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DEFINITION OF TERMS AND PRESENTATION OF PROCESSES REGARDING THE COLLECTION, RECYCLING AND CAPITALIZATION OF WASTE PACKAGING FROM AGRICULTURAL ACTIVITIES

ALIN-ANGELIN IORGA¹

Abstract: *Packaging, packaging waste and agriculture are separate, distinct concepts for Romania in 2015; they seem to have nothing in common. By bringing these words together and thoroughly studying the areas which they represent, we noticed that they are the starting point in defining a new concept: "Agriculture Waste Packaging". This concept is in fact a new issue which Romania will have to face and can bring great harm to the country's natural heritage no later than in 2020.*

Keywords: *packaging, packaging waste, packaging waste from agriculture*

INTRODUCTION

The need to feed the growing global population and the pressure that it exerts on agriculture has become a serious issue.

In this context, although currently Romanian agriculture is rather extensive than intensive, as is the case in most Western countries, there are certain signs showing that on medium term mechanization and innovations in this field will be similar to the Western ones. This clear shift from extensive agriculture to the intensive system will have both a positive impact, expressed in terms of agricultural productivity, and a negative aspect, in terms of environmental protection.

Thus, while economically Romania will benefit and will become an increasingly important exporter of agricultural goods, intensive farming impoverishes soil nutrients, reduces humus and at the same time its performance affected.

This problem is already reported by numerous European countries; unfortunately, the only natural and sustainable solution is to "let the soil rest." However, this method requires a significant level of financial losses due to the non-usage of agricultural areas annually allowed "to rest". In these circumstances, we can say with certainty that if the highly industrialized Western countries cannot afford to do so, or do not want to apply these measures which will inevitably lead to some economic losses, Romania will not use this method either.

Another less sustainable option, but with a less visible economic impact, is the permanent supply with fertilizers, herbicides and chemical pesticides. The problem is that using these chemicals, which are more or less dangerous, involves a number of risks which generate, in turn, a series of obligations on persons, companies or institutions who resort to the use of these chemicals.[1]

The biggest risk is polluting the soil, water and air by letting packaging waste from these products in nature, temporary or permanently. Therefore, packaging waste arising from the use of chemical fertilizers should be subject to strict regulation which obviously should be observed. In reality, however, due to the fact that these packages are subject to special regulation, producers, users and even the authorities are not cautious with this regard; they all prove to be ignorant rather than interested in this matter as they should be. What is even worse is that some manufacturers or users do not know what they are supposed to do with waste packaging from the activities they carry out.

This is why research and documentation on "Improving the collection, capitalization and recycling management of packaging waste from agricultural activities" is necessary for the sustainable development of the agricultural industry in Romania, affecting as little as possible the natural heritage of the country.

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MATERIALS AND METHODS

In terms of defining specific terms that can be found in the concept of integrated management of packaging waste, there are several definitions in the literature. The definitions which the Romanian law is based on are also included in the Government Decision No. 621/2005 on the management of packaging and packaging waste with additions and amendments represent the starting point of the personal research.

RESULTS AND DISCUSSION

Packaging is any object, regardless of the material which it is made of or its nature, whose purpose is the retention, protection, handling, distribution and presentation of products, from raw materials to processed goods, from the producer to the user or consumer. Non returnable items made for the same purposes are also considered packaging. The criteria defining an object as packaging are [6]:

- a) Items shall be considered packaging if they meet the definition without prejudice to other functions they may additionally perform, provided that it is not part of the product, being necessary to contain, support or preserve the product throughout its lifetime and all elements are intended to be used, consumed or disposed of with the product.
- b) Items designed and intended to be filled at the point of sale, as well as "disposable" items sold filled or designed to be filled at the point of sale, shall be considered packaging if they have a packaging function.
- c) Packaging components and other elements integrated into packaging shall be considered as part of that packaging. Other elements directly hung or attached to this product, fulfilling a packaging function, shall be considered packaging if they are not part of the product and if not all the elements are intended to be used, consumed or disposed of with the product.

