

THE PROBLEMS OF AGRICULTURAL WASTE IN UZBEKISTAN AND WAYS TO ADDRESS THEM

<https://doi.org/10.70728/conf.v2.i03.024>

*Zulфина Nazirova¹⁵,
a graduate student of Bioeconomics, Bukhara State University
E-mail address: nzulfina@bk.ru*

Abstract: This article explores the issue of agricultural waste in Uzbekistan, a country with a significant agricultural sector. The study investigates the types and quantities of agricultural waste generated in the country and the current practices for managing this waste. The article highlights the environmental and economic impacts of improper disposal of agricultural waste, including soil degradation and loss of valuable resources. Agricultural waste is an issue that requires a multifaceted approach involving technological, legal, and financial elements. The necessity of encouraging collaboration between companies that produce organic fertilizers, organic goods, and organic product sellers is discussed in the article. It is suggested to modify the current manure processing equipment in several ways to produce biologically active organic fertilizers. The study also examines the potential opportunities for utilizing agricultural waste as a renewable energy source and for producing organic fertilizers. The article concludes with recommendations for improving agricultural waste management in Uzbekistan through better regulation, education, and investment in sustainable waste management practices.

Key words: agricultural waste, waste management strategies, organic products, livestock farming, crop residues.

Introduction

Agriculture can be identified as “the science, art, or practice of cultivating the soil, producing crops, and raising livestock and in varying degrees the preparation and marketing of the resulting products” (Merriam-Webster Dictionary, 2020). Lands used for agricultural production occupy 45% of the territory of the Uzbekistan, about 50% of the population live in rural areas. Together with eater and forestry, the industry provides employment to 18% of GDP contributing to the country's overall growth. Export of agricultural products bring the Republic of Uzbekistan about 20-25% of total export revenues (Ministry of Agriculture, 2020). However, this sector also generates a substantial amount of waste, which poses a significant challenge for the environment and the economy. The improper management of agricultural waste can lead to soil and water

¹⁵ Bukhara State University, 200117, Uzbekistan, Bukhara, M. Ikbol Street, Building 11,

pollution, greenhouse gas emissions, and health hazards for humans and animals. Therefore, it is essential to address this issue through sustainable waste management practices that can benefit both the environment and the economy. This article examines the problem of agricultural waste in Uzbekistan, its types and quantities, current management practices, and potential solutions to mitigate its impact. By promoting sustainable agricultural practices and adopting innovative waste management strategies, Uzbekistan can reduce its environmental footprint while supporting the growth of its economy.

Literature review

Agricultural waste management has been a subject of increasing concern due to its significant environmental and economic implications. Various studies have delved into the impact of agricultural waste on soil and water quality, emphasizing the need for sustainable waste management practices to mitigate these effects. In the work of Ogden and Mauney, the potential of converting agricultural waste into biogas through anaerobic digestion was highlighted as a viable solution for both waste reduction and renewable energy generation. This method not only addresses waste management but also contributes to sustainable energy practices.

Furthermore, Smith et al. analyzed the economic benefits of circular economy principles in agricultural waste management, demonstrating the potential for cost savings and revenue generation by reusing agricultural byproducts in the production of fertilizers and animal feed. This approach not only reduces waste but also creates economic opportunities for stakeholders in the agricultural sector.

In a different context, Ramírez and Patel explored the role of policy interventions in promoting sustainable agricultural waste management. Their work underscored the importance of government support and regulatory measures to incentivize the adoption of innovative waste management technologies among farmers and agribusinesses. This indicates the significance of collaborative efforts between government agencies, agricultural businesses, and research institutions to develop effective policies and technologies for addressing agricultural waste.

These findings collectively emphasize the multifaceted nature of agricultural waste management and the need for holistic approaches that consider environmental, economic, and regulatory aspects. By synthesizing and analyzing the existing body of literature, this review aims to provide a comprehensive understanding of the current state of agricultural waste management and identify potential avenues for further research and practical implementation. Furthermore, the utilization of agricultural waste as a substitute for traditional products or as a feedstock in the production process offers promising opportunities, which can pave the way for sustainable and innovative practices in agricultural waste management.

