

Greenhouse Heating System Using Compost as the Heat Source

Northeast SARE Farmer Grant Project
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My business, Misty Morning Herbs and More, produces herbs; popular vegetables such as tomatoes, cucumbers, squash, red beets; and various greens and cut flowers.

The outdoor growing season begins in March and ends in late September. An unheated greenhouse measuring 12' x 16' x 7' is presently used in the spring to grow herb plants and some vegetable plants. The seeds are started in the house, and then moved to the greenhouse as small seedlings. The seedlings must be returned to the house each evening when low nighttime temperatures exist and when daytime temperatures are too cold. This on-going project will eliminate the need to move the plants daily and extend the greenhouse growing season, allowing for longer and more varied production.

A partially passive and partially active energy system is constructed adjacent to one end of the greenhouse. It consists of a cylindrical rat wire mesh frame reinforced with steel pipes and lined with plastic at the sides and top to retain moisture and help retain heat. (Figure #1)

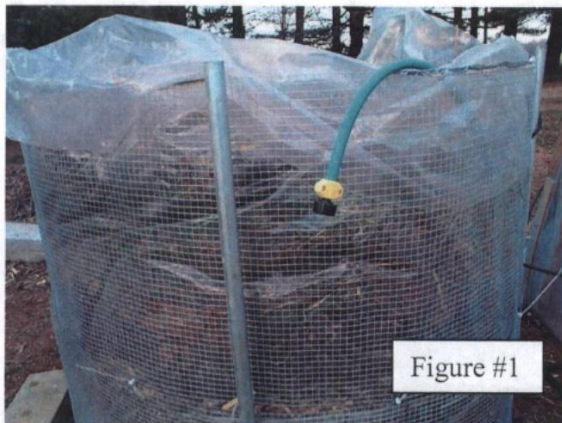


Figure #1

Wood chips, a waste product from the farm, are used for the carbon element in the compost pile as they break down more slowly, thus providing heat for a longer period of time. The nitrogen element comes from harvesting the winter cover crop. A small amount of manure from a nearby organic farm is added to enhance the microbial action and elevate the temperature of the compost pile.

A metal reservoir with a lid to keep out compost material is placed in the center of the pile and twelve inches from the bottom, and then partially filled with water. A sump pump is also placed in the reservoir. Semi-rigid black plastic pipe is connected to the

pump with plumbing fittings and coiled within the pile to absorb heat. The pipe exits the pile and is connected to black rubber hoses, which are insulated to prevent heat loss. (Figure #2) The hoses enter the greenhouse through openings made in the greenhouse wall, which is reinforced with thin plywood at that point. The hoses travel in a zigzag pattern under the growing tables. (Figure #3) Heat is transferred from the hoses by convection to heat the plants and the air. The hoses progress forming a continuous loop and exit the greenhouse where they return to the compost pile to start the process again.

The compost pile is constructed in conjunction with the addition of the various elements and additional layers are added as the materials break down and settling occurs. Each layer is moistened as it is added and checked periodically to be sure the moisture is not lost. A short length of hose is added stretching



Figure #2



from the outside of the compost pile to the reservoir to facilitate adding water to the reservoir if needed. The compost is not turned at any time since the internal components would prevent turning it.

A compost pile generally takes about one week to build up heat and normally maintains heat in the range of 140 degrees for about two weeks. With the emphasis on wood chips in this project, it is expected that the elevated temperature will continue for a longer period of time. A lower temperature range of 115 degrees is usually sustained for an extended period of

time. Thus, the pile and its continuous additions should maintain adequate temperatures to heat the greenhouse at night, and on cloudy and very cold days for the entire winter and into spring. The resulting compost material is also a beneficial soil amendment.

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