**TITLE**

**"Transforming Dry Leaves and Food Waste into Nutrient-Rich Compost fertilizer as a Sustainable Solution for Waste Management and Fertilizer Production”**

**1Dr. Tehseen Quds, 1Syed Awais Aftab, 1Dr. Erum Shah, 2Muhammad Naseer Khan, 1Uroob Usman, 1Khunsha Zia Ahmed, 1Saad Ali Rana, 1Rabbiya Khan, 1Usama Bin Irfan**

**1Dow College of Pharmacy, Dow University of Health Sciences**

**2Department of Applied Chemistry and Chemical Technology, University of Karachi**

**INTRODUCTION**

The proper management of organic waste, such as dry leaves and food waste play a crucial role in addressing the global waste problem and promoting sustainable practices. Dry leaves, which are abundant during the fall season, have immense potential for being transformed into nutrient-rich and eco-friendly compost fertilizer.

**1**

30% of food waste and 14% of yard waste is generated in Pakistan. So this is the need of time that proper leaves and food management should be done in such a way that they will convert into fruitful products as well as will be helpful to keep our city and country clean and green.

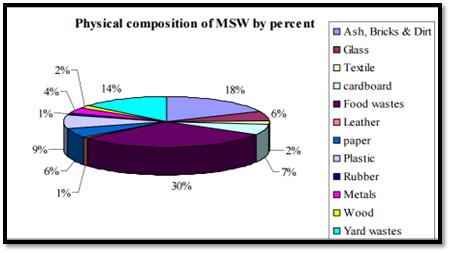
The current project encircles the importance of transforming dried leaves and food waste into compost fertilizer and its benefits as a sustainable waste management and fertilizer production solution.

**WHAT IS THE PROBLEM?**

The most critical issue in the world is waste management of excessive trash creation and inappropriate garbage disposal, which causes environmental, social, and economic issues. Waste accumulation is the buildup of waste products over time without proper disposal or management.

**2**

In Pakistan according to the report of International Trade Administration, Pakistan Country Commercial Guide, report on waste management in Pakistan described that food waste is the top waste generated in Pakistan. 30% of food waste and 14% of yard waste are produced1.



Pakistan: Physical Composition of Municipal Solid Waste by Percent

Source: United Nations Environment Program, report on waste management in Pakistan 

Ash, bricks, and dirt – 18%, Glass – 6%, Textile - 2%, Cardboard - 7%, Food wastes - 30%, Leather - 1%, Paper - 6%, Plastic - 9%, Rubber - 1%, Metal - 4%, Wood - 2%, Yard wastes - 14%.

Dry leaves waste and food waste are form of organic waste that provides special challenges if not properly managed. As deciduous trees shed their leaves in the autumn season, they produce a lot of dry leaves. The number of dried leaves may be large in many places, causing disposal problems.

The problem is not just related to waste-management of organic products but it also encompasses the production of nature-friendly bio-fertilizer. The use of chemical fertilizers comes up with a number of adverse effects such as decrease in mineral reserves of the soil, damage to the plants through chemical burning and acidification of the soil. In case if chemical fertilizer is mixed with the water resource (canals, rivers, seas etc.) it can cause algal growth and will decrease oxygen level in the water resulting in the loss of aquatic lives.

Therefore, it is necessary to implement significant strategies to utilize these dried leaves for manufacturing organic fertilizer to ensure proper waste-management of the organic wastes and formulation of a nature-friendly organic fertilizer.

**WHAT HAPPENS IF THIS PROBLEM IS NOT RESOLVED?**

1. Improper handling of dried leaves and food waste can contribute to a variety of problems. They can block drainage systems and cause flooding during rainstorms if they are left on roadways, sidewalks, or storm drains.

2) When dried leaves are burned in open places, harmful pollutants and particle matter are released into the air, contributing to air pollution and respiratory difficulties.

3) When dry leaf left over the surface or disposed of in landfills, they can block sunlight and air circulation, degrading soil quality and inhibiting plant development under the leaf layer.

4) Utilization of leaf compost may add up a number of benefits for our horticulture such as enhancing plants’ immunity, enhancing root growth, retaining moisture in the soil to maintain the temperature of the environment and minimizing the need of repeated watering and growth of soil-friendly microorganisms. By burning or discarding the organic waste, we are losing a chance to get benefit from the nutrient-rich waste products.

5) Karachi, which is Pakistan’s biggest city consumes three sanitary landfill sites for waste dumping while Lahore is utilizing two landfill sites. Lahore is the only city of Pakistan where proper solid waste management is done by outsourced Turkish companies while in Karachi no proper system of waste management is working. This issue will be resolved if we utilize or properly manage the waste otherwise the city condition will be worsted day by day as we have been observing.

**SOLUTION OF THIS PROBLEM**

Fertilizer is natural or artificial substance containing the chemical elements that improve growth and productiveness of plants. Fertilizers enhance the natural fertility of the soil or replace chemical elements taken from the soil by previous crops. This fertilizer helps plant because plants need nutrients to grow which they absorb from the soil via the plant’s root system. Fertilizers provide the major nutrients (nitrogen, phosphorus and potassium and important secondary elements) that plants need. Unless the nutrients are replenished, the soil’s productive capacity declines with every harvest.

**3**

The main solution of this problem is conversion of dry leaves and food waste into compost fertilizer. Dried leaves are high in organic content and they provide the essential constituents necessary for the development of a plant. When properly managed, they can be turned into compost, providing a valuable resource for enriching soil and promoting plant growth. Dried leaves and food waste may be properly recycled and composted and may provide numerous benefits such as minimizing the cost of watering by retaining moisture in the soil thereby reducing water bills, strengthening plants’ immunity thereby reducing the use of pesticides, encouraging the growth of soil friendly creatures such as earthworms, millipedes and ground beetles and supporting biodiversity. Moreover, the use of leaf compost on a garden or crop-fields may enhance their visual appearance and makes them vibrant and beautiful. Dry leaf composting, together with other organic waste materials (kitchen trash), reduces the quantity of garbage transported to landfills and provides nutrient-rich compost that may be utilized in gardening and landscaping.

**COST/ SCHEDULE**

**4**

**Minimum Budget**: For startup of this project on small scale approximately 15000/- Rs are required for buying containers and other necessary materials.

**EXECUTIVE SUMMARY**

16,500 tons of solid waste per day is generated in Karachi, 7, 690 tons per day in Lahore, 3973 tons per day in Hyderabad, 2048 tons per day in Peshawar. Overall Karachi is the most populated city of Pakistan and facing various problems in which proper waste management is the significant issue that has to be resolved to make this city Clean and Green. In all the waste generated food waste and yard waste are at the top and in this regard the current project will help not only properly manage the waste, reduction in landfill sites but also convert it into fruitful fertilizer.

**5**

**References:**

1. <https://www.trade.gov/country-commercial-guides/pakistan-waste-management>
2. Silva, C. H. C. D., Rocha, F. C., & Silva, L. L. G. G. D. (2018). Produção de composto orgânico com diferentes resíduos vegetais gerados no manejo de área verde urbana. *Revista Ciência Agronômica*, *49*(4), 558-565.