Research methodology

During the preparation of the article, mainly data such as land area, agricultural sector and agricultural waste amounts of Uzbekistan in 2017-2019 were analyzed. Based on this information, all problems related to agricultural waste were studied and innovative models of their elimination were developed.

Analyses and results

Agricultural waste can be defined as any byproduct or residue generated during agricultural production, processing, and distribution activities. This waste can include plant and animal matter, packaging materials, chemicals, and other substances that are no longer needed or useful in the agricultural process. Agricultural waste can be further classified into different categories based on its source, composition, and potential for reuse or disposal.

Agricultural waste are plant [residues](#) from [agriculture](#). These waste streams originate from [arable land](#) and [horticulture](#). Agricultural waste are all parts of [crops](#) that are not used for human or animal food. [Crop residues](#) consist mainly of [stems](#), [branches](#) (in [pruning](#)), and leaves. It is estimated that, on average, 80% of the plant of such crops consists of agricultural waste.¹⁶

The four most commonly grown agricultural crops worldwide are sugarcane, maize, cereals and rice. The total weight of all these crops is more than 16,500 billion kilograms per year. Since 80% of this consists of agricultural waste, many tens of thousands of billions of kilograms of agricultural waste remain worldwide. About 700 million tonnes of agricultural waste is produced annually by the EU.¹⁷

- Agricultural waste accounts for approximately 30% of the world's total waste;
- In 2017, the world produced an estimated 2.01 billion tons of agricultural waste, with Asia producing the largest share (over 50%);
- Crop residues (including straw, stalks, and husks) make up the largest share of agricultural waste, followed by animal manure and food processing waste;
- Approximately one-third of all food produced in the world for human consumption is lost or wasted each year, which amounts to about 1.3 billion tons of food;
- In terms of greenhouse gas emissions, food waste is responsible for about 8% of global emissions;
- The United Nations estimates that food waste costs the global economy around \$1 trillion annually;

¹⁶ Mohite, Jagtap, Avhad, More (September 2022). ["Recycling of major agriculture crop residues and its application in polymer industry: A Review in the context of waste to energy nexus"](#). *Energy Nexus*. 7:

¹⁷ ["PaperWise – wise with waste"](#). Retrieved 10 November 2022.

- In developing countries, most food waste occurs during production and post-harvest handling, while in developed countries, most food waste occurs at the retail and consumer levels;
- Livestock production generates significant amounts of waste, including manure and other organic matter. Livestock waste accounts for around 14.5% of global greenhouse gas emissions;
- The use of pesticides and fertilizers in agriculture can also contribute to environmental pollution and waste. For example, excess fertilizer runoff can cause eutrophication of water bodies, leading to algal blooms and fish kills (The Food and Agriculture Organization (FAO), 2018).

Over 40% of waste worldwide ends up in landfills, with the remaining 19% either recycled or composted. 11% of people are thought to undergo contemporary thermal treatment. Nonetheless, about 33% of waste is still disposed of in an open manner, particularly in low-income nations where 93% of people dispose of and burn their rubbish. Trash is thrown into roads, rivers, and open spaces. In contrast, just 2% of rubbish is thrown in the open in high-income nations. Creating an engineered or sanitary landfill is the first step in managing garbage sustainably after open dumping. In middle-income countries, over 54% of garbage is disposed of in proper landfills, while in low-income countries, the percentage is 3%. Conversely, high-income nations give materials recovery through composting and recycling more thought. In this income bracket, landfill disposal accounts for 39% of trash disposal, recycling for 29%, thermal treatment for 22%, composting for 6%, and open dumping for 2%¹⁸.

There are several types of agricultural waste over the world.

