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Separate bio-waste collection SEPARATE BIO-WASTE COLLECTION PAYS OFF

M. Sc. Eng. Andrzej Sobolak^a, M. Sc. Eng. Przemysław Seruga^b, M. Sc. Aneta Hofman^c

^a Chairman of ZGO Gać

^b Head of Biological Waste Treatment Plant of ZGO Gać

^c Administrative Specialist of ZGO Gać

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Abstract: The article presents the bio-waste separate collection problems. The aim of the study was examination of the usefulness of the biodegradable bags and its tests were carried out both in Germany and in Poland by Municipal Waste Management Plant from Gać, Lower Silesia. The residents of Gać region examined the bags and later fill in a questionnaire, as it was done in Germany recently.

Based on results it can be found that the biodegradable bags influence on residents life and waste management company, as well. The cost reduction of waste management system, improving the residents quality of life and the positive assessment of local authorities involved in this project can be noticed.

Introduction

Most part of sales representatives trainings focused on the customer needs. There is no need to purchase the fridge only because it is something new, but mainly to store the food. Based on this simple example the motivators for bio-waste collection can be noticed as: a clean environment demand, replacement of exploitative raw materials on sustainable development and a concern about the future generations.

The bio-waste fraction represents a very large part of our daily wastes. Joining the European Union in 2004 Poland has been obligated to reduce the weight of biodegradable municipal waste to be landfilled by 35% to 16 July 2020 (relative to the amount of biodegradable waste produced in 1995) [1]. The new law on waste, which obliges local government units to organize of the green biomass collection and disposal, forced greater involvement of the residents as well as finding improvements in waste management system [7,2]. Furthermore, not mixed bio-waste fraction with others to segregate even 90-95% of municipal solid waste "outgoing" from home [6]. Based on that the separate bio-waste collection can be noticed as a very important matter. That is not a complicated process begins at home and is the first step towards efficient recovery and recycling.

The idea of bio-waste separate collection problem leads to biodegradable bags. The examined in this study BASF Ecovio[®] bags are made of biodegradable film, dedicated to 10 l bins. They are dedi-

cated for kitchen waste in a typical household. It is believed that this product may be improvement in modern waste management. The application of the bags in the bio-waste separate collection process should be considered by relevant people: residents, carriers, waste management companies and local governments. Each group has its needs and these bags should satisfied most of them.

The common weal

Bio-waste mixed with other fractions of municipal solid waste increase the total cost of waste management system. In the municipal solid waste stream, bio-waste determine from 35-42% of total weight. The cost of their management in relation to the costs of mixed municipal waste management is from 35 to 70% lower. For instance, the price of one ton of bio-waste is 200 zł lower than the price of ton of mixed municipal solid waste. It can be assumed that yearly wastes production per capita amounts 350 kg. While collecting waste selectively, 30 zł per capita can be saved during the year. The bio-waste selective collection simply pays off. These savings regard the overall system, and only the relevant analysis made by local governments may amend the fees for the waste. After processing in a composting or fermentation facility, clean bio-waste become a compost. Later, after passing the legally required studies and obtaining certificates the compost can be used as a soil improver or for restoration of the degraded land. On the second hand, the municipal solid waste have to be safely

and thus, expensively, disposed in a landfill or an incinerator. Assuming that people want to collect bio-waste selectively why not to put them in baskets covered with PE bags, or newspapers like it was happened 25 years ago? It is possible, but it should be noticed that PE bags break from 500 to 1000 years and are the contamination for the compost. Therefore, that kind of waste will not be as cheap as clean bio-waste. Regarding illustrated magazines, they are a kind of chemical pollution in biological waste. Due to paper bags there is not a problem in the compost. In many European countries they are successfully applied. Their problem is low strength and leaking, which means to take out the trash along with the container.

Material and method

BASF ecovio® bags were given to the residents in Poland in Waste Management Plant GAC region. The bio-waste fraction was collected in households. Each resident could fill in a questionnaire with his own opinion about new bags. The collected organic fraction was delivered to GAC plant for research regarding the usefulness of biodegradable bags (BASF ecovio®) for the collection and processing of BIO wastes. Its susceptibility to biodegradation was examined in four different ways.

