BY JEFF LOWENFELS

WORM POWER

In the garden worms recycle 15 tons of soil and organic matter per acre per year. Nothing I can think of beats worms for their ability to recycle. In my mind they are an excellent example of an animal that promotes sustainability.

Just how good the product they produce is often not, but I get ahead of myself.

Consider any one of the several thousand different types of earthworms found in garden soils. All but less than a handful of these were introduced to North America by settlers who either brought them along in pots of plants or mixed in with their ship's ballast. Today, there are a staggering 2 million to 3 million earthworms in an acre of good garden soil or lawn.

Worms are blind. They avoid predators and find food with the use of receptors that are sensitive to vibration and touch. This is how a worm knows when a robin is hopping around above, looking for a worm snack.

Since they are sensitive to light, worms normally burrow through soil and crawl on the surface at night. When they head back down they pull organic matter below surface. They are constantly ingesting organic material and bits of soil in search of mainly bacteria. They also end up eating fungi, protozoa and nematodes in the process. This material passes through the worm, undergoing physical, chemical, biological and biochemical alteration, after which most of it is deposited out the worm's back end as vermicastings.

By pushing a fleshy pad known as the prostomium from its mouth, which then brings organic matter and soil into the worm's mouth, the toothless worm then uses strong muscles to start to tear and break up ingested material, mixing in saliva to help the process. This mixture is moved down the esophagus, into a muscular compartment called the gizzard. This is full of sand and mineral particles that grind everything into small enough bits so that they can pass into the worm's intestine.

Only a tiny portion of nutrients are ingested, and that's because the worm really doesn't have much by way of its own digestive enzymes. All the grinding in the gizzard is designed to open up the material so that bacteria in the worm's intestines can digest some of it. These microorganisms produce nutrients which are taken in through the worm's intestinal walls.

Worm Castings Rule

Worm castings are often compared to compost, indeed are often called "worm compost." The biggest similarities seem to be vermicompost has the same basic microorganism—bacteria, fungi, protozoa and nematodes. Vermicastings are more pathogen-free with less E. coli or salmonella than properly prepared compost. True, worm compost is made by mixing vermicastings with worm bin materials and getting the aid of sowbugs, centipedes and millipedes, springtails and the requisite four—bacteria, fungi, protozoa and nematodes.

What is not well known are some of the properties of wormcastings. For example, just before the material leaves the gizzard, it is mixed with liquid calcium carbonate. Castings have 50% more calcium than soil that didn't pass through a worm.

In addition, worm castings have somewhere in the vicinity of 5 times the nitrogen, 10 times the potash and 7 times the phosphate than soil that hasn't been worked on by worms. They also have about 3 times as much usable magnesium.

What is more, vermicastings usually have 50% more organic matter that regular soil. This makes sense as it is the organic matter that contains the bacteria sought by worms. And it explains in part the increase in the nutrients listed above and the increase in the soil's cation exchange capacity due to the surface area of the organic matter, which is deposited in worm burrows in the soil.

Why are vermicastings so effective when used around plants? For one thing, they are a perfect environment for microorganisms that feed on the organic matter contained in the pellets and, in turn, provide plants with nutrients and sustain the soil food web. And because castings are deposited in burrows which open up soil for aeration, and the microorganisms deposited are obligate aerobes (they require oxygen), these good-guy, non-pathogenic organisms thrive. This means they can outcompete the bad guys for nutrients and space. In doing so, they break down the organic matter in the castings and provide plants with nitrogen and other nutrients. Does this sound too good to be true? A good worm bin will consume one pound of waste per pound of worms per day.

If you are not using the power of worms, you are not practicing sustainable growing. Get back with the program that has served Nature so well all these years. Using worms is a good way to start over. Ultimately, this means less work for you.

Jeff Lowenfels is an avid gardener with a special interest in soil biology and sustainable gardening. You can buy the 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).