Table 1

Types of agricultural waste

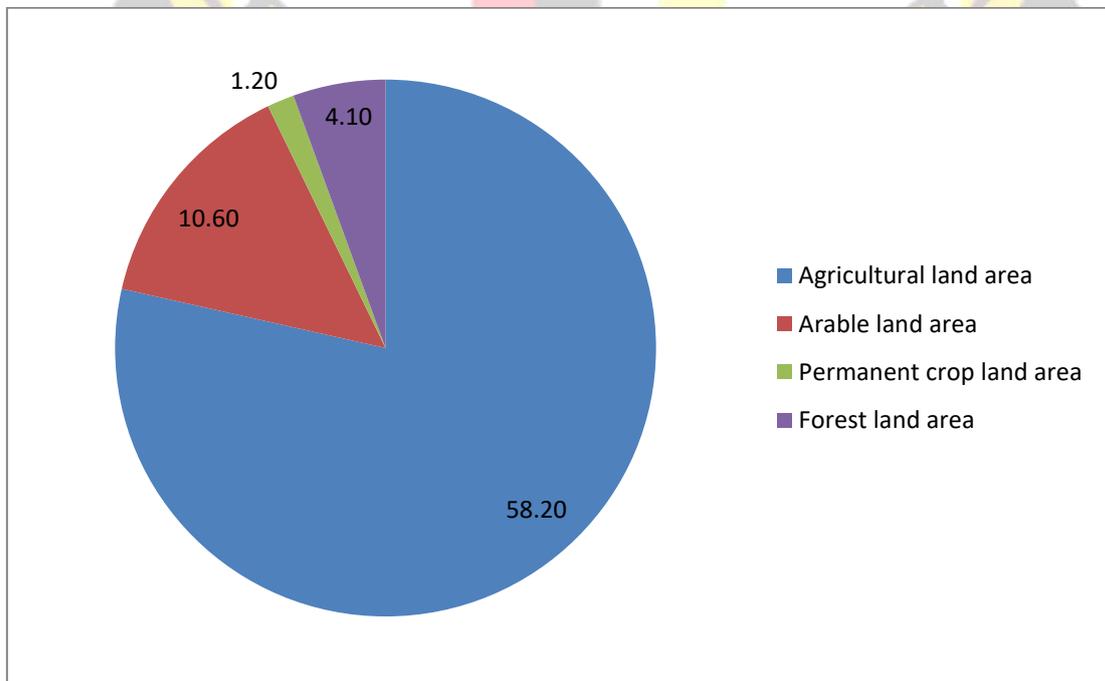
Naming	Definition
Crop residues	the parts of crops that are left over after harvesting, such as stems, leaves, and husks
Animal waste	manure, urine, and other byproducts from livestock farming
Food waste	food that is discarded during production, processing, distribution, and consumption
Packaging waste	materials used to package and transport agricultural products, such as plastic bags, boxes, and containers

¹⁸ Asian Development Bank, Waste to Energy in the Age of the Circular Economy Best Practice Handbook, November 2020

Naming	Definition
Agrochemical waste	pesticides, herbicides, and fertilizers that are used in agriculture and can have negative environmental impacts if not properly disposed of
Wood waste	wood chips, sawdust, and other byproducts from forestry operations
Energy crops	crops grown specifically for energy production, such as corn for ethanol or switchgrass for biofuels
Aquaculture waste	waste from fish farming operations, such as uneaten feed and fish feces
Processing waste	waste generated during the processing of agricultural products, such as fruit peels and pulp from juice production
Green waste	yard waste and other organic matter that can be composted or used for energy production

