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# Analysis of agricultural waste

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**Annotation:** This study includes an analysis of the available scientific output on agricultural wastes to date. The database contains many articles from Scopus, which were analyzed bibliometrically. This method focuses on the identification, evolution, approaches and trends in the application and processing of agricultural waste. In this article, proposals were made for the processing of agricultural waste, which is currently the main problem of world ecology and bioeconomy, and has not lost its relevance over the years. The main goal is to dispose of waste heaps in an environmentally friendly and non-wasteful manner.
**Keywords:** processing, waste, ecology, greenhouse gases, farm, plant residues, cellulose, biomass.

Agricultural waste refers to a wide range of organic and inorganic materials discarded after agricultural processes such as crop or animal husbandry. Think of plant residues (stalks, rice straw, leaves or husks), animal manure, waste feed, agricultural chemicals and all the packaging used in the production and supply chain.

Agricultural waste is a double-edged sword, given the diversity of these materials and the large quantities produced each year. If managed properly, it has enormous potential as it is biodegradable and rich in nutrients. Thus, it can become a valuable resource by composting, turning it into biofuel or biogas. [1]

On the other hand, the effects of agricultural waste can affect the quality of life and destroy ecosystems. Mishandling of agricultural products can lead to water pollution, reduced soil fertility, climate impacts and loss of valuable organic matter. In addition, it can significantly affect human health.

Thus, farms must implement cost-effective agricultural waste management systems to address food production challenges. The world's population is growing, they demand food security and increased agricultural production. Farming activities continue to generate large amounts of waste that should not end up in landfills. Farmers must learn to recognize the potential of agricultural waste and adopt environmentally sound strategies for a resource-efficient world.

## Types of agricultural waste

- Crop residues: stalks, leaves, husks and straw left after harvesting wheat, rice, maize, sugarcane, etc.
- Animal manure: feces, urine and bedding material
- Agrochemical containers of pesticides, herbicides and fertilizers
- Residual feed: grain, fodder and other feed materials
- Harvesting and processing waste: fruit peels, vegetable trimmings, damaged or rejected products, and food processing by-products
- Packaging materials: plastic bags, cardboard boxes and containers
- Green waste: clippings, clippings, plant debris, leaves, twigs and grass clippings [2]

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What is Agricultural Waste Management?

Agricultural waste management refers to the coordination, processing and control of all wastes generated by agricultural activities. The main goal is to prevent soil and water pollution, greenhouse gas emissions, and risks to human and animal health.

An effective agricultural waste management system focuses on one or all of the following methods:

- ✓ Reduce waste
- ✓ Recycling
- ✓ Reuse

These methods convert waste into valuable resources such as organic fertilizers or green energy such as biogas. This is a win-win for the environment, agricultural organizations, and the people they serve.[3]

Agricultural Waste Regulations

In general, agricultural waste regulations aim to balance economic development, agricultural efficiency, and environmental protection. International organizations such as the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) are crucial in promoting sustainable agricultural waste management practices globally. Additionally, international agreements such as the Paris Agreement on climate change emphasize the importance of reducing agricultural emissions.[4]

**Analysis and results:**

The composition of waste varies by income level, reflecting different forms of consumption. High-income countries produce relatively less food and green waste, which accounts for 32 percent of total waste, and more dry waste that can be recycled, such as plastic, paper, cardboard, metal, and glass, which accounts for 51 percent of waste. creates.

Middle- and low-income countries produce 53 and 57 percent of food and green waste, respectively, with the share of organic waste increasing as the level of economic development declines. In low-income countries, recyclable materials make up only 20 percent of the waste stream. There is not much variation in waste flows across regions, except those related to income. All regions except Europe, Central Asia, and North America, which produce the highest percentages of solid waste, produce an average of 50 percent or more organic waste (Figure 1). It is often mistakenly believed that technology will solve the problem of unmanageable and growing waste. good idea. Technology is not a panacea and is usually the only factor to consider in solid waste management. Countries that advance open dumping and other simple waste management practices are more likely to succeed in choosing locally appropriate solutions. Globally, most waste is currently landfilled or disposed of. About 37 percent of waste is disposed of in landfills of one kind or another, and 8 percent in sanitary landfills with landfill gas collection systems. [5]

31% of waste is open waste, 19% is recovered through recycling and composting, and 11% is incinerated for final disposal. Appropriate waste disposal or treatment, such as controlled landfills or more strictly controlled facilities, is almost exclusively the preserve of high- and middle-income countries.

