FWRC RESEARCH ADVANCES
Forest & Wildlife Research Center
March, 1997 • Volume 2, No. 2

COMPOSTING

MAY OFFER A SOLUTION TO THE COSTLY WOOD WASTE HANDLING PROBLEM

Furniture manufacturing, Mississippi's great and growing industry, generates huge amounts of wood waste. Much of it is mixed with wood flour, sawdust, wood flakes, fabric scraps and compounds from manufacturing. A group of scientists in the Forest Products Laboratory (FPL) composed these wastes, with and without horse manure, and got significant reduction of dry matter and reduction of toxicity Wood waste disposal is difficult and expensive. Composting appears to offer a viable option that could result in a value-added product. For example, experiments currently underway by two soil scientists suggest that the composted end product has potential as a soil amendment for row crops.

Dr. Hamid Borazjani (r., leftpage] supervises the mixing of wood waste with different amounts of horse manure before it is placed in wooden boxes prepared for this purpose.

INTRODUCTION

Hundreds of Mississippi furniture plants are faced with the problem of what to do with almost endless truckloads of wood waste. This waste comprises both hardwood and softwood sawdust, often mixed with wood flour, chips and flakes: small fabric scraps; and many finishing, polishing and gluing compounds. The last group of materials is often toxic, but fortunately is only a small part of the total and is not considered to be hazardous.

The debris may be burned, but many small furniture companies have no facilities for burning wood, and they usually lose money if they sell wood waste because the transportation cost outweighs the material's value.

Of the other possible options, on-site incineration is costly, partly because of the Environmental Protection Agency (EPA) emission regulations, and landfill disposal is becoming more expensive. For example, one Delta plant spends about $6,000 monthly in landfill fees, although this small firm generates only a fraction of the waste that some companies do.

The need of the furniture industry (and other wood products enterprises) in Mississippi thus becomes one of finding new methods of waste disposal.

Harold A. "Sandy' Stewart puts 60 pounds of fill-wood waste alone or waste mixed with 5 or 10 percent manure-into each 3 x 2 x I foot wooden box for outdoor testing

ADVANTAGES OF COMPOSTING

Composting offers three kinds of benefits in this situation. First, it is an aerobic decomposition process which converts biodegradable solid organic matter into a stable humus material. Second, it reduces the toxicity of the material treated. Third, it reduces the bulk and weight of the wood waste and thus cuts transportation costs

Dr. Hamid Borazjani. associate professor at the Forest and Wildlife Research Center's Forest Products Laboratory (FPL), Dr. Susan Diehl, assistant professor, and Harold A. Stewart, senior research assistant carried out an initial composting study, using a wood waste residue from a Mississippi furniture-making plant.

The large wood pieces and large fabric scraps were first removed. Moisture content was found to be 5 percent. The scientists built nine plywood boxes -- each 2 by 3 by I foot. They had weed-proof synthetic fiber mats placed in the bottom of each box, and 2 inches of pea gravel spread over each mat to enhance water and air flow.

Three boxes of waste received no additive. Horse manure at 5 and IO percent was added to six containers (three containers of each mixture). The treatment containers -- with 60 pounds of fill -- were randomly placed outdoors.

Borazjani, Diehl and Stewart adjusted the moisture content in each box to 50 percent by adding deionized water. Since aeration is needed when a compost exceeds 70°C or when moisture content is more than 60 percent, scientists incorporated air into the waste/manure mixtures every seven days by stirring.

Dr. Susan Diehl carries out toxicity tests on the wood waste-manure mixtures and wood waste alone. She tests these each month in her laboratory.

TEST RESULTS

After 180 days the contents of each box were weighed. The pH levels remained at 6 to 6.3 throughout the study. All treatments showed a significant weight reduction. A significant difference between manured and non-manured compost existed, but not between treatments with different amounts of manure.

For a more accurate evaluation, original manure weight was subtracted from the total, and the percent loss of weight in the remaining mixture calculated. The same pattern was seen, with manure treatments having significantly greater weight loss, but with 10 percent and 5 percent manure mixtures showing no significant difference.

The average weight of the original 60 pounds of sawdust (with the minor components intermixed) was 46.5 pounds, or 23 percent less, after 180 days, But a mixture with 5 percent horse manure reduced the weight from 60 to 34.5 pounds -- a weight loss of 43 percent -- or 39 percent with original manure weight subtracted. Addition of 10 percent manure brought a 180-day weight of 31.5 pounds -- for a 48 percent weight loss -- 42 percent with manure weight subtracted. These dramatic results can be clearly seen in figure 1.

The scientists' conclusion: "Composting appeared to be a simple, safe and viable option for disposal of wood wastes. Because of small particle size, these types of compost are particularly well suited as a soil amendment in areas where organic matter is low. Several manufacturers in an area could pool resources and build a large-scale composting site, selling the product to farmers and nurseries, or the material could be taken back to the forest,"

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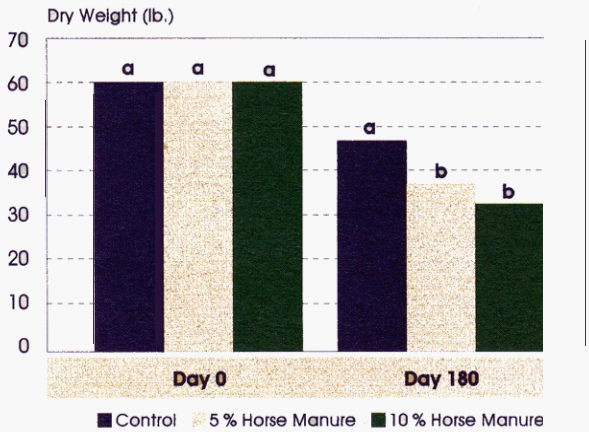
FWRC-FP-32

Dr. Jac Varco, .r., MAFES soils scientist, talks with Dr. Ardeshir Adeli about results on corn planted in the wood waste-manure growing medium. Materials other than horse manure are being composted with wood waste in further trials, and Varco and Adeli, who is a visiting postdoctoral assistant, are cooperating with FPL scientists in testing use of these composts on crops of the area.

Figure 1: Weight Reduction of Sawdust Fines
after a period of 180 days.

Letters above bars indicate significant differences at the p=o.o5level



CURRENT & FUTURE RESEARCH

The initial study's promising results have led to further research. Underway now is a project in which Dr. Jac Varco, MAFES soils scientist, is participating. FPL is once again composting furniture wood waste in 25-gallon cans with several different additives -- gin trash and chicken manure. Tests of waste for moisture content, pH and toxicity are being done each month.

The final products are being evaluated for their effects on growth of common Mississippi agricultural crops in a greenhouse study. From these results, recommendations for commercial -scale operations will be developed.

Other research involving the composting process will be carried out. A need to look at the effect of adding various inorganic materials to wood waste exists. The best size for a compost pile needs to be determined, and answers found on how to prevent spontaneous combustion of large amounts of compost. Further study of the toxicity and biological oxygen demand of leachates from the process is also needed.

Composting was known and has been used historically as an agricultural practice. What FPL scientists are seeking to learn is whether wood waste is an acceptable composting material. If it is, the next question is whether or not it's economically feasible for the timber industry to use it in this way to dispose of huge amounts of waste. Additional benefits include reduction of weight, a consequent drop in handling cost and the lowering of wood waste's toxicity.