



Socioeconomic and Environmental Implications of Compost Making: A Case of Urban Gardening in Maryland

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A significant proportion of the solid waste generated at the household level consists of food waste and other organic products that can be composted. Composting is an aerobic conversion of degradable organic matter into organic and inorganic byproducts that can be used as beneficial soil amendments. It is considered a straightforward and cost-effective way of practicing a circular economy model of production that helps reduce bio-waste and promote effective management of resources for environmental conservation. Even though composting can be practiced at various levels and scales, in different sectors, and for different purposes, it can benefit small-scale farmers by reducing waste disposal, saving on fertilizer costs, and increasing productivity by improving soil fertility without any upfront investment. More importantly, composting is recognized as a significant climate change mitigation activity as it provides substantial benefits to the environment and habitats within the agroecosystem.

Considering the facts above, the University of Maryland Eastern Shore (UMES) Extension implemented an urban gardening project in Baltimore, Maryland, to promote local food production, preserve ethnic crop biodiversity, enhance household food security, and improve the knowledge and experience of small and minority farmers on agricultural sustainability and climate change issues. However, the benefits of these programs have not yet been assessed and documented. The objective of this study was to evaluate the environmental and socio-economic benefits of composting at the household level. The project recruited 100 urban gardeners through a snowball sampling procedure and encouraged them to engage in gardening by providing production inputs, such as cow manure, garden topsoil, and natural mulch, along with educational opportunities for building capacity in urban gardening. Of the total urban gardeners recruited by the project, 40 of them participated in the survey. Open- and closed-ended questionnaires were used to collect detailed information about the composting practices adopted by the urban gardeners. Data were collected through in-person and telephone interviews and verified through garden visits. The collected data were cleaned, coded, and processed using Microsoft Excel and SPSS software. Descriptive statistics were calculated to assess the benefits realized and knowledge gained by participants about composting. Moreover, Fisher's exact test was applied to examine the association between farmers' willingness to adopt composting and the realized benefits.

Of the total respondents ($n = 40$), 77.5% were engaged in backyard composting and used compost as a primary source of nutrients for vegetable gardening, followed by 60% who used garden soil, 57.5% who used

livestock manure, and 12.5% who used chemical fertilizers. Most respondents (77.5%) reported using modern compost bins for compost making, whereas the remaining (22.5%) used conventional (heap and peat) methods of composting. Most respondents (92.5%) reported that composting would reduce production costs by lowering their dependence on chemical fertilizers and minimizing waste disposal expenses. Additionally, 77.5% opined that composting would improve soil health by supplying essential nutrients for vegetable production. Furthermore, 95% of respondents reported that composting would enhance soil structure, organic matter, and nutrient recycling in the soil while reducing nutrient losses (Fig. 1).

A positive association (p -value=0.046) was found between the participants' willingness to adopt composting and their perception that composting would lower production costs. In contrast, farmers' perceptions of improved soil health, waste reduction, and increased nutrient recycling from compost application were not associated with their willingness to adopt composting practices (Table 1).

Before the project intervention, 26.7% of respondents reported being very familiar, and 10.0% indicated that they were extremely familiar with the economic and environmental benefits of composting. However, following the intervention, 50% of respondents said they were very familiar (a 23.3% increase), and 23.3% said they were extremely familiar (a 13.3% increase) with the process, use, and implications of composting (Figure 2).

The findings from the study suggest that farmers who recognized the cost-saving benefits of compost application might be more inclined to adopt composting practices. Moreover, the urban gardening project informed farmers about the economic and environmental benefits of composting, potentially improving their knowledge. This enhanced knowledge level among urban gardeners could play a crucial role in promoting the adoption of composting practices, enhancing household waste management, and supporting agricultural production. Outreach interventions like those adopted by the UMES Extension could enhance small and minority farmers' participation in urban gardening and composting while supporting broader community resilience and environmental sustainability goals.

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Table 1. The association between farmers’ perceived benefits of compost application and their willingness to adopt composting practices as revealed by field surveys conducted in 2023, Baltimore, MD, USA.

Realized benefits of composting	Willingness to adopt composting
	p-value
Lowered production cost	0.046*
Improved soil health	0.057
Waste reduction	0.545
Increased nutrient recycling	1.000

* p<0.05.

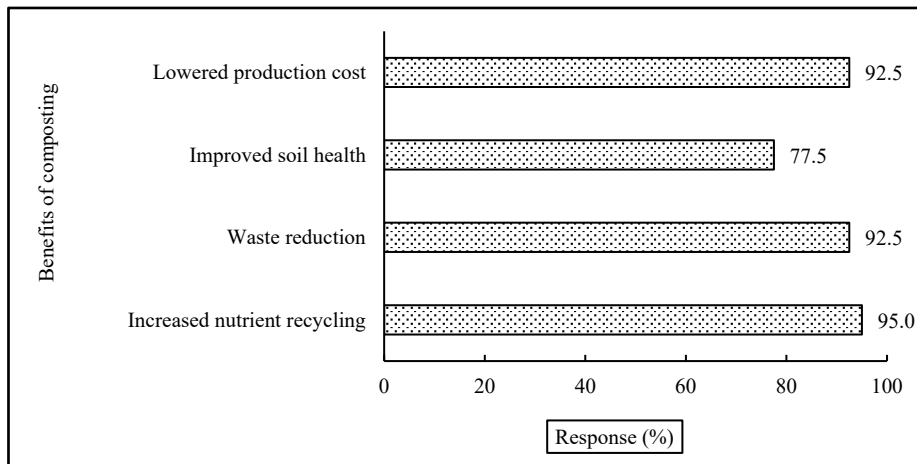


Figure 1. Benefits of composting as perceived by farmers (n = 40) in a survey conducted in 2023, Baltimore, MD, USA.

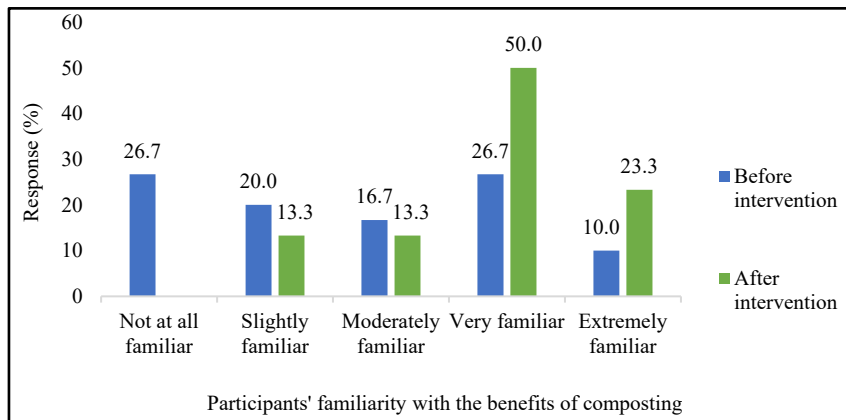


Figure 2. Impact of urban gardening project on participants’ familiarity of composting (n = 40) shown by a field survey conducted in 2023 in Baltimore, MD, USA

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