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Chemist develops alternative to composting

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Anaerobic fermentation system handles variety of waste materials

By STEVE BROWN
Capital Press

Calling on his 40 years in research chemistry, physician Larry Green has developed what he calls an improved alternative to composting: acidic anaerobic fermentation.

Green said his BokashiCycle quickly and cleanly deals with animal manure and viscera, food scraps and waste from vegetable, fruit, meat, dairy and fish producers and processors. The end product is a nutrient-rich soil amendment with twice the carbon content of composted material.

"It's a different biochemical process from composting," he said. "Composting loses half the mass of the original input. You also lose water vapor, heat and nutrients and give off carbon dioxide."

In contrast, he said his process yields a material that creates the opportunity for rapid expansion of diversity and population of soil microbes.

"It's like turning a fire hose onto your crops," he said.

Green, who lives in Seattle, has revitalized a process begun by researchers in Japan in the 1920s. They were concerned with the decreasing productivity of their soil. Their early work in fermenting was the root of Bokashi, which means "fermented organic material."

In the 1970s, a horticulturist studied the specific microbes involved, but the results were not documented.

Green's background in research chemistry enabled him to fine-tune a proprietary culture mix of wheat bran, molasses and microorganisms. He explained that in an acidic environment deprived of oxygen, "the enzymatic process breaks down structures, turning preprocessed waste material into valuable nutrients."

Also, in the acidic metabolic process, organisms such as E. coli and salmonella "fall off."

"It's a simple, elementary process ... that mimics what nature really does," he said. "It's a sealed process. The beauty of it is that there is no groundwater contamination or air contamination. There is no exposure to the air, which means no odor, no flies, no vermin, no pests."

Seven to 14 days after the waste material is exposed to the microbes, it's ready to be put in the ground. Seven to 14 days after that, the microbes in the soil have finished the job, and the soil is ready to be planted.

Because the fermentation works 10 times faster than composting, "you can turn it over faster, using less machine energy, less labor," Green said. That also means less space is needed.

Vegetable and fruit processors often create tons of cull material, he said. "The irony is that the farmer gets no value from all that material, which could return lost nutrients to the soil. So it solves a waste problem there."

Green said he has been in contact with a fish processing plant in Hawaii that has to deal with 80 tons of fish waste a month. "I've shown them how they can get rich nitrogen back into the soil."

There is also a fuel being created during the process, but it's not methane. With a pH below 6, he said, no methane is created.

"A key microbe is cellulase, which breaks down cellulose. Instead of alcohol being created, which is corrosive, the byproduct is butanol," he said. "Butanol is a four-chain carbon, with twice the octane rating of alcohol. It mixes well with gasoline and doesn't corrode lines, so it's easily transportable."

The primary cost to the farmer is the culture mix, which Green said can be bought in bulk for a low price, especially considering that wheat bran, a main ingredient, is so common. According to the website, a 25-pound bag costs $79.99.

Larger operations could use as many 55-gallon drums as necessary to handle large amounts of waste materials.

Green said he plans to contact conservation districts to see about setting up pilot demonstration projects so farmers can see how the process works.

He's currently gathering data to address county and state regulatory issues, because regulations are "not up-to-date on current developments."