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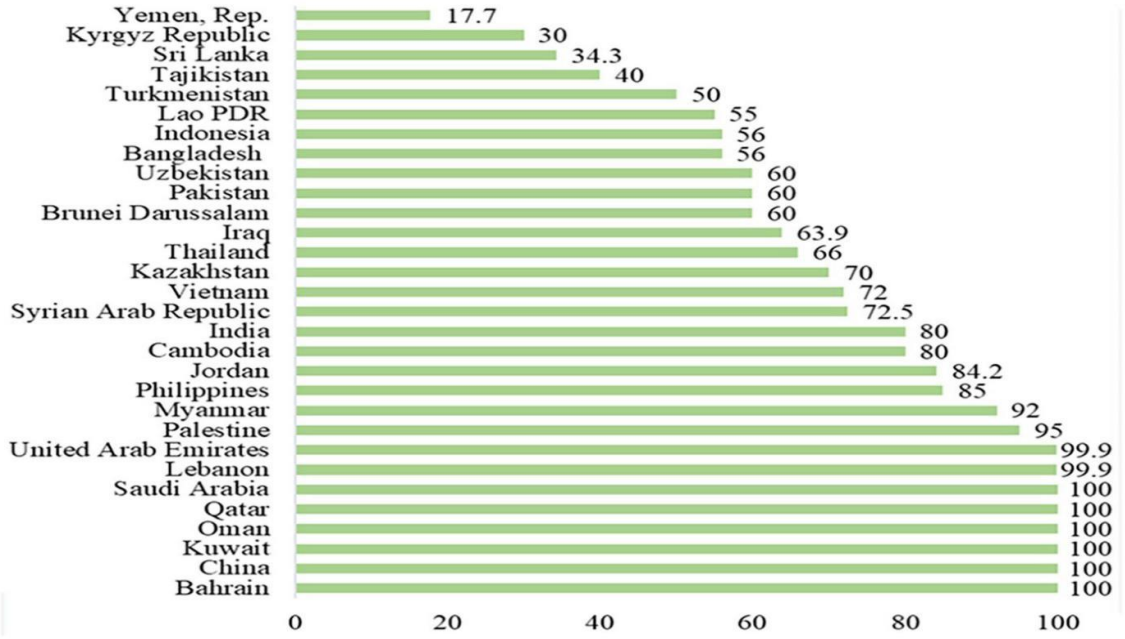


**Figure 1. Waste collection rate (%) in Asian cities ( Agamuthu et al., 2020 ; Modak et al., 2017 ; UNEP, 2019 ).[6]**

Low-income countries generally rely on open dumping; 93% of waste is generated in low-income countries and only 2% in high-income countries. Three regions openly dump more than half of their waste - the Middle East and North Africa, sub-Saharan Africa and South Asia. Middle-income countries have the largest share of landfills at 54 percent. In high-income countries, this figure drops to 39 percent, with 36 percent of waste going to recycling and composting, and 22 percent to incineration. Combustion is mainly used in high-power, high-income and land-limited countries. [7]

