



Teacher's Page

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Teachers Page - Rationale for School Composting

Composting as a Waste Management Technique

- ❖ A major issue facing modern society is waste management. More simply put, what should we do with the waste we produce? A growing emphasis has been placed on the three R's: Reduce, Reuse, and Recycle. Composting provides a means of accomplishing all three of the R's. Through composting the amount of garbage sent to the landfill is reduced, the organic matter is reused rather than dumped, and it is recycled into a useful soil amendment.
- ❖ Natural ecosystems have a proven method of breaking down organic materials into a useful end-product: the decomposers found within the food chain break down nature's organic waste and turn it into humus, the organic component of soil.
- ❖ Composting is a way of harnessing the natural process of decomposition to speed up the decay of waste. The history of composting dates back to the history of early agriculture. Many find that composting is as much of an art as a science. Recent concern about managing wastes and producing food in an environmentally sound manner has led to a renewed interest in small-scale, backyard composting as well as an interest in developing large-scale, commercial and municipal composting systems.
- ❖ Designing successful composting systems requires an understanding of certain biological, chemical, and physical processes such as the movement of air, uptake of carbon and nitrogen, and heat production and transfer. Students can be a part of the process of obtaining scientific information about composting, whether their results are applied in their own home, school, or by industry. At the same time, students engage in hands-on, minds-on composting activities with an opportunity to improve their understanding of many scientific processes and disciplines.
- ❖ The study of waste production and management lends itself to interdisciplinary study, and school composting provides an opportunity for real-world problem solving with cooperative learning groups. It therefore can motivate students who feel alienated by traditional "science" experiences. Furthermore, students gain an awareness of individuals' roles in the world today as they learn how waste is produced and how it can be reduced. Finally, through construction of compost systems, students are empowered to make a positive change in their world. For it is, after all, our youth to whom this planet belongs.

Composting as a Topic for Independent Study

- ❖ Contemporary high school science teachers are being challenged to change the way science is taught. These challenges come both from educational policy-makers and from the students. Policy-makers see a need to create a scientifically-literate populace. They envision a future generation able to analyze confusing arguments presented by the media or politicians about the efficacy of new policies designed to solve societal problems. Policy-makers also see the need for training the next generation of scientists to work in industry and academia. Students, on the other hand, want science that is

relevant to their lives. They want to see the connection between what goes on in the classroom and the realities they face outside of school.

- ❖ Students who have the opportunity to conduct meaningful, applied scientific research develop many of the analytical thinking skills called for in today's complex society. They also get a chance to see whether they may be suited for a career as a research scientist. At the same time, if the research in which they are engaged is relevant to issues they face in their daily lives, their motivation for conducting research will be high.
- ❖ Many of the activities on this WWW site were written by a group of high school teachers who spent several years conducting research at Cornell University, and then engaged their classroom and after-school science club students in similar research. The research focused on an important societal issue -- finding ways to handle the 20-40% of our waste stream comprising food and yard wastes. Properly managed through composting, these wastes can be converted into valuable soil amendments.
- ❖ The composting research we conducted at Cornell University lends itself well to classroom research for a number of logistical and educational reasons. First, it does not involve any expensive equipment; all the materials are readily available. In addition, although long-term composting research projects are possible, there are many experiments that can be conducted within one-two weeks or less. Composting is not limited to rural areas. In cities it is carried out in community gardens, and even in containers on rooftops and balconies. There is an endless number of experiments that students can design focusing on composting, and because much remains unknown about the science of composting, the students' results will be original and meaningful. For example, students can conduct experiments on determining mixtures of wastes and types of composting systems that promote rapid decomposition. Once they have set up a composting system, students can use the compost for experiments including assessing microbial activity in decomposing organic wastes, observing the behavior of soil invertebrates, and determining how the microorganisms and invertebrates relate to each other in the composting food web. They can also determine the effect of the composts they have produced on plant germination and growth. The possibilities for designing experiments with different independent variables are endless.
- ❖ In addition to experiencing the scientific process, students engaged in composting research gain some important other skills. By discussing how their results relate to the larger issue of waste management, students develop an appreciation for the role of science in policy-making. Students can also examine their contribution to solving solid waste problems, through applying what they learn to their personal consumption and waste reduction habits. Additionally, they can acquire social skills that will aid them in the workplace and their personal lives, through working together in cooperative learning groups while conducting their research. They can develop presentations of their research results, and incorporate them into portfolios to be used for assessment purposes.
- ❖ Students can also improve their understanding of some of the basic sciences through their composting research. Designing successful composting systems requires an understanding of biological, chemical, and physical processes, such as uptake of carbon and nitrogen by microorganisms, the movement of air, and heat production and transfer. We have incorporated composting into a number of subjects, including biology, environmental studies, earth sciences, horticulture, microbiology, and science research. Students participating in a summer engineering research program designed compost systems using computer assisted design (CAD) programs. Composting, and the overriding issue of waste management, can also be approached from the social sciences, including economics, social studies, and history.