



Utilization of Various Types Soild Waste Material in the Agriculture Field for Increasing Productivity

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How to Cite this Article:

Satvica.V, , Jyothi.P, S., Nikitha.P, & Vamsi.V, V. (2026). Utilization of Various Types Soild Waste Material in the Agriculture Field for Increasing Productivity. International Journal of Creative and Open Research in Engineering and Management, <i>02</i>(04).
<https://doi.org/10.55041/ijcope.v2i4.043>

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<https://doi.org/10.55041/ijcope.v2i4.043>

ABSTRACT

The utilization of organic solid waste materials in agriculture is a sustainable practice that helps improve soil fertility, crop productivity, and environmental protection. Common organic wastes such as food waste, fruit waste, and flower waste are rich in essential nutrients and organic matter. When these wastes are properly segregated and composted, they can be effectively used as organic manure in agricultural fields. The application of composted food, fruit, and flower waste improves soil structure, increases water-holding capacity, and enhances microbial activity, which supports healthy plant growth.

The nutrient quality of waste-derived compost is evaluated using chemical tests such as nitrate, ammonia, and phosphate analysis. The nitrate test determines the availability of nitrogen required for vegetative growth, while the ammonia test indicates the presence of readily available nitrogen released during decomposition. The phosphate test measures the phosphorus content, which is essential for root development, flowering, and fruit formation. These tests help assess the effectiveness of solid waste compost in supplying nutrients to crops.

The use of food, fruit, and flower waste in agriculture reduces the dependence on chemical fertilizers and minimizes solid waste disposal problems. It also lowers environmental pollution and promotes recycling of biodegradable waste. Overall, the utilization of organic solid waste in agriculture supports sustainable farming practices, improves soil health, and increases long-term agricultural productivity.



Introduction:

Solid waste generation has increased significantly due to rapid urbanization, population growth, and changing consumption patterns, creating serious environmental challenges. A large portion of this waste consists of biodegradable materials such as food waste, fruit residues, and flower waste, which are often improperly disposed of, leading to soil and water pollution and greenhouse gas emissions like methane. However, these organic wastes are rich in essential nutrients and organic matter, making them valuable resources for agriculture. Through scientific processes like composting and vermicomposting, they can be converted into nutrient-rich fertilizers that improve soil health, enhance nutrient cycling, and support sustainable crop production.

The use of organic waste in agriculture offers an eco-friendly alternative to chemical fertilizers, helping to restore soil fertility and reduce environmental degradation. Processed organic wastes improve soil structure, increase water retention, and promote beneficial microbial activity. Additionally, their use reduces dependence on synthetic inputs, lowers farming costs, and supports sustainable and circular agricultural practices. Proper management and utilization of these wastes not only address waste disposal issues but also contribute to improved agricultural productivity and long-term environmental sustainability.

LITERATURE_REVIEW:

Kaur (2020) investigated the utilization of fruit waste and petal residues as organic amendments in agricultural soils. The study reported that fruit waste is rich in biodegradable organic matter, sugars, and essential nutrients, which upon decomposition improve soil nutrient availability and microbial diversity. Petal waste, particularly from temple and floral industries, contains bioactive compounds and micronutrients that contribute to soil enrichment. The combined application of fruit and petal waste enhances soil organic carbon content, improves soil texture, and promotes plant growth. The study concluded that recycling such biodegradable wastes into compost not only reduces environmental burden but also supports sustainable agriculture by increasing crop productivity and soil fertility.

Shah (2020) focused on the application of flower waste in agriculture and its potential as an eco-friendly soil amendment. Flower waste, generated in large quantities from religious and commercial activities, contains valuable nutrients and organic compounds. The study demonstrated that composted flower waste significantly improves soil physicochemical properties, including pH balance, nutrient content, and moisture retention. Additionally, it enhances microbial activity and supports plant growth by providing essential nutrients in a slow-release form. The use of flower waste compost was found to increase crop yield while reducing dependency on synthetic fertilizers, thereby contributing to sustainable agricultural practices and effective solid waste management.