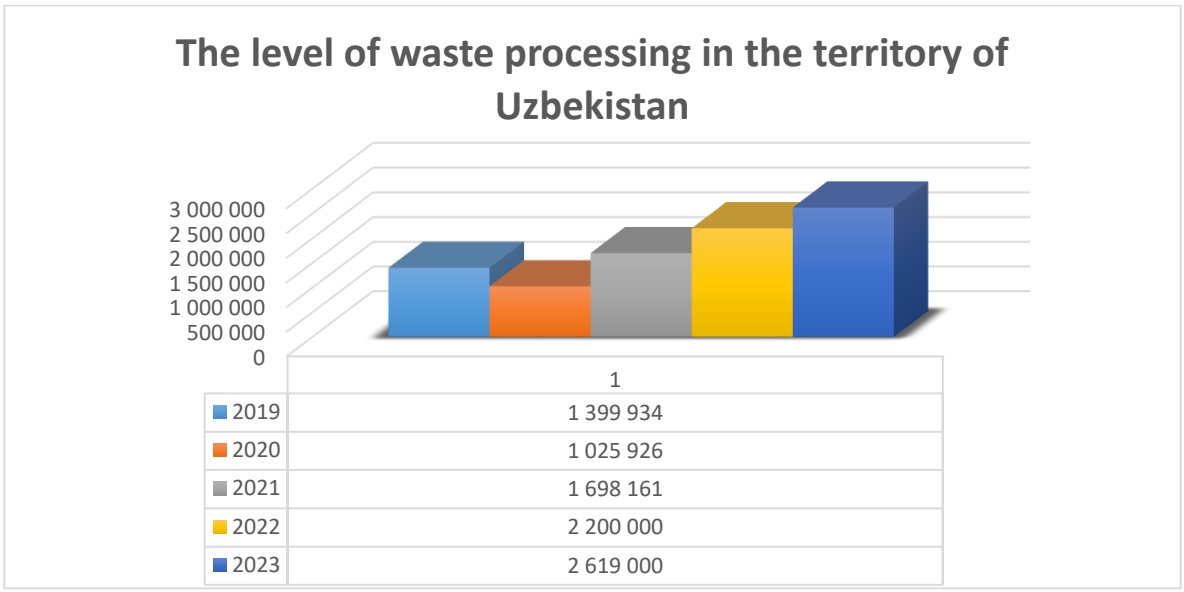


**Figure 2. Indicator of waste processing in Uzbekistan (in tons).**

Uzbekistan produces 35 million cubic meters of household waste every year. This is about 254 thousand wagons. 165 kg per year for every citizen of Uzbekistan. emits household waste. On average, 25% of garbage cans are food waste, 5-10% - paper, 50% - polymers, the rest - metal, textiles, rubber, glass, etc.

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You can get acquainted with the national level of waste processing in the territory of our republic in Figure 2. This indicator increased by 87.1% in 2023 compared to the corresponding period of 2019.