The table was created by authors

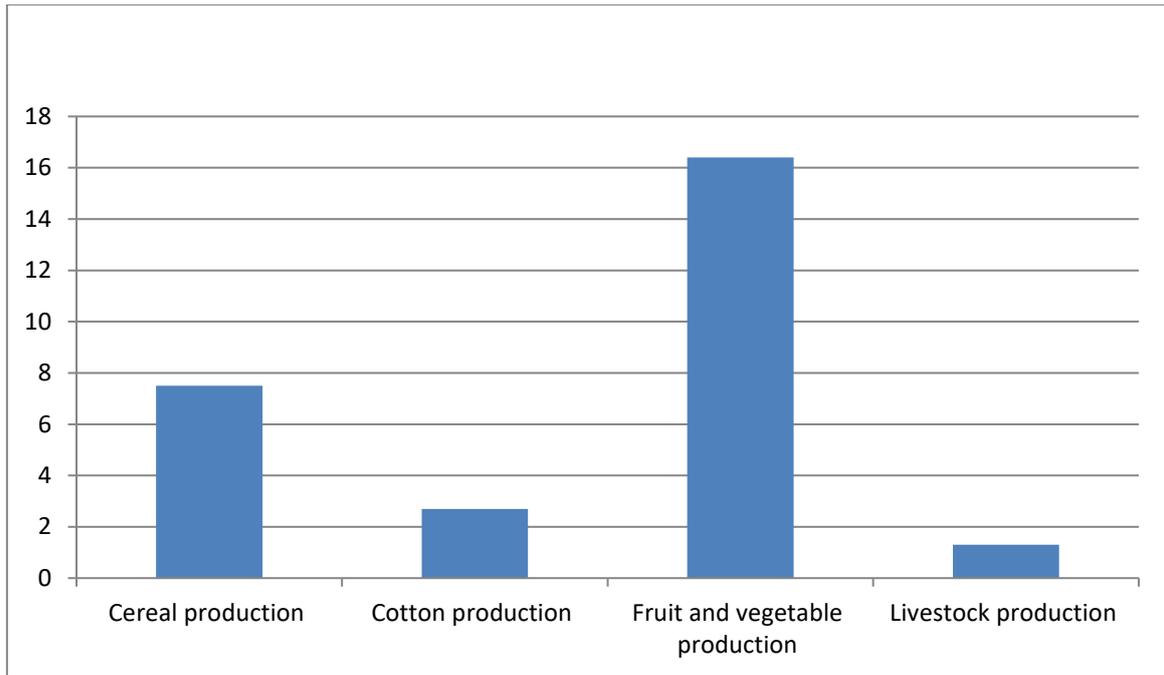
The agricultural sector of Uzbekistan is contributed 24.7% of the country's GDP in 2019 (The World Bank, 2019).



Source: author's calculations based on information of FAO, 2019

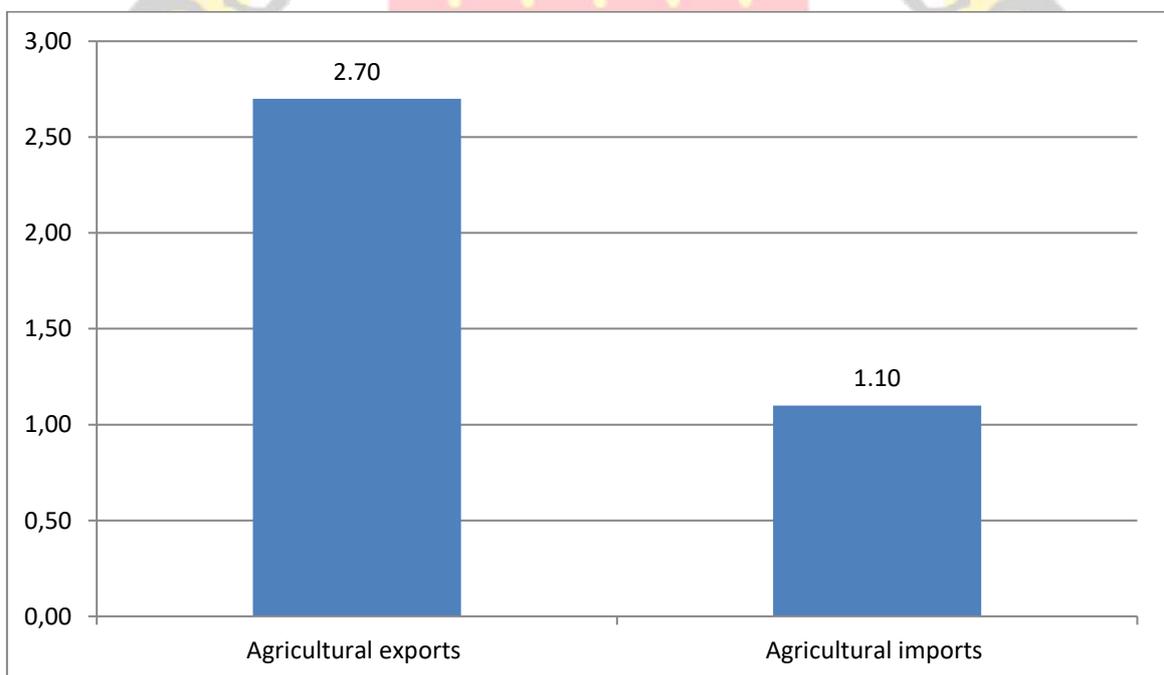
Figure 1. Distribution of main land areas of Uzbekistan (in million hectares) (Total land area: 448,978 km²)

