

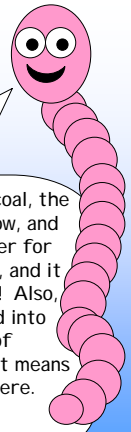
Hi, my name is **Charlie!** I'm going to tell you why I am so excited about **charcoal!** Charcoal isn't just for cooking tasty food on the grill. In fact, people have been using charcoal for thousands of years to help their plants grow! It's true! Charcoal is good for plants, and for the fungi, bacteria, and critters like me who live in the soil with the plants!

Better Than Barbecue...

CHARCOAL HELPS PLANTS GROW!

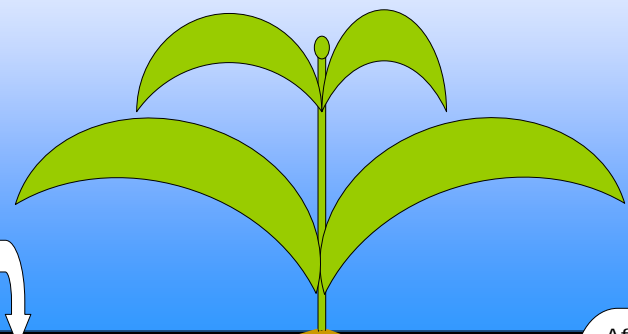
Brooke McBride-College of Forestry and Conservation, UM

The next time you're cooking on the grill, remember the other amazing things we can do with charcoal! Bye!



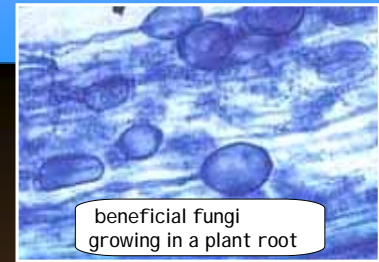
The more that we understand about charcoal, the better we can use it to help our plants grow, and to help the environment! Charcoal is better for the environment than chemical fertilizers, and it can last in the soil for thousands of years! Also, when wood or other plant matter is turned into charcoal and mixed into the soil (instead of decaying or burning all the way into ash), it means that less CO₂ is going up into the atmosphere. This may be a way for us to control global warming by reducing greenhouse gases!

In Brazil, scientists have discovered that native people once made large amounts of charcoal and mixed it in with the soil in their gardens. This produced a rich, dark soil that is now called "Terra Preta" or "Dark Earth". Even though the soil was created 500 to 2500 years ago, it is still used by farmers today to grow bigger, healthier, and more valuable crops! It's amazing that Terra Preta soils have remained fertile for SO LONG!



Dark Earths have also been discovered in other parts of South America, as well as in Africa, Australia, and Germany. It seems that ancient farmers from all around the world were really on to something!

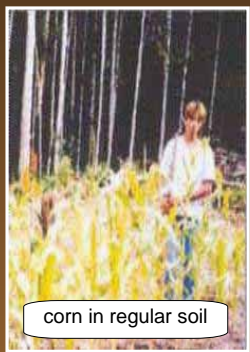
After the plants have grown, we can measure and weigh their leaves and roots. Also, we can stain the roots with a special blue dye that lets us see how much beneficial fungus is growing in the roots! This way, we can tell what types of charcoal help the plants grow best!



beneficial fungi growing in a plant root

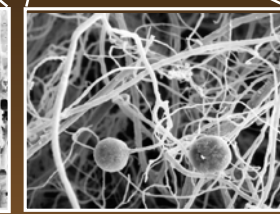
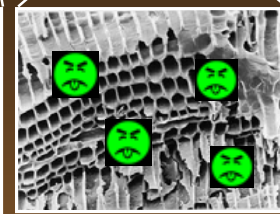
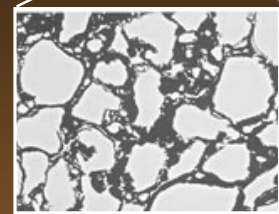


plants growing in soil with different types of charcoal



corn in regular soil

corn in Terra Preta



Hypothesis 1. Charcoal helps plants by improving the structure and chemistry of the soil.
Evidence: Charcoal increases the amount of water a soil can hold, and it improves soil pH, so the plant can get more nutrients from the soil!

Hypothesis 2. Charcoal helps plants by soaking up toxic chemicals in the soil.
Evidence: Charcoal is full of tiny pores, like a sponge, so it can absorb pesticides, and chemicals secreted from the roots of noxious weeds!

Hypothesis 3. Charcoal helps plants by boosting the activity of beneficial fungi and bacteria in the soil.
Evidence: Charcoal enhances special fungi that infect a plant's roots and help it get more nutrients from the soil!

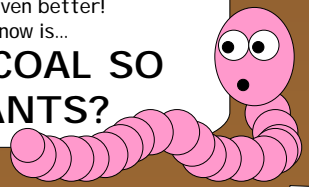


making different types of charcoal

For example, charcoal can be made from all sorts of things, including wood, vegetables, and even peanut shells! Also, charcoal can be made at very different temperatures, like at 300 versus 600 degrees Celsius! One question is...
Are different types of charcoal better than others at helping plants grow?

Recently, scientists have shown that our own charcoal helps many plants grow faster and bigger, and can make fertilizer work even better! But what we still don't really know is...

WHY IS CHARCOAL SO GOOD FOR PLANTS?



Scientists have **3 main hypotheses**, or educated guesses, about why charcoal is so good for plants. They are doing **experiments** to test these hypotheses and see if they are correct. So far, their evidence suggest that all 3 hypotheses may be correct. But, we are only just beginning to unravel the exciting mystery of charcoal! There is so much more that is waiting to be investigated!