

The Development Status of Market of Fermenter for Organic Fertilizer in China

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Abstract

China is a large agricultural country with abundant organic solid waste resources, however it has the characteristics of large amount of resources and low utilization rate. Organic fertilizer fermenter can treat organic solid waste environmentally and effectively. Through literature and data research, this paper summarizes and analyzes the market development status of organic fertilizer fermenter, and summarizes the market characteristics of organic fertilizer fermenters.

Keywords

Organic Fertilizer Fermenter; Agricultural Wastes; Organic Fertilizer.

1. Introduction

With the continuous improvement of global awareness of food safety, soil health and ecological environment protection, organic agriculture and green agriculture have been unprecedentedly promoted and developed internationally. In this context, organic fertilizer plays an increasingly important role in agricultural production because of its unique and significant advantages. Its market share is increasing year by year, and it has gradually become a key factor to improve soil structure, improve the quality of agricultural products and ensure the sustainable development of agriculture [1-3].

The main production process of bio-organic fertilizer is composting process, and the core link is the effective fermentation of organic waste. In this process, microorganisms convert organic waste into high-quality organic fertilizers rich in plant-absorbable nutrients and beneficial microbial communities under appropriate temperature, humidity and oxygen conditions. As the core equipment in this transformation process, the fermenter undertakes the important task of creating and maintaining the best fermentation conditions to ensure the efficient decomposition and transformation of organic matter.

2. Types of Fermenter

2.1. Section Headings

2.1.1. Sub-section Headings

At present, there are two main types of organic fertilizer fermenter on the market : vertical and horizontal [4]. The vertical fermenter is designed with a vertical structure layout to meet the needs of large-scale continuous production. Its main specifications are customized according to

user processing capacity and site conditions, with a wide range of capacity, ranging from dozens of cubic meters to hundreds of cubic meters, with significant expansion. Due to its good mixing and oxygen supply mechanism, the vertical fermenter can usually complete the high temperature fermentation of organic waste in a short time. The daily output of the vertical fermenter depends on the specifications of the fermenter, fermentation time, fermentation materials and other factors. Generally speaking, the daily output can reach several tons to dozens of tons, and the production capacity is outstanding. Under suitable operating conditions, the fermentation cycle is usually 7-14 days. The vertical fermenter has the characteristics of small floor space, uniform fermentation effect and easy operation.

Horizontal fermenter usually adopt drum design. As an innovative composting treatment solution, they have won wide recognition in the market due to their unique horizontal rotating structure design. The output and capacity of horizontal fermenter are related to the diameter, length and rotation speed of the drum. Generally speaking, the daily processing capacity of a single device is between hundreds of kilograms and tons, which is suitable for small-scale to medium-scale production. Although the daily production capacity of single equipment may be relatively low, it has high practical value and application prospect in specific occasions, especially for users who pursue refined management and process optimization. Compared with the vertical fermenter, the horizontal drum fermenter covers a larger area, but it is more convenient to enter and leave the material.

3. Analysis of Market Scale, Production and Demand of Fermenter for Organic Fertilizer

Organic fertilizer fermenter is mainly used to treat various organic wastes, such as livestock and poultry manure, crop straw, etc., and convert them into organic fertilizer. At present, there is a lack of market scale research specifically for organic fertilizer fermenters. According to the report on the development opportunities and prospects of China's fermenter industry in 2023, according to the Beacon Consulting, the market size of China's fermenter industry will reach 938 million yuan in 2022, and the global fermenter market will reach 14.699 billion yuan. It is expected that the global fermenter market will reach 25.026 billion yuan in 2028. During the forecast period, the annual compound growth rate of the global fermenter market is estimated to be 9.38 %.

The capacity of organic fertilizer fermenters ranges from tens of kilograms to hundreds of tons, and the market sales prices range from tens of thousands to more than one million. Due to the lack of corresponding data in the market of organic fertilizer fermenter, this paper mainly analyzes the upstream industry of organic fertilizer fermenter. The main analysis contents include the production of raw materials (including livestock and poultry manure, straw, domestic waste and other agricultural waste) of organic fertilizer fermenter. The output of organic fertilizer fermenter products, namely the market scale and output and demand of organic fertilizer.

3.1. Production Raw Materials of Fermenter for Organic Fertilizer

3.1.1. Livestock Manure

Livestock manure should be fully decomposed as fertilizer, and the hygienic index and heavy metal content should meet the requirements of this standard before it can be applied. When livestock and poultry manure is applied alone or in combination with other fertilizers, it should meet the needs of crops for nutrients, and fertilize appropriately to maintain or improve soil fertility and soil activity. According to the data, the amount of livestock and poultry manure returned to the field in China will reach 2.4 billion tons in 2020, and it is expected that the

amount of livestock and poultry manure returned to the field in China will reach 2.5 billion tons in 2021.