International Conference on Education and Innovation



Source: author's calculations based on information of FAO, 2019

Figure 2. Main agricultural production sectors of Uzbekistan in 2019 (in metric tons)



Source: author's calculations based on information of FAO, 2019

Figure 3. Agricultural export and import indicators of Uzbekistan in 2019 (in metric tons)

Agricultural waste is a significant environmental concern globally, and Uzbekistan is no exception, as the country produces large amounts of waste from cotton, wheat and rice production.

Uzbekistan is a landlocked country in Central Asia with a predominantly agricultural economy. The country's main crops include cotton, wheat, rice, and vegetables. Uzbekistan's agricultural sector produces various types of waste, including crop residues, animal manure, agrochemical packaging, and post-harvest losses. Crop residues are one of the most common form of waste, accounting for a substantial proportion due to Uzbekistan's extensive cotton cultivation. Animal manure is another significant contributor, primarily from livestock farming.

Cotton is the most significant crop in Uzbekistan, and it generates the most significant amount of agricultural waste. Cotton production generates large quantities of cotton stalks, leaves, and bolls, which are usually burned or left in the fields. Wheat and rice production also generate substantial amounts of straw and husk, which are often burned or left to decompose.

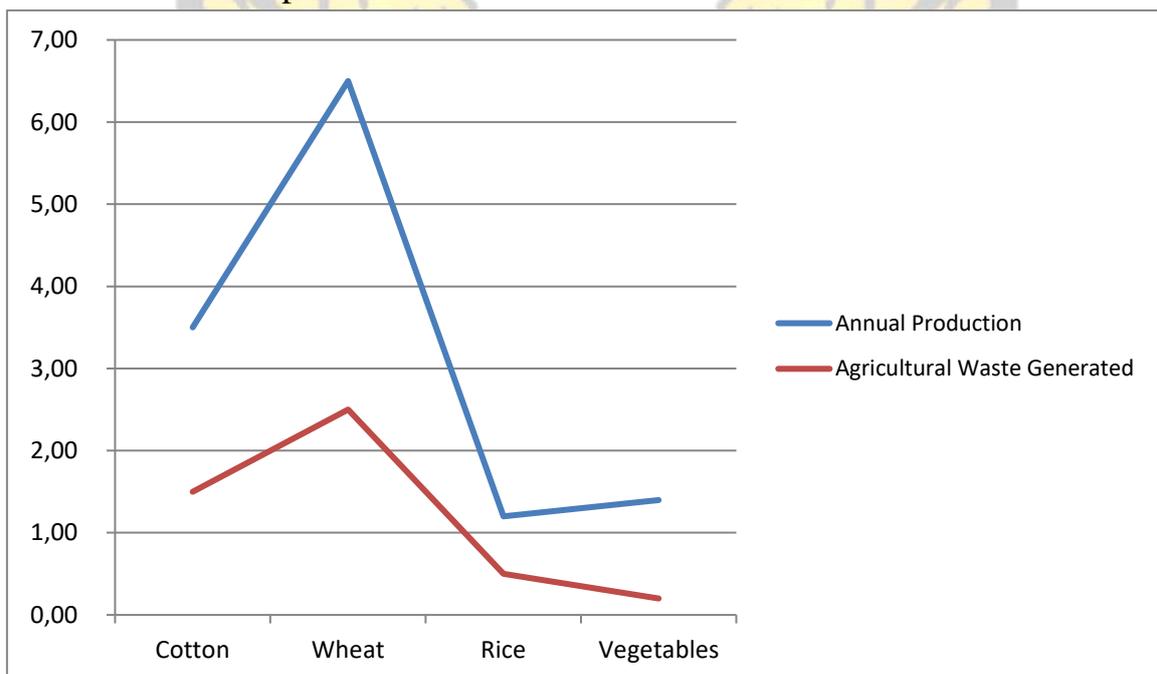


Figure 4: **Agricultural Waste Generation in Uzbekistan (in million tons) in 2019**

Total amount of agricultural waste generation was 4.7 million tons in 2019 (Figure 4).

Improper disposal of agricultural waste can have severe environmental consequences. Burning agricultural waste releases harmful pollutants into the air, leading to air pollution and respiratory problems. The decomposition of agricultural waste also releases methane, a potent greenhouse gas that contributes to climate change.

Moreover, the accumulation of agricultural waste in fields can lead to soil degradation and nutrient depletion. The excessive use of chemical fertilizers to compensate for nutrient depletion can result in soil pollution and water contamination.

