



BioChar, the Miracle Ingredient for the Organic Garden

Being blessed with many coconut trees, coconut oil is one of the main products of our organic garden. So far, only the shell and the flesh have been used, while the remaining coconut husks have been burned. Considering the fact, the dry season is just about to start, we wanted to try out making biochar out of coconut husks as a soil supplement.

Biochar adds many benefits to your garden and helps building up a healthy soil. Millions of microscopic holes provide a living environment for many different microorganisms and help holding back plenty of water. Also Nutrients are effectively locked up and are slowly released according to the requirements of the plants. This way, a loss of nutrients caused by too much rain can be prevented. Biochar can also be used in compost toilets, as a water filter or simply as a burning material.

If you want to use biochar in the garden, it is recommended to saturate the biochar with nutrients before applying to the soil. This can be done by adding biochar during the composting process, mixing with fresh compost or watering it with compost tea. Applying unsaturated biochar directly to the soil could give plants a harder time to grow, because the majority of nutrients may be adsorbed by the char in first place.

The Principles of BioChar Production - Pyrolysis

If you want to make biochar, it is important to understand the physical principles behind the process. If you light up a fire, it is not the wood that burns in first place, but the released gases driven out by heat. The fire will burn these gases in a clear flame consuming all oxygen while forming a protective layer around the wood. As long as there is a lack of oxygen, the wood underneath will carbonize and turn into char. This is called pyrolysis. If no more freshly dried material is added and gases are no longer produced, oxygen can penetrate towards the coal, and the coal will slowly turn to ash. The key point to make biochar is to prevent coal turning into ash while maintaining a clear burn. It's important to maintain a mostly smoke free fire in order to gain biochar with a good quality and less toxic substances caused by smoke.

To achieve the right process conditions, the physiology of the fire and the geometry of the pit are crucial. Lighting up the fire in a pit or a barrel helps suppressing oxygen flowing from underneath, causing the produced coal to turn to ash. As dry coconut husks are a good material to produce biochar, it can be hard to maintain a clear constant flame by just using husks. Therefore apply easily burnable material just as dry bamboo or wood in the middle of the fire and place the coconut husks around. This creates a chimney effect in the middle that will guarantee a good burning process.



Preparation



Get started by digging a hole in the ground with about 1m depth and about 1.50 m width. Prepare a good amount of coconut husks and other burning material such as bamboo, wood, coconut fronds and leaves. This way you can stay focused on the fire instead of rushing to prepare suitable burning material. Be sure to use only dry material, otherwise it will be much harder to maintain a

smoke free burning process.

Starting the Fire



Start a small fire in the middle of the pit by using small pieces of chopped bamboo, paper etc. Keep adding material, until the fire is filling up almost the whole bottom of the pit. Now you can add the coconut husks around the fire by placing in such a way, that airflows crawling downwards the side are interrupted.

Add more easily burnable material, such as bamboo and wood in the middle of the fire to maintain a clear burn. In that way the middle of the fire acts as a chimney and burns most of the gases produced during the combustion process. If you can see the husks turning from black to slightly glowing, add more





husks in the same way. Every now and then compress the produced coal by spanking them with a shovel. Just be sure to keep the structure in the middle more loose to not inhibit the fire. Build up layer by layer by using the same principle until you reach the top of the pit.

Once the husks on top turn black, you can start to cover the fire by adding big coconut fronds or leaves. Finally add about 15 cm of soil on top to cover the fire completely and make sure no smoke is exiting anymore. Free the surrounding of the pit of any burnable material and wait for about 3 days until you start harvesting the finished coal.



Harvesting the Biochar



Start opening the pit by removing the top layer of soil. Before you start harvesting the coal, apply plenty of water. This helps to put out still glowing coal and prevents forming coal dust while harvesting. You can also implement a pipe to apply water straight to the bottom of the pit. Fill the coal into bags for storage or apply immediately to

your compost. Be sure, the coal is cooled down completely, so there is no chance it can ignite again while stored.



References:

https://www.researchgate.net/profile/Hans-Peter_Schmidt/publication/275097537_Kon-Tiki_flame_cap_pyrolysis_for_the_democratization_of_biochar_production/links/55323ece0cf20ea0a071dfb5/Kon-Tiki-flame-cap-pyrolysis-for-the-democratization-of-biochar-production.pdf

<https://pacificbiochar.com/atoll-growing-biochar-coconut-husks-better-toilets-bigger-bananas/>