Spent Mushroom Compost–

A Natural Resource That Provides Solutions To Environmental Problems

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CAC Committee on Spent Compost

Mushroom compost has multiple environmental benefits as research at Penn State, the University of Connecticut and the Stroud Water Research Center of the Academy of Natural Sciences of Philadelphia are documenting.

"Spent mushroom compost is a natural resource," said Paul Wuest, a professor of plant pathology at Penn State University.

His studies have found that spent mushroom compost adds nutrients to the soil, helps neutralize acidic soils, facilitates plant growth in barren areas and, in some cases, even improves water quality. Other researchers are reaching similar conclusions.

"This has major implications for mushroom farming operations," said Jamie Ciarrocchi, past president of the American Mushroom Institute. "Spent compost has always had agricultural uses and now it has environmental benefits as well."

Some of Wuest's work has focused on reclaiming strip mining sites – a serious problem which is more than an eyesore. Legislative action passed in the '80s requires companies who strip mine to return the land to its original typography.

"After strip mining the land is left open and scarred–like something out of a moonscape," Wuest said. "If you re-establish vegetation on the site of strip mines, grasses and trees and bushes that grow there support the flora and fauna life that was there before strip mining–making mining environmentally benign."

His research found that spent mushroom compost helps achieve the dual goals of beautifying the countryside, and making sure the land and water are not negatively impacted.

Compost has the ability to modify the PH of the soil over long periods of time, a positive attribute when dealing with acidic strip mine soils. In addition, nutrients from spent compost are released about 10% per year so the organic matter breaks down slowly in the soil while at the same time providing nutrients plants need for their growth and survival.

"The principle involved and the practices developed in western Pennsylvania are applicable in other areas," Wuest said, "such as strip mines in other parts of the state and country."

Other studies Wuest has done over the last several years take the research a step farther. In Appalachia his work addressed the treatment of acid mine water.

Wuest explained that sulfur deposits form near coal seams. When rainwater gets into these pockets, sulfuric acid is formed creating acid mine drainage. Plants and fish cannot live in this environment and, in addition, the situation leads to water pollution not just in neighboring streams but throughout the watershed.

"One can remedy the water quality through a wetland treatment," Wuest said. "How do you establish a wetlands to treat drainage? You can create them – and you can construct them out of spent mushroom compost."

He defined a wetland as an area where water above the surface is relatively shallow. Spreading compost about 1.5 feet deep and allowing acid mine water to drain over it creates a wetland. A plus is that spent compost provides organisms and chemistry which reduce the amount of time necessary for a wetland to become functional.

"When the water comes out, the PH has gone up, and the iron and sulfur contents go down," Wuest

said. "The water released from these wetlands meets clean stream specifications."

Looking at a different issue, preliminary work at the Stroud Water Research Center of the Academy of Natural Sciences substantiates research data from the University of Connecticut and Penn State University which have found that the use of spent mushroom compost on soil does not harm water quality.

The Stroud study examined four study sites including two mushroom farms, an alfalfa field that does not receive mushroom compost and a woodland site. One site receiving compost violated no primary drinking water standards. Neither of the compost sites had any detectable pesticide residues, either. One of the compost sites, however, did have raised nitrate levels. And all three agricultural sites – had higher salt concentrations than the woodland site.

Wuest was pleased with the results because they confirmed his own, earlier work. "I, too, found elevated nitrate levels, but within the acceptable range which accommodate standards for drinking water set by the state and national governments," Wuest said.

Dr. Abigail Manyard of the University of Connecticut Agricultural Experimental Station recently published an article in *Biocycle* magazine on the results of similar research. She applied spent mushroom compost on land where vegetables were grown and then sampled the water below the field.

Manyard found that using spent mushroom compost resulted in lower nitrates than would have occurred if she had used standard inorganic fertilizer. She concluded that the use of composted material has less potential harm to water quality than using inorganic fertilizers.

There are positive attributes, too. For instance, when spent mushroom compost is applied to the land, there is no surface leaching of ingredients into streams as occurs with a chemical fertilizer or even fresh manure. In addition, nutrients are slowly released to plants growing in the soil over a period of years.

Enthusiastic about the broad-based findings, Wuest believes spent mushroom compost has widespread environmental applications which could provide benefits for private industry and government agencies.

"I talked with the past Department of Environmental Resources President Nick DiBenedictus and suggested that DER from Pennsylvania could get together its counterpart in Florida where there is so much sandy soil," Wuest said. "They are concerned about fertilizers and pesticides getting into the ground water there and using compost could lower or eliminate the likelihood of environmental threats.

And he sees that as just the beginning. "Similar soils are found all the way down the coast. Sand is devoid of nutrients so compost could enhance it. Spent compost has the marvelous capacity to rejuvenate soils and to assist in revegetation," he said.

With millions of tons of compost generated by mushroom operations around the country, the main problem is finding economical ways to transport the spent compost to the sites where it is needed.

"It gets down to a joining of minds and commitment – and of supplying large markets," he said. "There's no doubt about it – spent compost is a valuable natural resource." **MN**