Sustainable Solutions for Agricultural Waste Management. The management of agricultural waste in Uzbekistan requires sustainable solutions that address environmental concerns while promoting economic development. One potential solution is the conversion of agricultural waste into bioenergy through anaerobic digestion or gasification. The annual potential for bioenergy production from agricultural waste in Uzbekistan is approximately 2.4 million TOE, which could provide about 20% of the country's current energy consumption¹⁹.

Another potential solution is the use of agricultural waste as a feedstock for composting. Composting can convert agricultural waste into a nutrient-rich soil amendment that can improve soil health and fertility. Composting also reduces the amount of waste that needs to be disposed of, reducing environmental pollution.

Implementing sustainable waste management practices is crucial to mitigate the adverse effects of agricultural waste and promote a greener and more sustainable agricultural sector in Uzbekistan.

The management of agricultural waste in Uzbekistan is a growing concern, as improper disposal can lead to environmental pollution and health hazards.

In Uzbekistan, the integration of crops and livestock, and the use of manure as fertilizer, are traditional practices and is the basis of the farming systems, especially at smallholder level. Nowadays local farmers prefer to use traditional and low-cost technologies for recycling the livestock manure through: anaerobic biodigestion (biodigesters); aerobic biodigestion (composting) and by direct application as organic fertilizer. The livestock waste treatment technique, however, are still too simple and improving is going insignificant. The monitoring system of manure composition, or its allocation to the drop fields is not completely developed. The system for monitoring the composition of manure, its allocation to the deposit fields, is not up to date. Fuelwood in drylands is often scarce due to deforestation and degradation of pastures, leading to the increasing role of animals as suppliers of manure for fuel, plus means of transportation. The phasing out of energy subsidies has also meant that manure from livestock is not returned to the farm but used for heating and cooking, as alternative energy sources are no longer available or affordable.

A number of local initiatives aimed at improving waste management and waste treatment companies are being implemented in different cities.

¹⁹ The Journal of Cleaner Production, 2019

Biomass is also a traditional energy source for biogas production and a promising energy direction in the agrarian sector of Uzbekistan.

Uzbekistan has great energy potential from the amount of 0.3 million tonnes of oil equivalent²⁰.