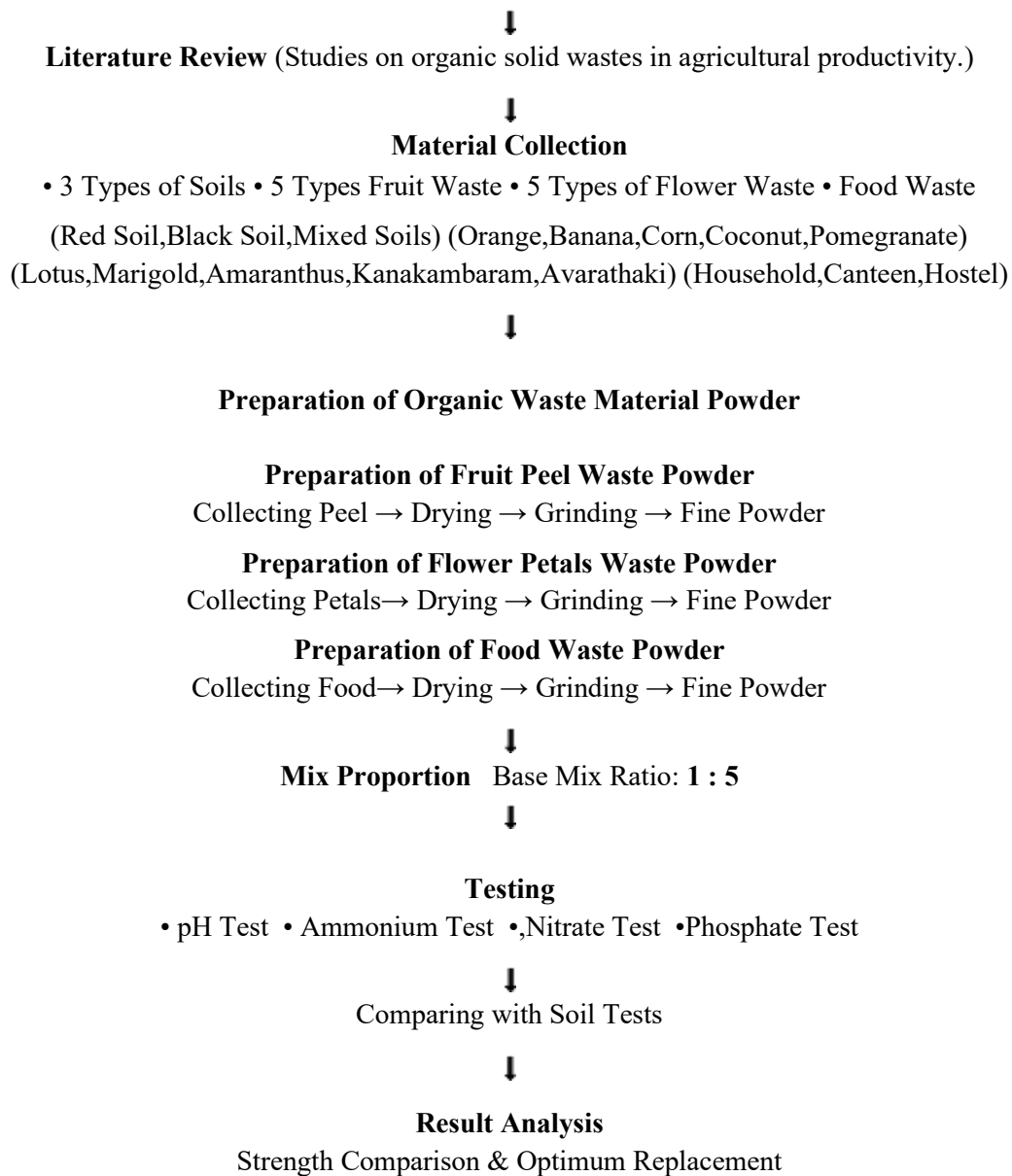
Kumar et al. (2020) emphasized the significant role of vermicompost derived from organic solid wastes in enhancing soil fertility and agricultural productivity. Their study highlighted that vermicompost, produced through the biodegradation of organic waste by earthworms, is rich in essential nutrients such as nitrogen, phosphorus, potassium, micronutrients, and growth-promoting substances. The application of vermicompost improves soil structure, increases water-holding capacity, and enhances microbial activity, thereby leading to better seed germination, plant growth, and crop yield. Furthermore, vermicompost acts as a sustainable alternative to chemical fertilizers, reducing environmental pollution while maintaining long-term soil health and productivity.