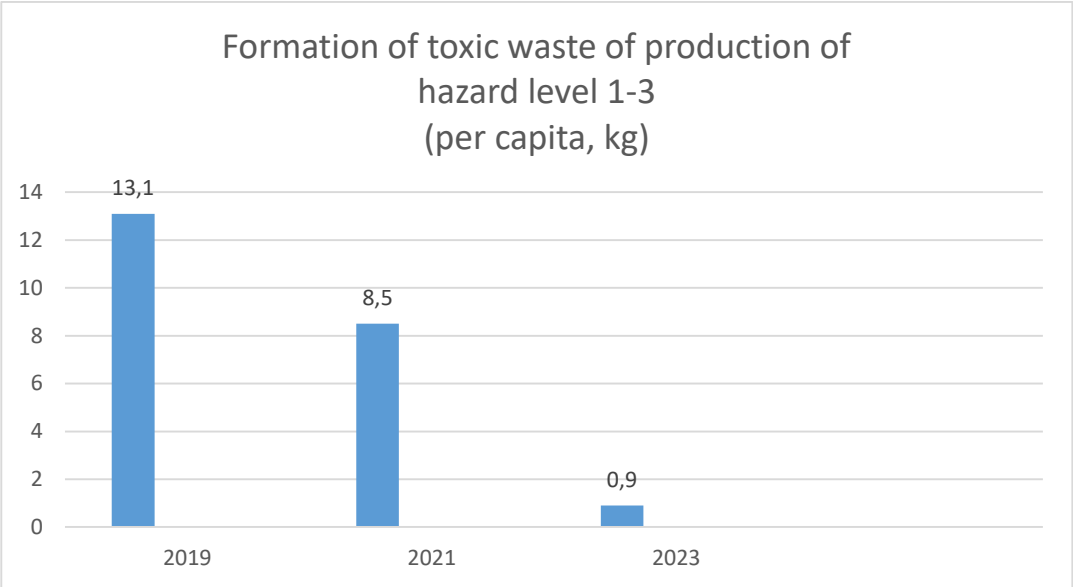


**Figure 3. The generation of toxic wastes of production of hazard level 1-3 class during the years.**

In 2017-2020, the level of danger per capita of the production of toxic waste of class 1-3 increased from 0.7% to 10.6%. Instead, during these years, the rate of recycling of solid household waste increased from 9% to 21.9%. The indicator of the formation of this type of toxic waste per capita in 2019-2023 was analyzed. This indicator was 13.1 kg per person in 2019, and by 2023 this indicator decreased by 0.9 kg. Compared to the corresponding period of this year, it decreased by 93.1%. (Figure 3).

Solid waste management systems are not adequately equipped to meet current demand. Outside of Tashkent, only simple waste management systems operate, the collected garbage is simply dumped in an open landfill outside the village.

*The Institute of Forecasting and Macroeconomic Research estimated the volume of greenhouse gases released into the atmosphere in the agricultural sector of Uzbekistan in 2020:*

*In 2020, the total amount of greenhouse gases released into the atmosphere in agriculture was 36.1 million tons of CO2 equivalent. Compared to the last official assessment in 2017, greenhouse gas emissions from agriculture increased by 7.2%. This indicator is 1.5% lower than the official forecast in the first two-year report presented on updated data of the Republic of Uzbekistan. In the future, if agricultural production methods remain the same, the amount of greenhouse gases released into the atmosphere by the network is expected to increase by 27.7% by 2030, and by 83.2% by 2050. In order to estimate the amount of greenhouse gases released into the atmosphere in agriculture, the methodology of the Intergovernmental Panel on Climate Change. Its National Greenhouse Gas Inventory Cadastre Management Rules" was used. The strategy for the development of agriculture of the Republic of Uzbekistan in 2020-2030 is reflected in reducing the amount of greenhouse gases released into the atmosphere by 50% by 2030.*

**Conclusions and recommendations:**

In order to increase the capacity and potential of processing agricultural waste of our country, several effective methods are recommended by the authors, inspired by the world experience.

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Processing of packaging materials

Agriculture uses a variety of materials to facilitate planting, harvesting, and transportation of crops, including plastic containers, bags, and packaging. Although these materials are necessary to ensure efficient and hygienic practices in agriculture, their widespread use increases the environmental impact of agricultural waste.

Proper recycling involves the collection, sorting and processing of plastic materials, turning them into raw materials for new products or production. An agricultural organization that participates in recycling programs contributes to a circular economy, reducing the demand for new raw materials and conserving natural resources.

Reducing contaminants to improve food safety

Improper disposal or improper treatment of agricultural waste can contaminate soil, water sources, and food crops with pesticides, herbicides, heavy metals, pathogens, and chemical residues.

As these contaminants accumulate in the food chain, they pose a health risk to consumers and livestock.

Pollutant reduction begins with integrated pest management (IPM) techniques that encourage the use of natural predators and crop rotation to control pests and diseases, reducing the need for pesticides.

In addition, farmers must monitor the quality and safety of agricultural waste to ensure that the products produced meet safety standards.

Reducing emissions to the environment

Agricultural waste, especially manure, releases large amounts of methane and nitrogen oxides during decomposition and fermentation. In addition, improper waste disposal can lead to water and air pollution.

This is another issue that anaerobic digestion and composting can help with. Implementing best management practices is another key approach to reducing emissions to the environment. This includes methods of waste storage, recycling and application to reduce the release of pollutants into the environment.

**Advantages of efficient agricultural waste management**

By reducing the release of harmful substances such as pesticides, herbicides and animal manure, farmers reduce the risk of polluting natural resources and maintain ecosystem health.

Recycling organic waste through composting or anaerobic digestion produces nutrient-rich fertilizers, protects water quality, and supports sustainable food production at scale.

By using waste for bioenergy or compost, farmers can make more money and save on waste disposal costs by improving soil health and productivity.

Proper waste treatment improves food safety by reducing exposure to harmful chemicals and pathogens.