Conclusion

The management of agricultural waste is a critical challenge for Uzbekistan, as it has significant environmental, economic, and public health implications. Sustainable solutions, such as bioenergy production and composting, can help manage agricultural waste while promoting economic development and protecting the environment. The government and private sector need to work together to implement these solutions effectively and ensure their long-term sustainability.

The government has implemented measures to improve waste management and promote sustainable agriculture practices. However, there is still much work to be done to effectively manage agricultural waste in Uzbekistan. Proper management of agricultural waste is critical to minimize environmental impacts and promote sustainable agriculture practices.

Recommendations and proposals.

- ✓ Encourage the use of modern technologies: The Uzbek government should invest in modern technologies that can help manage agricultural waste. For example, biogas plants can be used to convert waste into energy, and composting can be used to create organic fertilizers.
- ✓ Promote awareness campaigns: The government should launch awareness campaigns to educate farmers on the importance of proper waste management. This can include training programs, workshops, and seminars.
- ✓ Improve infrastructure: The government should invest in the necessary infrastructure to support waste management. This can include waste collection and transportation systems, as well as disposal facilities.
- ✓ Encourage collaboration: The government should encourage collaboration between farmers, waste management companies, and other stakeholders to develop effective waste management strategies.
- ✓ Provide incentives: The government should provide incentives to farmers who adopt sustainable waste management practices. This can include tax breaks, subsidies, and other financial incentives.

²⁰

https://www.researchgate.net/publication/5161701_Utilization_of_Agriculture_Residues_and_Livestock_Waste_in_Uzbekistan

- ✓ Develop regulations: The government should develop regulations to ensure that farmers comply with waste management standards. This can include penalties for non-compliance and regular inspections to ensure that waste is being managed properly.
- ✓ Foster research and development: The government should invest in research and development to identify new and innovative ways to manage agricultural waste. This can include partnerships with universities and research institutions.

REFERENCES

1. Asian Development Bank, Waste to Energy in the Age of the Circular Economy Best Practice Handbook, November 2020, : <http://dx.doi.org/10.22617/TIM200330-2>
2. D. Arpad. 2013. Engineering and Environmental Geology. Eger, Hungary: Eszterházy Károly College. https://www.tankonyvtar.hu/en/tartalom/tamop412A/2011-0038_37_david1_en/ar01s11.html.
3. Туробова, Х. (2019). Агротуризмни ривожлантиришнинг ўзига хос хусусиятлари. Экономика и инновационные технологии, (6), 166-172.
4. Fritsch, Caroline; Staebler, Andreas; Happel, Anton; Cubero Márquez, Miguel Angel; Aguiló-Aguayo, Ingrid; Abadias, Maribel; Gallur, Miriam; Cigognini, Ilaria Maria; Montanari, Angela; López, Maria Jose; Suárez-Estrella, Francisca; Brunton, Nigel; Luengo, Elisa; Sisti, Laura; Ferri, Maura; Belotti, Gianluca (August 2017). "[Sustainability in Food Supply Chain and Food Industry](#)". Sustainability. 9 (8): 1492. [doi:10.3390/su9081492](https://doi.org/10.3390/su9081492).
5. Mohite, Jagtap, Avhad, More (September 2022). "[Recycling of major agriculture crop residues and its application in polymer industry: A Review in the context of waste to energy nexus](#)". Energy Nexus. 7:
6. "[PaperWise – wise with waste](#)". Retrieved 10 November 2022.
7. [Statistical Yearbook World Food and Agriculture](#). 2021. [doi:10.4060/CB4477EN](https://doi.org/10.4060/CB4477EN). ISBN 978-92-5-134332-6. S2CID 240163091. Retrieved 28 November 2022.
8. The Journal of Cleaner Production, 2019
9. U.S. Geological Survey (USGS). Wastewater Treatment Use. https://www.usgs.gov/special-topic/water-science-school/science/wastewater-treatment-water-use?qt-science_center_objects=0#qt-science_center_objects.
10. https://www.researchgate.net/publication/5161701_Utilization_of_Agriculture_Residues_and_Livestock_Waste_in_Uzbekistan