



*People and Nature: Our Future is in the Balance*

## **National Wildlife Federation®**

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### **Clemson University Clemson, South Carolina Spring 2004, Vermicomposting**

## **BACKGROUND**

### **Campus Profile**

Clemson is a public land grant and research university located in a rural area in the northwest corner of South Carolina. It has an enrollment of approximately 17,000 students, served by approximately 1,200 faculty and 4,500 staff. Bachelor's through Ph.D. degrees are offered in a number of disciplines. The university emphasizes agriculture, architecture, business, education, engineering, natural resources, science and technology. Clemson has been engaged in campus greening across both operations and curriculum for six years as a part of the SC Sustainable Universities Initiative.

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## **GOALS AND ACCOMPLISHMENTS**

### **Goals**

1. To demonstrate vermicomposting as an alternative disposal method for campus cafeteria waste and other campus organic wastes.
2. To increase public awareness, both on campus and in the surrounding community, of vermicomposting as a method to reduce the environmental impact of organic waste.

### **Accomplishments**

The students established a "Worm Wigwam" composter (Worm Works, Inc.) loaned by the state Department of Health and Environmental Control, in an outdoor laboratory managed by Clemson's Sustainable Agriculture Program. This site provided shade for the composter and a source of water. Worms were fed using organic wastes (all plant material) provided by ARA Dining Services Schilleter Dining Hall Cafeteria (David Raiger, Dining Services Manager) and the Sustainable Agriculture Garden located in the Calhoun Fields Laboratory. Initially, five pounds of plant waste were added weekly until the worms began feeding steadily; subsequently, the amount was gradually increased so that by the spring of 2004, the system was converting 25 to 30 pounds of waste per week. In March students began harvesting castings. The castings were air-dried, sieved to remove coarse undigested materials and bagged. Beginning in late April, bags of compost were then sold at the Calhoun Fields Laboratory Farmers Market in Hendrix Student Center at \$5 per four-pound bag.

(See <http://www.sc.edu/sustainableu/2003McInnisFinal.pdf> for more information.)

At this time, we have not been harvesting compost long enough to calculate an accurate cost-benefit analysis of using vermicomposting as an alternative to landfills for organic waste disposal. However, figures from the vermicomposting unit at the Medical University of South Carolina, provided by Christine Von Kolnitz, show that after six years of operation, amortization of the initial capital investment and sale of castings will allow vermicomposting to become cheaper than tipping costs for handling all dining hall organic wastes.

The class participated in several campus and community events to disseminate information about vermicomposting during the past year. We developed a poster display that explained vermicomposting and wrote instruction sheets describing how to establish small home systems to compost kitchen scraps. The poster was used at the following events:

- Clemson University Earth Day, on campus. Displayed poster, distributed brochures on vermicomposting, and answered questions.
- “Clemson Outdoors,” held at Clemson Elementary School with over 1000 attendees.
- Sprouting Wings summer camp led by Susan Valentine of the Sustainable Agriculture Program. This day camp at Clemson University involved elementary-age students learning about various aspects of sustainable agricultural techniques, of which vermicomposting is a part. Jesse Woodard, the vermicomposting student assistant, participated in this event. Other Sprouting Wings camps across the state were held that included vermicomposting in the activities.
- Sprouting Wings of Clemson and Seneca held a workshop over a two-week period in the fall to promote sustainable vermicomposting at two different sites. The Seneca Sprouting Wings group included nearly 20 elementary age students who worked on the construction of their own vermicomposting system to manage cafeteria waste from the school and snacks from the after-school program. The Clemson program operates out of the SC Botanical Gardens.
- Learning Classroom and nearly 50 elementary students worked over several days to construct a large bed in order to compost the waste from their own gardens and from their after-school snacks. Both groups were given a short lesson on the importance of sustainable usage and instructed on how to successfully manage a vermicomposting system.

### **Challenges and Responses**

There were several setbacks in establishing a stable system. The amount of water added was gradually adjusted to provide sufficient moisture to favor worm survival and reproduction, yet not cause the soil to become too soft to be retained in the composter. A steel grid with 4 inch x 4 inch openings supports the bottom of the compost bed. Too much or too little water caused the compost bedding to fall through the grid (cave-ins) unexpectedly, necessitating rebuilding the substrate. By the fall, the system was stabilized and we gradually reached our goal weight of waste conversion. During the winter, the composter temperature was not maintained at the optimum temperature for earthworms (60/80°F) as we had hoped. The microbial and earthworm metabolism could not generate sufficient heat alone, and supplemental heating was necessary. In January 2004 we purchased a heating pad with a thermostat from the Wigwam manufacturer, which helped maintain an acceptable minimum temperature. In addition, we were able to move the Wigwam into an enclosed storage building provided by Dr. Geoff Zehnder and the

Sustainable Agriculture Program. This provided a more stable environment and allowed better temperature control.

## **ENGAGEMENT AND SUPPORT**

### **Leaders and Supporters**

The project was carried out by Dr. Tom McInnis's senior seminar in biological sciences, with support from the Sustainable Universities Initiative (SUI) and the Clemson University Environmental Committee. An undergraduate student received financial support to service and maintain the composter. Joan Williams, at the SC Department of Health and Environmental Control, and Dr. Geoff Zehnder, professor and director of Clemson's Sustainable Agriculture Program, provided valuable assistance and advice.

### **Funding**

The vermicomposter, valued at approximately \$500, was loaned to the university by the Department of Health and Environmental Control. An \$8,700 SUI minigrant provided funding for worms, a pH meter, a leaf shredder, a soil thermometer and topsoil to establish the system. The grant also supported the undergraduate assistant. Time and space were generously donated by Dr. Zehnder of the Sustainable Agriculture Program. Dr. Zehnder also provided a market for the worm castings through the weekly Farmers Market in the student center, where organic produce from the outdoor laboratory is sold.

### **National Wildlife Federation's Campus Ecology® Program**

"I don't think that anyone involved used Campus Ecology resources, although having Campus Ecology 'out there' is like having a cheering section that you know you can turn to if you need it." Patricia Jerman, June 24, 2004.

## **CLOSING COMMENT**

Dr. Geoff Zehnder, Director of Clemson's Sustainable Agriculture Program summarized the program:

"Younger students who visited the vermicomposting unit were impressed by the masses of worms they could see inside and also that the worms turned the 'garbage' into compost that looked like 'clean dirt' that didn't smell bad. College students working on the project were amazed at the speed with which the food waste was broken down by the worms and loved to see the dark, rich worm casting compost that was produced by the worms in the unit. They were able to see the agricultural benefits of the compost applied to the Calhoun Field Lab vegetable plots and also the economic benefits as evidenced by the brisk sales of bagged worm compost at our Farmers Market. From a teaching standpoint, the vermicomposting unit has been an effective and interesting way to demonstrate the practical benefits of conservation."