Categories of packages considering their *use* are:[8]

- **Primary packaging** - sales packaging - packaging designed and made to act as a sales unit, for the final user or consumer, at the point of purchase;
- **Secondary packaging** - grouped packaging, over packaging designed to constitute a grouping of a number of units for sale at the point of purchase, whether it is sold as such to the final user or consumer; it can be separated from the product without affecting the product's characteristics
- **Tertiary packaging** - transport packaging - packaging designed to facilitate handling and transport of a number of sales units or grouped packaging, to prevent damage during handling or transport.
- **Reusable packaging** - packaging reused for the same purpose, whose return by the consumer or trader is ensured by paying a sum as a deposit system, through repurchases or otherwise.

Reusable packaging shall be considered packaging waste when it is removed at the end of its useful life. Reusable packaging shall not be considered packaging waste when it is returned to be reused.

Waste is represented by any substance or object which the holder disposes of or intends to throw away or is required to discard.

Packaging waste is defined as packaging or materials that do not satisfy the requirements and purpose which they were designed and manufactured for and which remain after the packaged product was used.

Generated packaging waste is the packaging that becomes waste after being used.

Integrated management of packaging waste means all activities of organizing and managing waste

Packaging waste management involves waste prevention, collection, transportation, capitalization, recycling and disposal, including the supervision of such operations and subsequent maintenance of the collection and disposal sites.

Prevention means measures taken before a substance, material or product becomes waste, thus reducing:

- a) the amount of waste, including reuse of products or extending their life;
- b) the adverse impacts of the generated waste on the environment
- c) the content of harmful substances in materials and products

Pre-collection is the activity that takes place prior to collection. This comprises all actions necessary for the disposal of waste to the place where the collection services lift it up.

Collection consists of lifting up, composting and / or regrouping, including preliminary waste storage prior to transport to a waste treatment facility;

Selective (separate) collection is collecting packaging waste by type of material and / or material - a waste stream is kept separately by type and nature of the waste in order to facilitate a specific treatment

Waste transportation represents all processes that start after waste collection and end with handing them over to the point of treatment, recycling and capitalization.

Treatment is all physical, chemical and biological processes performed at the collection centres, which change the waste characteristics in order to reduce the volume and dangerous nature with a view to capitalize, recycle or dispose of them.

Recovery of packaging waste consists of any process applied to packaging waste by industrial procedures so as to turn it into a secondary raw material which helps replace other raw materials that are used in the production process.

Energy recovery of packaging waste requires the use of combustible packaging waste as a means to generate energy through direct incineration, with or without other waste, but with energy recovery.

The recovery or incineration objective at waste incineration plants with energy recovery is the total amount of packaging waste recovered or incinerated at waste incineration plants with energy recovery, reported to the total amount of packaging waste generated.

Packaging waste recycling is the reprocessing operation in a production process for packaging waste to be reused for the original purpose or for other purposes.

The recycling target is the total quantity of recycled packaging waste, reported to the total amount of packaging waste generated;

Presentation of the packaging waste collection processes, capitalization and recycling

Waste management is one of the major issues Romania faces in terms of environmental protection. Waste management includes the following: collection, transport, recycling, capitalization, disposal of waste, including the supervision of such operations and care after closing their storage areas, and, as a final process, elimination of amounts that cannot be recycled or capitalized.[9]

The packaging waste collection - collection and transport of waste and recyclable materials is an important link in the waste management; although it is often undervalued, it represents between 60% -80% of the total cost of waste and recyclables management, therefore any improvement to this element can greatly reduce this cost.

For the efficient and optimal organization of the collection and transport of waste and recyclables certain characteristics of reference will be considered, namely: the size of the collection area, the economic structure of the collection area, urban conditions, customer requirements, choosing the suitable collection scheme.

The container type, its volume, the container combination and frequency of waste collection waste affect the composition, the quantity and quality of recyclables collected separately.

