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Dr. Caitlin's garden recovery program

BY CAITLIN YOUNGQUIST

Using a rototiller is like putting your soil — and all the life it contains — through a blender.

Tilling with a rototiller destroys the structure (i.e. tilth) that allows air and water to move through the soil. Bare soil is hot and dry in summer, blows away in the wind and welcomes weeds. Soils high in clay can become "addicted" to tillage over time. This means they no longer have good structure and rely on tillage to be workable.

The soil is a complex living system of plants, animals, insects and microbes. Tilling disturbs the balance of this system and increases reliance on inputs such as fertilizers, fungicides and herbicides.

Protecting the surface of your soil and reducing disturbance (i.e. tillage) can greatly improve the health of your soil and garden over time.

Step One: Ditch the Rototiller

This spring, instead of rototilling your soil until it's smooth and barren, reach for a shovel. Gently turn the soil and look for the earthworms. These are nature's rototillers. When left undisturbed to do their job, they mix and fertilize the soil. They eat decomposing material on the surface and carry it down into the soil.

If starting the garden with transplants, dig a small hole where the plant will go, incorporate some compost or potting soil and set your transplants in the ground. They do not need a smooth surface.

If starting with seeds, you may need to work the soil a bit more, using a shovel or trowel and your hands. Small seeds like lettuce and carrots will germinate better in finely textured soil that provides good seed–soil contact. They can be planted in a thin layer of potting soil on the surface. Large seeds like peas and beans are quite tough and can handle an uneven soil surface and thick mulch.

Worms and fungi are two of our greatest allies in the soil. Research in Wyoming has found a single gram of soil can contain hundreds of meters of fungal hyphae (filaments). In our arid, high-pH soils, mycorrhiza can greatly increase the ability of most plants to find water and hard-to-access nutrients such as phosphorus and iron.

Through the process of photosynthesis, plants convert carbon dioxide from air and water and nutrients from the soil into carbohydrates for energy and growth. They grow bigger, healthier and more resistant to drought and other stress.

Perhaps this year, designate one garden area as no-till and slowly experiment with reducing tillage in the rest of the garden. Instead of three passes, try two. Instead of tilling in the fall and spring, try tilling in the spring only. Over time, your soil will improve and your garden will thrive with less effort and fewer inputs.

Step Two: Love a Messy Garden

Think about the way Mother Nature does it. As leaves fall and plants die, they cover the surface of the soil and are eaten by bugs, worms and eventually microbes – the original recyclers. When you pull weeds in the garden, use them as mulch. This keeps the surface of the soil cool, conserves water and slows weed growth.

Add grass clippings in the summer and leaves in the fall. As these organic materials decompose, they feed the worms and microbes, provide plant nutrients and improve the health and tilth of the soil.

Bare soil gets hot! Mulch keeps the soil protected from the drying sun and wind and conserves water, which means less money and time spent on irrigation. Mulch also prevents some weed seeds from germinating, which means less time weeding and more time harvesting.

Compost and manure can be added in the fall after harvest. This gives the worms and microbes plenty of time to start their work and reduces the risk of burning new seedlings. Instead of incorporating a large quantity of compost or manure with the rototiller, consider adding a thin layer (.5 to 1 inch) every fall and letting nature's rototillers do the work for you.

In the spring when you are ready to plant, pull back the mulch that has protected and fed the soil all winter and look at the rich, healthy soil underneath. All you need is a shovel and rake to get the garden ready for seeds and transplants. As you rely less on the rototiller and more on nature, your soil will improve and gardening will get easier and more efficient.

So now, what are you going to do with that rototiller collecting dust in your garage?

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FUNGAL FRIENDS

Mycorrhiza (plural: mycorrhizae) is an association between fungi (myco) and plant roots (rhiza). There are seven kinds of mycorrhizae, and up to 90 percent of all plants on the planet benefit from mycorrhizal associations of some type.

As macrosymbionts, plants benefit because the fungal mycelium (hyphe or filaments) extend the reach of the roots, enhancing the plants' ability to access water and nutrients in the soil.

As the microsymbiont, the mycorrhizal fungi benefit because they get to use carbohydrates produced by the plant for their own growth. In exchange, they provide the plant with nutrients and water.

Here's what a rototiller can do for your garden

- **Help weed seeds germinate.**
- **Hinder hard-working earthworms.**
- **Discourage friendly fungi.**
- **Take out essential organic matter.**
- **Compact soil.**
- **Promote erosion.**