The first sample was kept in room temperature in the open container. The other runs focused on an intensive oxygen stabilization in the enclosed bioreactors with active aeration and irrigation under the conditions: placing the 2nd sample on the top of the pile, burying the 3rd sample under a 20 cm layer of material and placing the last sample in the middle of the pile. The process time was set up for 2 weeks and the temperature of material was measured.

Result and discussion

Over the years the people got used to take the rubbish while leaving the house, what causes covering them with plastic bags as well. The bags made of Ecovio® respond to people needs regarding cleanliness and comfort. It was found that the even waste collected for many days do not cause a leakage. They limit the spread of the odors. During using a container with closure together with bags any bad smell was observed.

Our study can be confirmed by the researches carried out in Berlin in similar areas [5]. 21 000 households were supplied with Ecovio® bags for kitchen waste (Photo 1). However, the green and garden waste should be collected in other containers next to the house (Photo 2). The research has started in August and has been continued by the end of the year. The difference in favor of Ecovio® was noticed very quickly. During the test, when it got colder the results were more and more distant from each other (Figure 1). These findings can be also confirmed by previous researches done



Photo 1. Ecovio® bags to collect kitchen waste (Pic. BASF).



Photo 2. Model of bio-waste collection in Berlin (Pic. BASF)

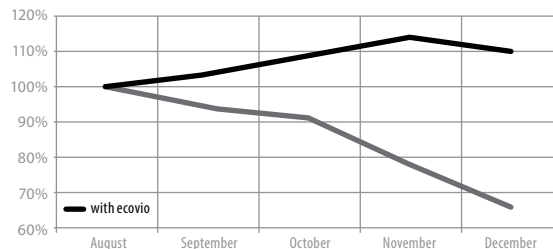


Figure 1. The results of separate bio-waste collection in Berlin [5].

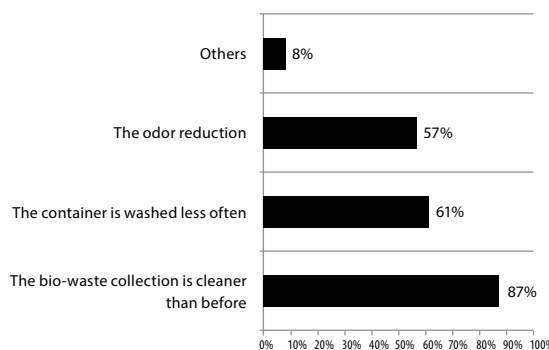


Figure 2. Reasons for higher bio-waste collection with ecovio®. Survey results from Bad Dürkheim [3].

by the University of Mannheim in the district of Bad Dürkheim, where the Ecovio® bags were provided to 65 000 households. A significant increase in the amount of separately collected bio-waste was observed. The survey provided an answer to the question why do people collect more bio-waste? - 90% of them said that the collection of waste is cleaner than it was before (Figure 2) [3].

It can be found that the cleanliness and comfort are quite important parameters for the residents when comes to diligent sorting of municipal waste. Collecting kitchen waste in Ecovio® bags provides also other advantages. Studies made by Bifa Umweltinstitut GmbH from Augsburg showed that using of them reduces the growth of microorganisms. Human hand has 10 000 colonies of microbes per cm². Ecovio® bags came out very well with a score of 220 colonies per cm² (Figure 3) [4].

Make it easier for carriers

The biggest problem for the carriers is that solid waste freezes to containers. It significantly slows down the emptying and loading of waste into the garbage trucks. Very often it comes to remove them mechanically. As a result, the containers break down. Due to the Ecovio® bags the problem of freezing is minimized, because these bags are sealed and do not allow the effluent to get away. Therefore, using them improves comfort of work and contributes to minimize unnecessary costs.

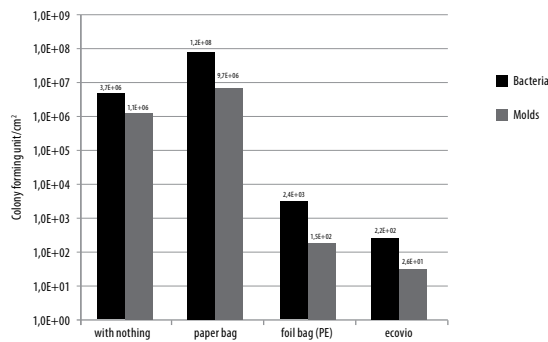


Figure 3. Increasing numbers of bacteria depending on the material used for the bio-waste container [4].