3.1.2. Crops Straw

China has a huge amount of crop straw resources and is the world's largest crop straw country. According to relevant data, the comprehensive utilization rate of crop straw in China has been steadily improved. In 2021, the utilization of crop straw in China will be 647 million tons, with a comprehensive utilization rate of 88.1 %. In 2022, the utilization of crop straw in China will reach 662 million tons, and the comprehensive utilization rate will reach 89.80 %. It is estimated that the national crop straw utilization will reach 688 million tons in 2023, and the comprehensive utilization rate will reach 90.12 %. From the perspective of utilization ways, the main body of feed utilization accounted for the highest proportion, reaching 76.9 %, and the main body of fertilizer, fuel, base material and raw material utilization accounted for 7.8 %, 8.9 %, 3.8 % and 2.6 % respectively.

In addition, agricultural waste resources such as leaves and apple pomace can also be used as raw materials for organic fertilizer fermentation. It can be seen that China's agricultural waste resources have great potential [5].

3.2. Market Scale, Production and Demand of Organic Fertilizer

3.2.1. Livestock Manure

Fertilizer is an important means of production in agricultural production. The sustainable and healthy development of agriculture and the improvement of crop yield are inseparable from fertilizer. Fertilizer is widely used in agricultural production because of its high nutrient content, significant yield increase and fast fertility. At present, China's fertilizer production and use in the world is in the first place. In the production of chemical fertilizers, the main chemical fertilizer varieties at this stage have been in a state of overproduction. With the introduction of China's green development concept and the implementation of relevant policies, there is an urgent need to reduce the use and production of traditional fertilizers, and at the same time shift to organic fertilizers. The development of the organic fertilizer industry has shown a rapid growth model. According to data, the market size of China's organic fertilizer industry in 2021 will be 120.2 billion yuan, up 9.1 % year-on-year.

3.2.2. The Output and Demand of Organic Fertilizer Industry

With the continuous development of the industry, the output and demand of organic fertilizer in China have been increasing in recent years. According to relevant data, in 2021, China's organic fertilizer output was 16.2 million tons, an increase of 3.8 % year-on-year, and the demand was 15.7 million tons, an increase of 3.6 % year-on-year. The data show that the supply and demand of organic fertilizer in China are basically balanced from 2016 to 2020. In 2021, the output of organic fertilizer in China will reach 16.2 million tons, and the demand will reach 15.7 million tons.

4. The Number and Regional Distribution Characteristics of Fermenter for Organic Fertilizer Production Enterprises

The main production enterprises of organic fertilizer fermenter in China are Shandong Fuhang New Energy Environmental Protection Co., Ltd., Henan Tongda Industrial Technology Group Co., Ltd., Zhengzhou Shande Machinery Co., Ltd. and other enterprises. There are a large number of enterprises in China's organic fertilizer industry, but the production scale of enterprises is generally small, most of the related technologies are in the research and development stage, the production capacity of enterprises needs to be built, the production of the industry has not yet achieved industrialized scale production, the industry is in the stage of intensified development, and the competition in the industry will be further intensified.

Through inquiry, there are 691 organic fertilizer fermenter manufacturers, mainly distributed in Shandong Province, Hebei Province, Henan Province, Jiangsu Province, Hubei Province and other provinces, while there are few organic fertilizer fermenter manufacturers in Shaanxi Province. Similarly, through different shopping platforms, organic fertilizer fermenter suppliers were found throughout the country. Organic fermenter manufacturers provide professional installation and after-sales service on the basis of selling equipment. Among many organic fermenters, intelligent high temperature aerobic fermenter is a kind of equipment with good prospect and strong harmless production capacity of organic fertilizer production in China.

5. Market Characteristics of Fermenter for Organic Fertilizer

In general, the regional market of organic fertilizer fermenter is relatively strong, which is mainly affected by economic, technological, resource, policy and other factors. China 's organic fertilizer fermenter related manufacturers are mainly distributed in economically developed areas and areas rich in organic fertilizer resources. Economically developed areas, including Guangdong, Jiangsu, etc., these areas have good environmental awareness, relatively mature technical support, and the local government has introduced relevant preferential and support policies to promote the development of organic fertilizer and organic fertilizer fermenter industry ; organic fertilizer resource-rich areas, including Shandong, Hebei, Henan and other places, these areas have a large number of livestock and poultry farms and other organic fertilizer resources.

