



Can kitchen garbage be recycled and reused?

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Abstract. According to the characteristics of kitchen domestic waste in my country, firstly, the types and components of kitchen domestic waste are quantitatively analyzed, secondly, environmental pollution and the harm to people's physical and mental health are expressed. Furthermore, the main problems existing in the recycling of kitchen domestic waste are presented in my country. Last, relevant countermeasures and processing techniques are proposed.

Keywords: kitchen waste; recycle; reuse; Harmless utilization

1 Introduction

The annual output of municipal waste is nearly 150 million tons, and the total amount of urban domestic waste is growing at a rate of 8% to 10% per year in my country. The major cities in China are under the huge pressure of the increase in domestic waste while the economy is developing rapidly. Therefore, garbage issue has become a thorny problem in city development and an important environmental problem that plagues human beings [1].

According to statistics, two-thirds of more than 380 cities in my country have fallen into the siege of Garbage Mountains. At present, municipal waste is mainly domestic waste, and domestic waste is mainly kitchen waste [2]. Due to its high water content and organic content, it is easy to rot and deteriorate in a short period of time, causing great pollution to the surrounding environment. At present, kitchen domestic waste has problems such as disordered management and arbitrary disposal in most cities in China. Kitchen domestic waste has become a difficult problem in collection, transportation and landfill disposal, which seriously affects the appearance of the city, the health of residents and the quality of the environment. Therefore, it is imperative to effectively treat and dispose of kitchen waste.

2 The hazards of kitchen waste

2.1 Analysis of kitchen domestic waste

Household kitchen waste refers to leftovers and food scraps produced at home. Mainly include: ① starchy substances containing rice, flour food, potatoes and other products; ② cellulose substances containing old vegetable leaves, roots, melon peels; ③ fatty substances containing waste animal and vegetable oils; ④ protein substances containing pork, fish and other meat; ⑤ animal bones, preservatives and other food additives and other substances [3]. They are perishable, smelly, easy to breed pathogenic microorganisms and mosquitoes, and endanger environmental hygiene. According to literature [2], the following three tables are obtained as:

Table 1. Survey results of household kitchen waste [2]

Average household size in the surveyed area(person)	4.8
Weight of food consumed by households per day (kg)	5.8
Kitchen waste produced by households per day (kg)	1.83

In table 1, it can be seen that the average household (nearly 5 persons) produces about 1.83kg of household kitchen waste every day. If calculated according to this ratio, a province like Liaoning produces a large amount of household kitchen waste every day. If it is directly discarded, it will not only affect the living environment around the residents, but also cause harm to the environment of the entire Liaoning Province.

Kitchen waste is mainly leftovers, which chemical composition is mainly C, H, O, N, S, Cl, as shown in Table 2 [4]. The types and compositions of household kitchen waste are shown in Table 3.

From Table 3, we can find that household kitchen waste is mainly leafy vegetables, stem vegetables, fruits, rice and meat and bones, etc. These substances have high utilization, and if they are directly discharged, it will not only waste resources, but also affect environment.

Table 2. Chemical composition of household kitchen waste [4]

Garbage type	Chemical composition (%)					
	C	H	O	N	S	Cl
Kitchen waste	43.52	6.22	34.50	2.79	0.3	0.21

Table 3. The types and compositions of household kitchen waste [2]

Garbage type	Mass (kg)	Percentage (%)
Leaf Vegetables	0.41	23
Stem classes	0.25	14
frutta	0.28	15
Rice	0.32	17
Pasta classes	0.10	5
meat and bone classes	0.21	12

oils	0.09	5
mussel	0.15	8
Others (plastic bags, etc.)	0.01	1

2.2 Harm of kitchen domestic waste

After the kitchen waste is discarded, the main hazards to human life and the environment have the following as:

(1) It takes up too much space. Garbage piled on the outskirts of the city, encroaching on a lot of farmland.

(2) Polluting the air. It can be seen from Table 3 that the water content of kitchen waste is high and the calorific value is too low [5]. The moisture content of these wastes is about 90%, and the calorific value per unit mass is about 2100-3100 kJ/kg, which cannot meet the calorific value requirements of waste incineration power generation (that is, more than 5000 kJ/kg). At the same time, it will produce poisons such as dioxins Substances that endanger the atmosphere.

(3) Polluting water resource. If household kitchen waste is mixed with domestic waste and directly landfilled for a long time, it will lead to crops to fail to grow and penetrate into the groundwater, which will cause more serious pollution [6].

