

# Composting and Recycling Urban Food Wastes in Korea With Effective Microorganisms

K. H. Lee

Korea Nature Farming Research Center, Suweon, Korea

## Abstract

Food waste which accounts for approximately 30 percent of urban garbage was collected from selected cities of Korea and treated with EM in household recycling and demonstration programs. The quantity of garbage was reduced significantly with no malodors commonly associated with refuse fermentation. The fermented food waste can be used beneficially as an organic fertilizer for crop production. This paper discusses a program for recycling food wastes that will be extended throughout Korea in 1995. Support from the Korean government will be solicited to broaden the scope of the project, and the fermented product will be tested more extensively for use as a soil conditioner, organic fertilizer and animal feed.

## Background

The rapidly expanding urban population in Korea has generated an ever increasing volume of municipal solid waste (MSW or garbage) which has caused some serious environmental and social problems from its ultimate disposal. This, in turn, has raised questions as to how this waste should be managed and possibly recycled for the benefit of society. Table 1 shows that in 1994 the daily production of municipal solid waste in Korea was 58,350 metric tons of which 16,410 tons, or about 28 percent was food waste. More than 95 percent of the total MSW produced was disposed of by land reclamation or in landfills, and less than 5 percent was incinerated. The ultimate disposal of food wastes by land reclamation has caused severe problems of malodors and pollution of surface water and groundwater, while incineration has adversely affected air quality.

Consequently, in 1991 the Korean government began to explore other alternatives that would allow food wastes to be recycled as compost (i.e., for use as soil conditioners and organic fertilizers) or animal feed. As a result, the amount of food waste being disposed of by landfilling and incinerating has declined by more than 25 percent since 1991. By 1994, 8796 tons of food waste or 54 percent of the total daily production (Table 1) was being recycled for beneficial use.

**Table 1. Total Daily Production, Recycling and Disposal of Municipal Solid Waste by the Urban Sector in Korea (1994).**

Waste material	Amount produced (tons)	Amount produced (%)	Recycled (tons)	Disposed <sup>1</sup> (tons)
Food	16,410	28.1	8,796	7,614
Paper	13,674	23.4	-	13,674
Ash (briquets)	6,608	11.3	-	6,608
Other	21,658	37.1	-	21,658
Total	58,350		8,796	49,554

<sup>1</sup>Approximately 95% of this total is disposed of by landfilling and 5% by incinerating.

## Projects Involving Recycled Food Waste

### Composting Food Waste with Effective Microorganisms

In 1993 we began to compost urban food waste in the Yeonchon area of Kyonggi Province using Effective Microorganisms (EM), a mixed culture of beneficial microorganisms, as an inoculant. The project was supported by the Korean government and was very successful in producing a high quality compost. In 1994, at the request of the Korean government, we established food waste composting demonstration projects in 12 cities involving some 7,600 households. EM was effective in suppressing malodors during composting and finished compost was shown to be an excellent soil conditioner and organic fertilizer for crop production. These demonstration projects will be expanded in 1995 to include large-scale food waste composting for the cities of Pusan, Kwangju,

Yeonchon and Daejon. The Korean government is providing funding equivalent to \$600,000 USD for the development of each project. The compost products will be evaluated for their use as organic amendments on farmland and as livestock feed.

### **Cooperative Food Waste Composting Project Involving Pusan City and the Pusan Red Cross Society**

In 1994, Pusan City and the Pusan Red Cross Society established a cooperative project for composting food waste and utilizing the product as an organic amendment and fertilizer for crops. About 860 households in Pusan City participated in the project which involved collecting and treating food wastes with EM in plastic fermentation chambers. One chamber per household was supplied free-of-charge by Pusan City and the Pusan Red Cross Society. EM effectively controlled malodors during fermentation. Each week the municipal waste authority for Pusan City collected the fermented food waste and transported it to a composting facility for processing into a final product. In 1995 the project will be expanded to include 200,000 households.

### **Earthworm Production with EM-Fermented Food Waste**

Earthworms are produced in Korea as a source of medicinal extracts and as protein supplements for animal feeds. In the marketplace earthworms can bring \$20 USD per kilogram. EM-fermented food waste was used as food for earthworms in a demonstration project with considerable success compared with conventional methods. This work will be expanded in 1995 in Kyonggi Province.

### **Conclusions**

Composting and recycling urban food wastes in Korea with Effective Microorganisms are viable alternatives to land reclamation (i.e., landfilling) and incineration which can cause both malodors and environmental pollution. Household participation projects for treating and fermenting food wastes with EM have been highly successful and produced high quality composts for use as organic fertilizers and livestock feeds.

### **Suggested References**

- Parr, J. F. and S. B. Hornick. 1993. Utilization of municipal wastes. p. 545-559. In F. B. Metting (ed.). *Soil Microbial Ecology: Applications in Agricultural and Environmental Management*. Marcel Dekker, Inc. New York, N.Y., USA.
- Higa, T. and J. F. Parr. 1994. Beneficial and Effective Microorganisms for a Sustainable Agriculture and Environment. International Nature Farming Research Center, Atami, Japan. 16 p.
- Parr, J. F., S. B. Hornick and D. D. Kaufman. 1994. Use of Microbial Inoculants and Organic Fertilizers in Agricultural Production. Extension Bulletin No. 394. Food and Fertilizer Technology Center, Taipei, Taiwan. 16 p.