Departments of Municipal Waste have its benefits

The bio-waste stream have to be processed at composting or fermentation facilities and in both cases its contamination is very important for process occurring. PE bags are heavy contamination and must be subjected in mechanical or manual disruption processes and separation from bio-waste. Sometimes there is no possibility to eliminate everything. Smaller or larger parts stay in compost. Ecovio® bags entirely break down into water and CO₂. Researches made on eight types of installations (lasted from 10 to 29 days depending on the used technology) have shown that these bags decomposed in 100% [5].

Recently, bags have been tested in most composting and fermentation technology available on the market. Results of research for each trial conducted in ZGO Gać for a composting process are presented below for each run. In the case of the bags stored at room temperature after 1st week the odor and the effluent was noticed. But there was no degradation sign. After 2nd week, the bags were still in its entirety, but leakage was bigger. In addition, visible decomposition of waste appear, as well as increased temperature. Due to bioreactor test on the top of pile, the decomposition of organic wastes and effluent leakage were observed after 1st week. After 2nd one, the material inside the bags became uniform, reduced volume and was warm. However the bags remain in their entirety. In case of the bioreactor test under 20 cm layer the total unification of wastes and effluent leakage was noted after 1st week. After 2nd one, a further waste decomposition and volume reduction was observed. The bags were in their entirety, but during lifting crumbled. Due to bioreactor test inside the pile the waste were unified and visible holes appear in the bags after 1st week. During lifting fall apart into small fragments. After 2nd week of process only small pieces of bags remain visible. During the research room temperature oscillated between 21-23°C. In the bioreactor temperature was noticed: approx. 30°C, in the range of 50-55°C and above 60°C, respectively for each bioreactor run. ZGO Gac conducted also research which showed that bags have significantly decomposed in process of thermophilic anaerobic digestion which lasts 12 days. Complete decomposition occurs in the next 14 days during the ripening process on a composting place. This works for the installation to ensure (Photo 3) the increased amount of bio-waste, particularly in winter. It is very desirable waste, which due to the fat content significantly increases the production of biogas, electricity and heat. Local residents were satisfied with the bags. The increased amount of separately collected bio-waste reduced the cost of waste management system. Separately collected fractions of municipal waste do not pol-

lute the raw materials contained in mixed municipal solid waste. This causes a higher recovery rate of materials contained in municipal solid waste. The Waste Management Plant Gac is satisfied with bags for kitchen waste because of increment of cost savings and revenues from the sale of energy and raw materials, as well.

The local authorities have a chance

In the new legal situation municipalities are responsible for reaching the increasing levels of recovery and recycling. It does not apply to bio-waste. However, the European Commission has already announced changes in the law waste. Selective waste collection will be mandatory. EU members will be obliged to reach specific levels. Today selective bio-waste collection contributes to increase the purity of the raw materials contained in waste and allows to get higher levels of recycling. If the total cost of waste management will be lower and improve the quality of residents life, the authorities will be appreciated.



Photo 3. Bio-compostable Ecovio® bags. Distributed by ZGO Gac (Pic. A. Sobolak).

The quality of Ecovio® bags is confirmed by documents and publications. The most important thing is that such kind of product should have been certified by authorized institutions in accordance to the European Standard EN 13432.

Conclusions

The separate bio-waste collection becomes trendy. The support for all relevant in this process can be biodegradable bags application. It helps to increase the purity of the raw material fraction contained in municipal solid waste and helps to achieve higher levels of recycling. If the total cost of waste management system through this selective collection of bio-waste will decrease, and the comfort of residents life improves, it will surely be noticed and appreciated.

However, remember when choosing the right type of bags, because it happens that dishonest manufacturer adds bio-compostable material to the usual PE and claims to have biodegradable product. Nothing could be more wrong. In fact, part of the bio-compostable material will decay, but the PE in powder form will contaminate chemically compost for hundreds of years. ■

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