Treating waste as a resource contributes to more sustainable and sustainable agriculture, long-term economic growth and environmental protection.

HomeBiogas systems provide convenient and affordable solutions for turning waste into valuable resources. These systems use anaerobic digestion, a natural biological process that breaks down organic matter without oxygen to produce biogas and nutrient-rich liquid fertilizer.

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By using HomeBiogas solutions, farmers can use agricultural waste to fuel clean and sustainable production cycles. Biogas is a renewable source of energy for cooking and heating, reducing reliance on traditional fossil fuels and contributing to a greener environment. This cleaner production reduces waste and reduces the overall carbon footprint associated with traditional waste disposal methods. [9]

As the issue of food safety becomes a pressing issue, HomeBiogas solutions provide a dual benefit. Nutrient-rich liquid fertilizer (digest) is a valuable resource for soil enrichment, crop yield, and agricultural productivity.

It is a cost-effective way to close the nutrient chain while reducing dependence on external sources, ultimately contributing to food security and sustainable development. Strengthening national capacity to manage e-waste.

Indicators of agricultural waste in Uzbekistan and issues of their management are important. Here are some key metrics and data:

1. Plant waste:

- Wastes generated in the process of growing plants, such as cotton residues, vegetable and fruit residues. These wastes are estimated in millions of tons annually.

- Residues are often used as compost or used in biogas production.

2. Animal waste:

- Waste collected during animal husbandry (for example, manure) is used as organic fertilizer in agriculture.

- Millions of tons of manure are produced annually.

3. Chemical waste:

- Waste from pesticides, fertilizers and other chemicals. Issues of their safe disposal and environmental protection are urgent.

4. Water resources:

- Water pollution can be caused by chemicals used in agriculture. This issue is important in the conservation and treatment of water sources.

5. Recycling and disposal:

- Various agricultural waste recycling programs are underway, such as composting of organic waste and biogas production.

There are projects and programs being implemented in Uzbekistan for the management of agricultural waste and their effective use. This helps in reducing waste and ensuring environmental sustainability.

**References**

1. https://unfccc.int/sites/default/files/resource/FBURUzru.pdf
2. https://bellona.ru/2021/10/01/zamykaya-krug/
3. https://assets.kept.ru/upload/pdf/2023/12/ru-kept-review-global-circular-economy-trends.pdf
4. https://1economic.ru/lib/111233
5. https://issek.hse.ru/trendletter/news/187434013.html?ysclid=lw8vlbbb

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6. https://www.researchgate.net/publication/366476913_ Agricultural_circular_economy_model_in_the
7. https://translated.turbopages.org/proxy_u/en-ru.ru.a5e46154-6645b121- 2e7a62c04722d776562 /https/www.frontiersin.org/articles/10.3389/fsufs.2023.1170380/full
8. https://journals.sagepub.com/doi/10.1177/0734242X231199938
9. https://www.homebiogas.com/?srsltid=AfmBOor83IokO5Vg3Dnj5g_
10. Saribayevich , X. F., Sariyevich, X. X., Davlatov, S., Turobova, H., & Ruziyev, S. (2024). Analysis of Factors Affecting CO2 Emissions: In the Case of Uzbekistan. International Journal of Energy Economics and Policy, 14(4), 207–215. https://doi.org/10.32479/ijeep.16193.
11. Turobova, H. (2022). БИОЭКОНОМИКА: ВОЗМОЖНОСТИ РАЦИОНАЛЬНОГО ИСПОЛЬЗОВАНИЯ СЕЛЬСКОХОЗЯЙСТВЕННЫХ ПЛОЩАДЕЙ БУХАРСКОЙ ОБЛАСТИ. ЦЕНТР НАУЧНЫХ ПУБЛИКАЦИЙ (buxdu.Uz), 8(8). извлечено от http://journal.buxdu.uz/index.php/journals_buxdu/article/view/4689.
12. Rustamovna, Turobova Hulkar, and Narzullayeva Gulchehra Salimovna. "Possibilities Of Bio Economic Development In Uzbekistan." European Multidisciplinary Journal Of Modern Science 4 (2022): 860-866.