Soil Health and Compost Education for Elementary School Students

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1. Abstract

Food waste deposited in landfills has negative impacts on humans and the environment. These effects include carbon emissions, in the form of methane, and landfill leachate from decomposition of food waste, which both exacerbate climate change and reduce soil and water quality. In contrast, composting provides a method to manage food waste and recycle valuable nutrients to improve soil structure and fertility. This study focused on training elementary school students on food waste reduction, recycling, and diverting food waste from the school's cafeteria through composting. The aim of the study was to apply science education to teach environmental responsibility and resource conservation. Food waste from the school lunch was recycled through composting to provide soil nutrients and improve soil health, hence creating a balance in the food ecosystem. The students sorted their food waste, plastics and paper waste into separate bins. The food, plastics and paper waste was collected and weighed daily over a six-week summer camp. The food and paper waste was composted using two tumbling compost units to produce a soil amendment for use in the school garden. A compost thermometer was used daily to monitor the compost temperature. These activities provided hands-on training and experiential learning for the students. Results of a post-training assessment revealed that the students' understanding of composting and its relevance for soil health and ecosystems balance was much improved. These results illustrate the value of science education in elementary schools to solve environmental problems and encourage pro-environmental behavior.

2. Introduction

- Soil health is defined as the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. Healthy soil gives us clean air and water, bountiful crops and forests, productive grazing lands, diverse wildlife, and beautiful landscapes (NRCS, 2023).
- Compost improves agriculture systems' sustainability by recycling nutrients, improving production and soil health (Kelly et al., 2020).
- The use of food-based compost has the additional benefit of diverting organic waste from landfills and reducing greenhouse gas emissions (Kelly et al., 2022).
- Educational programs in schools geared toward food waste reduction and recycling could have a greater impact in fostering sustainability (Wilkie et al., 2015).

3. Objectives

- Determine how much food waste, plastics, and paper were diverted from the school's cafeteria at the end of the study.
- Assess students' understanding of composting and its relevance for soil health and nutrient recycling.

3. Methods

- The study was conducted over a 6-week summer camp at St. Patrick Interparish School, Gainesville, Florida.
- Students brought their lunch from home as meals were not provided.
- Food waste, plastics, and paper were collected, sorted and weighed with a precision scale.
- Data was recorded over six weeks.
- Food waste and paper generated from the summer camp lunch were composted in two UV-resistant black plastic tumbling composters with a capacity of 140 liters/37 gallons each.
- A thermometer was used daily to monitor microbial activity.
- Students were trained to participate in each task, including collecting/sorting/weighing the waste fractions and turning/monitoring the compost.
- Assessments of 40 students were conducted before and after the training.

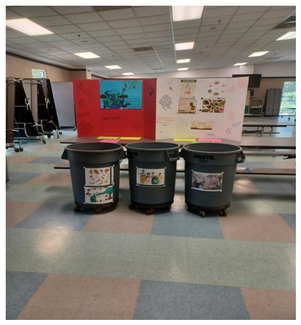

Fig. 1: Waste collection/sorting.

Fig. 2: Compost unit.

4. Results

Fig. 3: Students turning the composter.

Fig. 4: Students' comments after training.

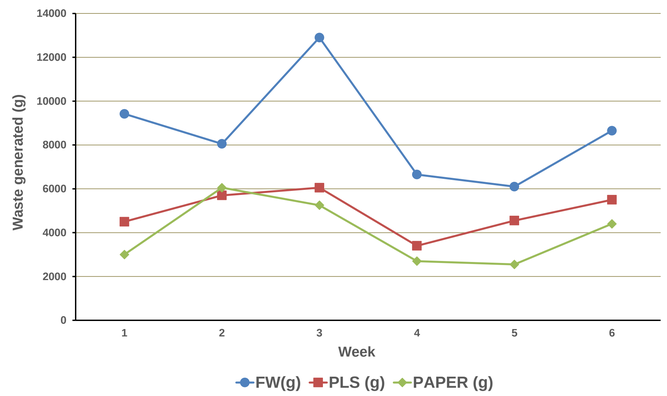

Fig. 5: Waste generated from the cafeteria (g/week).

Fig. 6: Students adding compost to soil.

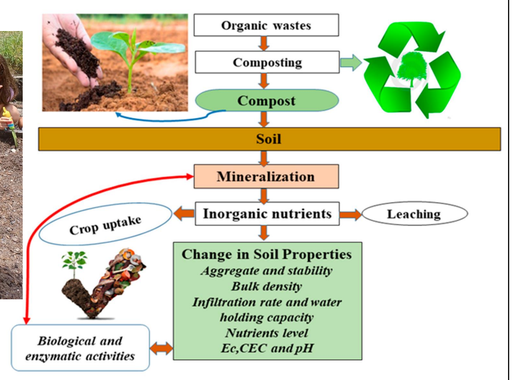

Fig. 7: Compost for soil health.

5. Conclusions

- Composting improves soil health by enriching soils with nutrients and organic matter, helping to retain moisture and prevent nutrient leaching.
- Hands-on training and experiential learning for elementary school students contributed to food waste reduction, increased environmental awareness, and behavioral change.
- Total food waste (52kg) generated was recycled through composting for use as a soil amendment in the school's garden.
- Students' understanding of the relevance of food waste composting for soil health improved.
- This study demonstrates how science education can enhance and foster pro-environmental behavior.

References

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Acknowledgements

This research was conducted in partial fulfillment of the requirements for a Master of Sustainable Development Practice (MDP) Degree, at the BioEnergy and Sustainable Technology Laboratory, Department of Soil, Water, and Ecosystem Sciences, UF/IFAS. The authors thank the students and staff of St. Patrick Interparish School, Gainesville, FL for their cooperation.