

CAMPUS INITIATIVE

MULTIPURPOSE PROGRAM AT KENTUCKY COLLEGE



Student employee separates preconsumer food residuals in Berea College kitchen for collection and composting.

RESIDUALS from Berea College's food service have become a valuable multipurpose resource. In 1998, several students in the Department of Agriculture and Natural Resources at the college, a small liberal arts institution in eastern Kentucky, began a pilot food residuals collection and composting operation. Their goals were to reduce waste, generate compost, and improve the overall sustainability of the campus.

The college's food service feeds 1,200 students daily during the fall and spring semesters and about 200 during the summer session. Previously, all food residuals were sent down drain disposals to the city's sewage treatment plant, which landfills all of its biosolids. Now all preconsumer food residuals are collected in two 40-gallon, plastic cans placed in the kitchen — one in the preparation area and one next to the washing sink. Kitchen workers are asked to put all food residuals in the buckets while

Thermometers (inset) monitor temperatures of compost piles as well as media in seeded horticultural flats. Placed on metal mesh tables above an active compost pile, the flats (right) are seeded with vegetables and covered to retain heat.

Collection and composting of Berea College's food service residuals provide nutrients for organic gardens and heat for greenhouse while improving sustainability of the campus.

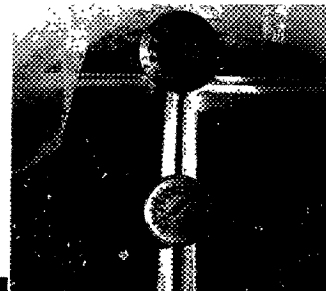
*Sean Clark
and Derek Law*

trying to minimize the amount of nonorganic waste such as plastic wrappers. Each day, buckets are collected, emptied at the compost site, washed, and replaced in the kitchen. This collection system has continued, more or less uninterrupted, since October, 1998. The estimated amount of preconsumer food residuals generated per capita at Berea College is about .25 lb/day. Over the course of a year this yields 30 to 35 tons (wet weight) from the facility.

COMPOSTING PROCESS

During warmer months, food residuals are either fed to a small mixed flock of poultry or composted outside. For composting, the food residuals are layered with dry materials high in carbon, such as straw, wood shavings from the college's woodcraft enterprise, or landscape materials from campus, such as leaves. Depending upon the amount of food residuals collected, it takes two to three weeks to build a pile large enough for composting.

Once piles are five to seven feet wide at the base and two to three feet high, temperatures are monitored and piles are turned as necessary, by hand or with a front-end loader, to





Compost generated from food residuals is the primary soil amendment for food grown in Berea College's gardens and greenhouse.

reach and maintain 150°F or higher for several weeks. Water is added as needed, but the food residuals usually contain adequate moisture. After active composting, piles are allowed to cool and cure for several months with occasional turning and watering.

During the colder months, the operation is moved into a glass greenhouse. Metal-mesh tables are placed over the active piles and seeded horticultural flats are then set on the tables, where microbial heat promotes germination and seedling growth for vegetable transplants. A back-up heating system using natural gas operates when tempera-

tures inside the greenhouse drop to freezing.

Energy use by that greenhouse and another one heated only with natural gas was compared for the winter months of 1999. The compost-heated greenhouse used 95 percent less fuel. Air temperatures often dropped to near freezing, especially at sunrise, but soil temperatures in the flats above the active compost piles were maintained at 10°F to 20°F above ambient and high enough for rapid seed germination and plant growth.

Compost produced from the food residuals has been used as a soil amendment to build fertility in the college's organically managed gardens and as a partial or full substitute for purchased commercial potting mix used for growing crops in the greenhouse. The nutrient composition is comparable to commercial composts on the market. Based on estimated amounts of preconsumer food residuals generated at Berea College, the compost produced should eliminate the need to purchase manure, compost or fertilizer.

ECONOMICS

The economics of collecting, composting and using the processed food residuals from Berea College were initially assessed based on costs of acquiring and processing the residuals and the value of the nutrients obtained. The costs included labor paid at \$7/hour and equipment (40-gallon plastic buckets, dolly and pitchfork) depreciated over five years. The value was determined based on plant macronutrient content (nitrogen, phosphorus, potassium, sulfur, calcium and magnesium) with all macronutrients assumed to have equal value. Because much of the food residuals was wheat-based (bread and pasta), it was assumed that their weight had the nutrient composition of wheat. It also was assumed that one-third of the nitrogen would be lost during the composting process, so this was subtracted from the estimated total nutrient content.

The estimated cost for the plant macronutrients collected was \$1.76/lb. This compared favorably with the costs of plant macronutrients in commercially available composts, which ranged from \$2 to over \$4/lb. When savings in natural gas use are factored into the equation, the cost-benefit analysis for the collection, processing and use of the composted food residuals is extremely favorable. The use of the compost heating system in the greenhouse saved over \$900 in fuel costs from mid-January to early May, exceeding total food residuals collection costs for an entire year by over \$100. Additional benefits not factored into this analysis include improvements to soil tilth from compost applications and reduction in solid waste. ■

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