MATERIALS USED:

- Different types of soils
- Fruit Peel Waste
- Flower Petals Waste
- Food Waste



METHODOLOGY:



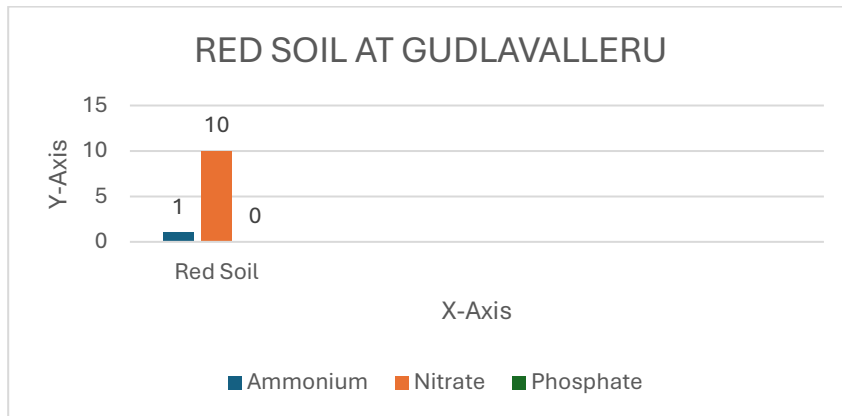
TESTS CONDUCTED :

1. pH TEST
2. AMMONIUM TEST
3. NITRATE TEST
4. PHOSPHATE TEST

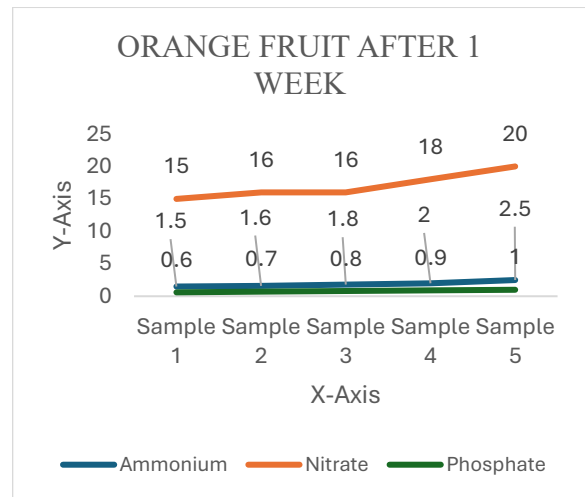
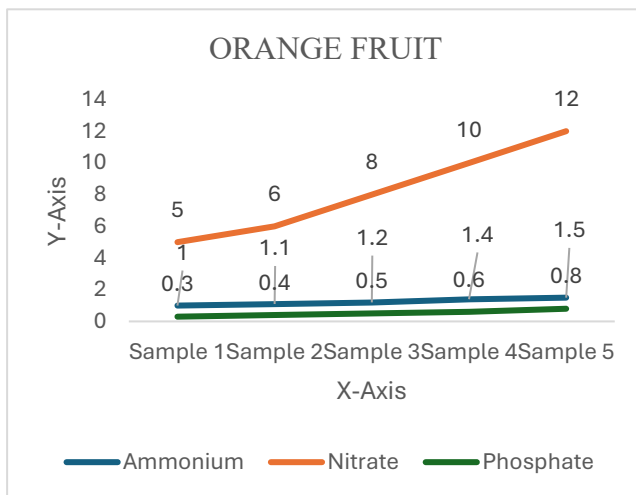


TEST RESULTS:

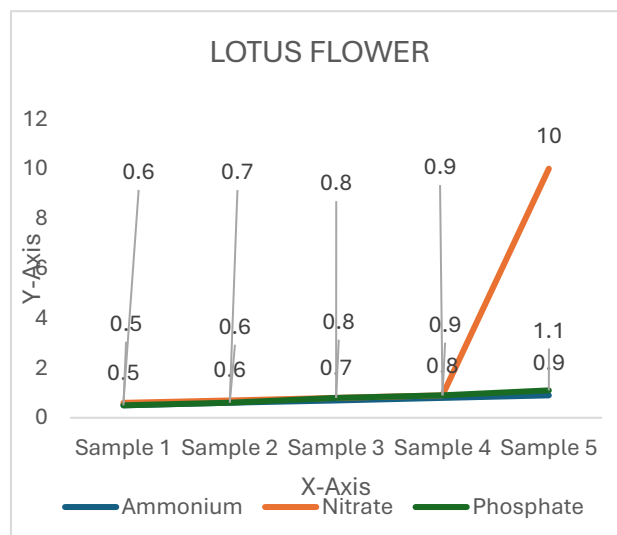
Red Soil (Ammonium, Nitrate, Phosphate Test)

