins, which slows fungal growth down. They can be used, but aging is preferred.

3. Fungi need to breathe Just like us, they breathe in oxygen and let out carbon dioxide, so don't use plastic covers or impervious weed mats. Straw or geotextile breathable covers work well.

4. Fungi need warmth There are some cold weather strains but most fungi like it warm around 20 degrees C (70 degrees F). Nothing above 36 degrees C) 105 degrees F.

#### **Extra mushroom bonus:**

Mushrooms can be added to your grey water system.

Mycelliated straw can be used to absorb spilled oil.

Straw bales can be inoculated with mushroom spawn, and lain in polluted runoff areas or contaminated streams.

Alternatively, hessian/burlap sacks can be filled with straw, coffee grounds, cardboard, and mushrooms spawn, and used to catch and filter contaminated water.