Packaging waste transportation[7]

Waste transportation means all processes that start after waste collection and end with delivering them to recycling, treatment or disposal plants. Waste transportation is of two kinds: short distance transport and long distance transport. After collecting the waste from the place where it was generated follows a short transport to the nearby waste recycling treatment and / or disposal facility or at a transfer station. From the transfer station waste gets to a central facility for recycling, treatment and / or disposal by sea transport.

Material recycling involves: intermediate processing, such as sorting, shredding and / or compacting; transportation, material recovery; final processing.

The recycling benefits are preserving natural resources and reducing storage space. However the collection, transport, capitalization and the final processing require additional energy and most recycling programs would economically subsidize.

Fundamental recycling problems are related to: identification of recyclable materials; identification of reuse and recycle opportunities; identification of markets for recovered materials.

A primary goal in waste management is to maximize the service life and minimize waste deposits. To this end, materials that can be withdrawn from the waste stream to achieve this objective have to be identified.

Recycling and development programs should consider markets for recovered materials, collection infrastructure and general costs. In most cases, recovered materials are of inferior quality compared to the original ones, so that the market price should be attractive to potential buyers.[2]

Waste incineration capitalization

Waste packaging that cannot be reused or recycled are not considered raw material for industrial combustion systems but can be used as alternative fuels. Using industrial waste combustion systems is called co-incineration.

Waste and alternative fuels produced from it through various methods of treatment are accepted as energy sources and are increasingly used as substitutes in industrial processes, mainly in cement factories and power plants.

Co-incineration in cement kilns - A key aspect in making cement is clinker production in rotary kiln. [1] The starting material for the production of clinker is dried and heated to 1400 ° C and due to chemical reactions cement clinker forms. Whichever method of manufacture, obtaining clinker is a conversion process in which used materials (fuels and raw materials) are consumed or integrated into the final product.

Due to high temperatures in the cement kiln, the organic content of alternative fuels is totally destroyed. Some characteristics of clinker manufacturing, in case of using alternative fuels, are:

- extending the residence time of waste gases in the rotary furnace at temperatures of over 1200 ° C;
- using the ash resulting from burning alternative fuels as part of clinker with other materials;
- chemical and mineralogical fixing in the clinker of the elements found in very low concentrations.

Burning in power plants - power plants as electricity producing plants are designed for efficient use of conventional fuels. However they can be adapted to alternative fuels.

Using waste and alternative fuels is limited by the following elements:[3]

- storage possibilities in power stations;
- waste pre-treatment requirements to bring them into a usable form of particular combustion systems used in power plants;
- waste behaviour during the combustion process, respectively reducing the combustion process by filing the kiln walls, corrosion and influencing waste gas abatement systems.

Incineration of waste in Romania is used mainly in the cement industry. This is due to increasing demand from the cement manufacturing industry and relatively small demand from

electric power industry, as electricity is mainly produced by the numerous hydropower plant located on the main rivers of the country. The advantages of co-incineration are:

- reducing waste deposited;
- waste energy recovery where material recovery is not possible;
- conservation of raw materials needed to produce energy.

CONCLUSIONS

Waste management is a major issue that Romania will face in terms of increasing intensive agriculture.

The activities related to waste management should be carried out with due regard to environmental standards that are consistent with the requirements of EU legislation.

EU policies in the field of waste management highlight the importance and as such they need an integrated approach to waste management.[5]

Waste management involves the collection, transport, treatment, capitalization and disposal of generated waste.

The collection, recycling, recovery through incineration are waste processing methods commonly used in most countries. Such methods are intended both for factors such as environment protection and for the rational and effective economical exploitation of natural resources.

Recycling focused on two fundamental objectives: - neutralize toxic waste in order to reduce air, water and soil pollution as much as possible, and cause no harm to living organisms as well as reduce waste mass and volume for safe storage.

Total or partial capitalization of packaging waste from agriculture can be made by obtaining fuel or secondary energy that can be used in other industries.[10]

In conclusion, the issue of the negative environmental impacts resulting from the constant trend to increase the quantities of packed chemicals and hence the rise in volume of the used packaging waste and will be used in modern agriculture by increasing intensiveness will be the challenge for which Romania needs to be prepared to sustainably manage considering its natural heritage.

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