

GOOD SOIL IS ALIVE



A block of soil heavily covered in activated fungi by the experiment described in the accompanying text. The white, fuzzy fungal mycelium created in the science project are just one sign that your soil is healthy and teeming with microscopic life.

populations of mites, lady bug larvae and other arthropods is a great sign your soil is healthy.

How about some of the smaller organisms, starting with fungi? These are way too small to see individually, but often enough merge together forming visible strands known as mycelium. You can stimulate formation of some of the fungi in your garden soils by 'activating' it. You need a small container with a cover, soil and baby or ground up oatmeal. The containers are easily obtained by recycling any plastic sushi or salad bar take-out container or a yogurt or cottage cheese cup.

Mix the oatmeal into the soil and fill the container. The soil should be only slightly damp, not wet. Cover lightly and place the container in a dark, warm location. Try a furnace room, on top of a refrigerator or on a seed germinating mat for the right amount of heat. (Heck, I live in Alaska. Many of you may simply be able to take the activity outside where it is the requisite 80 degrees or so). Just lightly cover the container – don't seal it off. Check daily to remove condensation from the lid. In four or five days, the soil should be covered with white, fuzzy fungal mycelium if your soils have a good fungal component. What was loose soil should be firmly held together.

Now, bacteria are a bit more difficult to see, but there is a simple project that will show colonies of bacteria as well as fungi. In addition to some chunks of skinned pumpkin, you will need a couple of clear, glass beer bottles (without the beer, of course) and some non-absorbent cotton, which you can buy at a pharmacy if you don't have any laying around.

Put about a quarter inch of water in each bottle, place a couple of cut cube of skinless, pumpkin on the bottle bottoms and stuff the top with the non-absorbent cotton. Next, sterilize the bottles by putting them into a deep cooking pot and filling it with water. Stop at the point the bottles start to float, then take out a bit of the water so they won't

Cover the pot and boil the water for 20 minutes. This will sterilize the inside of the jars and the pumpkin and cotton.

Let things cool and remove the bottles, carefully take out the cotton plug from one and put a pea-sized bit of garden or yard soil into one bottle. The other bottle is the 'control'. Put both in a warm spot and wait three or four days. You should start to see microbes coating the pumpkin in the jar with the soil. As the days go by you will see different colors, shapes and textures, each representing different kinds of microbes.

Finally, for those who really want a thrill (or a scare depending on how you view these things), it is possible to trap and view soil nematodes using something known as a modified Baermann funnel, again, named after the inventor. This requires a small glass or plastic funnel, available at good cooking stores if you don't have one around. You will also need 6 to 18 inches of rubber tubing that will fit over the tip of the funnel. Use a binder clip to shut off the far end of the tubing. Support the funnel so the rubber tubing hangs down. One way is to cut a hole in an upside down yogurt or coffee cup for a stand. Place the tubing and funnel end through it.

Using a facial tissue or a Kim-wipe, make a 'tea bag' filled with the soil to be tested. Insert this into the top of the funnel and fill the funnel and tubing with warm water so the 'bag' is immersed but no soil leaks out. The water pushes the air out of the soil and the nematodes drop out and into the tubing. They settle at the bottom where the binder clamp is holding the tubing shut. After 24 to 48 hours, open the tubing and retrieve the first few drops of water. Look under a microscope and observe nematodes.

Any one of these experiments should demonstrate to you that your soil is, in fact, teeming with microbes. 🍃

Jeff Lowenfels is an avid gardener with a special interest in soil biology and sustainable gardening. You can buy his book, "Teaming With Microbes: A Gardener's Guide to the Soil Food Web," from The Growing Edge online bookstore – www.growingedge.com/store/books_multimedia.php.

Soil Food Web gardening can require a bit of trust. This really comes into play when someone like me tells you that if you garden organically your soils will be teeming with microbes.

Ah, but how can you be sure this is true? Fortunately, scientists have devised ways to actually give gardeners a good indication of what is in their soils. These projects are fun and well worth trying.

The first is by constructing and using a Berlese funnel, named after an Italian entomologist who invented it (say "ber LAAS eee") to look at the small organisms in the leaf litter. There are several ways to make a Berlese funnel but the easiest uses a single, 2-liter, plastic pop bottle. Take a shape knife and cut around the bottle at the point where the neck starts to curve into the bottle's body. This top piece, when inverted forms a funnel. Place it into the bottom of the bottle, pointed end down. This makes a nice funnel and 'catch' container. Block off the hole in the funnel with a piece of window-size screening.

Next, fill the 'funnel' with leaves and a bit of soil from your gardens. Place the whole apparatus a few inches under a 60 watt, incandescent light for three or four days and then observe what has traveled down through the screen and dropped into the container. If you have a healthy soil food web, you will find all manner of little arthropods running around trying to protect themselves and eat others. The presence of diverse and healthy