(4) Generating the nest of pests. Household kitchen waste is rich in types, with sufficient carbon and nitrogen sources. As long as it is placed for 12 hours, the growth rate of microorganisms will be amazing. According to the detection, it contains mold, yeast and pathogenic bacteria, and the total number of bacteria can be as high as $4.1 \times 10^5/g$, and *Escherichia coli* ≥ 240 MPN/g [7].

Therefore, we should pay attention to the disposal of household kitchen waste.

3 Can kitchen garbage be reused?

From Table 2 and Table 3, it can be seen that the main components of household kitchen waste are starch, dietary fiber, animal fat, etc., which are rich in C, N elements and protein, and are rich resources for making animal feed and organic fertilizers. Household kitchen waste has a high recycling value,

So, about kitchen waste can be reused? The question, the answer is: yes, kitchen waste can be reused.

3.1 Conventional treatment methods of kitchen domestic waste

Kitchen waste mainly has two processing directions: harmless and recycling: harmless mainly includes landfill, incineration, etc in China. Recycling mainly includes anaerobic digestion, composting, and making feed.

Because of its simplicity and low cost, landfill is widely used in China. Landfill will have a serious impact on the groundwater, soil and the environment around the landfill.

The incineration method harmless treatment, and the disposal facility occupies a small area, but it will increase fuel consumption and produce gaseous secondary pollutants such as dioxins.

To make organic fertilizer, the basic technology can be divided into aerobic fermentation composting method and anaerobic fermentation digestion method.

3.2 Illegal use of kitchen waste

There are problems such as disorderly management and arbitrary disposal of kitchen waste in most cities in China [8]. According to the survey, its main destinations are the followings

- (1) Pigwash is sent to pig farms, especially at the urban-rural junction.
- (2) Some of the Pigwash was purchased by unscrupulous traders and used for oil refining, which flowed into the grain and oil market, and was brought back to the table of citizens.
- (3) Some kitchen wastes are dumped together with ordinary domestic wastes, and the Pigwash oil is directly discharged into the sewer, then enters the urban sewage pipe network, increasing the treatment burden of the sewage treatment plant.

3.3 How to effectively reuse kitchen waste

Since 2010, a new round of urban waste classification has been launched in China. Due to the large proportion of kitchen waste in domestic waste, with the continuous deepening of waste classification, the total amount of kitchen waste will increase significantly. How to effectively deal with the sorted kitchen waste has become an important problem in urban waste treatment in China. The author thinks it should be proceed from the following four aspects:

- (1) Vigorously improve the purity of kitchen waste
- (2) Rational allocation of kitchen waste facilities
- (3) Effectively control the output of kitchen waste
- (4) Kitchen waste treatment technology

Since the composition of kitchen waste after garbage classification is still complex, the processing technology of kitchen waste must have more auxiliary processes and complex processes, and at the same time, many processing problems must be solved.

3.4 The processing technologies

At present, the processing technologies have the followings:

- 1) Households use self-made compost to grow flowers and vegetables and dispose of organic waste by themselves. A garbage shredder can be used to shred the kitchen waste and discharge it into the urban sewage pipe network for treatment.
- 2) Utilize earthworms to dispose of perishable organic waste. Since earthworms can degrade organic matter into humic acids, and their body surface can secrete easily decomposed monosaccharide organic matter. Therefore, earthworms can significantly improve the activity of microorganisms in soil.

3) The aerobic and anaerobic coupling treatment of kitchen waste is a widely used kitchen waste treatment method in recent years due to the rapid degradation of waste and the availability of resources. However, the application of anaerobic fermentation technology is not mature and the technology is complex in China, so specific treatment facilities and processes should be carefully selected.

4) A biological process technology that uses a combination of microorganisms and microcomputers to rapidly decompose domestic waste into water and carbon dioxide through special biological working medium to deal with kitchen waste.

5) Small biochemical processor is a kind of organic waste treatment method that has flourished in recent years. It is a dynamic and fast organic waste composter that adds high-efficiency bacteria and controls composting conditions.

4 Conclusion

Through investigation and analysis, it is found that kitchen garbage can not only be reused, but also must be recycled and reused harmlessly. Furthermore, the emergence of kitchen garbage has played a certain role in promoting our awareness of conserving resources. At the same time, all aspects of our students, society and the government should play their roles and promote the effective and safe resource utilization and harmless development of kitchen domestic waste through multiple incentives

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