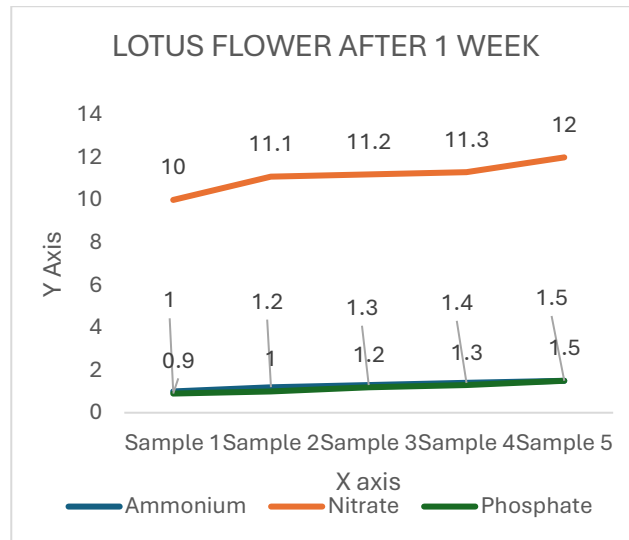


Orange Peel Powder:(Ammonium, Nitrate, Phosphate Test)

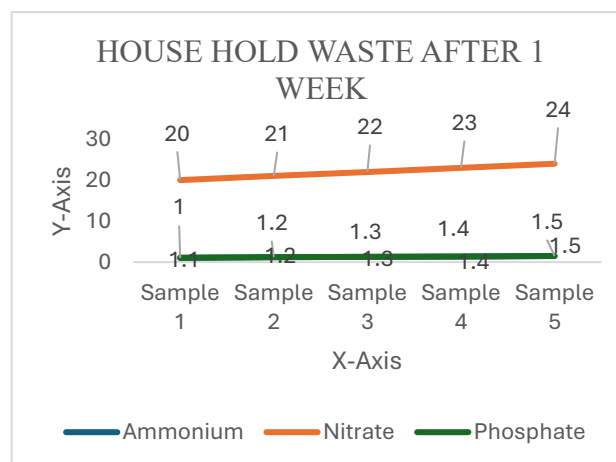
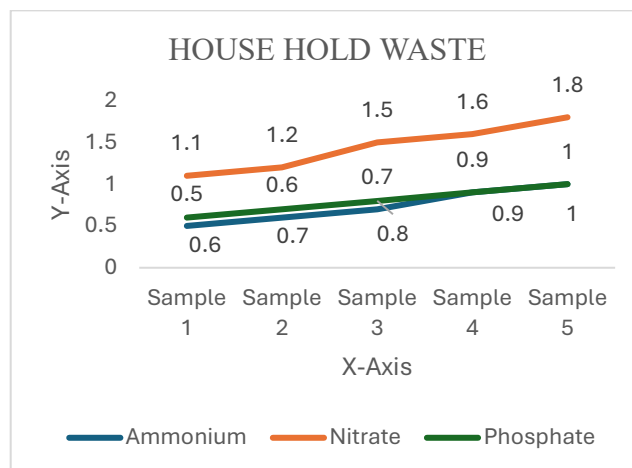


Lotus Petal Powder:(Ammonium, Nitrate, Phosphate Test)





Food Waste Powder:(Ammonium, Nitrate, Phosphate Test)





CONCLUSION:

- The study confirms that food waste, fruit waste, and flower waste can be effectively converted into useful organic fertilizers through natural processes such as composting, decomposition, and vermicomposting.
- Organic waste materials significantly increase essential nutrients like nitrogen, phosphorus, potassium, and micronutrients, thereby improving soil fertility and supporting plant growth.
- The application of organic waste enhances soil physical properties by improving structure, increasing porosity, reducing compaction, and increasing water-holding capacity.
- Decomposition of organic waste promotes the growth of beneficial microorganisms such as bacteria and fungi, which play a vital role in nutrient cycling and soil health.
- The kinetic study shows that nutrient release from organic waste is gradual and time-dependent, acting as a slow-release fertilizer that ensures continuous nutrient supply.
- All soil types, including red soil, black soil, and mixed soil, show improvement after the addition of organic waste, with mixed soil exhibiting the highest productivity and nutrient availability.
- Organic waste utilization reduces environmental pollution, decreases greenhouse gas emissions, lowers dependency on chemical fertilizers, and provides a cost-effective solution for farmers.
- The overall findings support sustainable agriculture by promoting eco-friendly farming practices, improving long-term soil health, and encouraging the reuse of waste materials as valuable resources.

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