With the intensification of fierce competition in the international agricultural product market and the improvement of people 's living standards, there are higher requirements for the quality of agricultural products. On the one hand, the relevant incentive policies of the state and the reduction of chemical fertilizers, the acceleration of the utilization of agricultural waste resources and the promotion of agricultural mechanization and the transformation and upgrading of agricultural machinery and equipment industry are making livestock and poultry manure organic fertilizer become the ' new favorite ' of the industry, and the market prospect is broad ; on the other hand, the problems of low standard threshold, product homogeneity and chaotic market competition in the organic fertilizer industry are also hidden dangers in the development of the organic fertilizer fermenter industry. At present, the main problems faced by the organic fertilizer fermenter industry are as follows:

(1) Industry management is non-arrival

At present, there are many kinds of organic fertilizers on the market, but there is only one unified content standard, and there is no corresponding technical requirement for organic fertilizers produced by different raw materials and different processes. At present, there are tens of thousands of large and small organic fertilizer production enterprises in China. Factors such as chaotic production raw materials, shoddy products, lack of production technology, and lack of detection methods have led to a decline in the reputation of the organic fertilizer market. Compared with organic fertilizer production methods such as compost, organic fertilizer fermenters have increased production costs and increased requirements for equipment personnel, which limits the development of the organic fertilizer fermenter market.

(2) The problem of excessive heavy metals in commercial organic fertilizer

The problem of heavy metal pollution in organic fertilizers with livestock and poultry manure as raw materials is particularly prominent. At present, a large amount of copper, iron, zinc, manganese, iodine, arsenic, selenium and other metals and heavy metals are added to the feed additives of livestock and poultry in China. There are about 133,000 tons of heavy metals brought into the soil every year by organic fertilizers with livestock and poultry manure as raw materials. Compared with the early 1990 s, the content of some heavy metals increased

significantly : zinc, copper, chromium, cadmium, arsenic and mercury in chicken manure and pig manure increased more. The contents of zinc, copper, arsenic and mercury in cow dung increased. The content and proportion of various heavy metals in straw also increased slightly, and zinc, copper and chromium increased by 2-4 times. This is a problem that organic fertilizer fermenter needs to consider in the production process.

(3) The cost of raw materials for organic fertilizer fermenter production

China 's organic fertilizer production and utilization of organic waste as raw material characteristics, determines the degree of its industrialization development depends on the raw material cost, process cost, transportation cost and other factors, which also determines the inevitable to rely on ' low cost and high efficiency ' to promote the development of its industrialization pace. For the fermenter with larger capacity, its output is higher, but in its use process, it is necessary to consider the transportation cost of raw materials. The organic fertilizer fermentation box is conducive to local materials, high flexibility, easy to manage and adjust, but its output is relatively low, which is not conducive to large-scale production.

(4) Organic fertilizer fermenter fermentation efficiency, equipment stability and other issues

In the production of organic fertilizer by fermenter, the fermentation period is usually 7-14 days. The improvement of fermentation efficiency, tail gas treatment and equipment stability in the fermentation process are the problems to be considered in the future.

6. Conclusion

China is a large agricultural country. On the one hand, the annual amount of agricultural waste, such as straw and livestock manure, is huge. Due to the limited soil environment, the contradiction between planting and breeding industry for cultivated land resources is prominent. Industrial and agricultural waste (furfural residue, Chinese medicine residue, monosodium glutamate residue, biogas residue biogas slurry, straw, livestock and poultry manure) causes great pressure on the environment. The contradiction between development and environmental protection is prominent, and resource utilization is imminent. The process of agricultural ecologicalization in China is obviously accelerated, and the transformation of conventional agriculture to organic agriculture or ecological agriculture will also become the trend and direction in the future. It can be seen that the demand for organic fertilizer in China 's agriculture is getting stronger and stronger. However, the current production technology is simple and crude, and the production process is uneven, resulting in large differences in product quality. The large storage area is easy to cause pollution, and the environmental impact assessment is not up to standard. Compared with the traditional composting and other fermentation processes, the organic fertilizer fermenter occupies a small area, is less disturbed by the natural environment during the fermentation process, and has little impact on the surrounding environment. The stability of the organic fertilizer produced is high. At present, there are relatively few manufacturers producing organic fertilizer fermenters in China. Therefore, organic fertilizer fermenters have broad development prospects in the future.

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