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XIII ENVIRONMENTAL PROTECTION OF URBAN
AND SUBURBAN SETTLEMENTS
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PESTICIDE PACKAGING AND ITS IMPACT ON PRESERVING THE ENVIRONMENT

Abstract

Packaging as an indispensable part of most industrial products, and it occupies a very important place both in economic and ecological terms. Achieving high yield of crops today can not be imagined without the use of mineral fertilizers and pesticides for the control of diseases, pests and weeds. As a consequence of production and use of various chemicals in agriculture pesticide-contaminated packaging remains. The aim of the paper is to contribute to the understanding of the problem of packaging waste management from applied chemical substances in agriculture, as an important component of the total amount of waste in Serbia and other countries. Collection and destruction of empty packaging is done in such a way that it does not have an adverse effect on human health, beneficial organisms and the environment.

Key words: *packaging, waste management, recycling, pesticides, environment*

INTRODUCTION

Packaging is a product made of materials with different properties, which is used for the storage, keeping, handling, delivery, presentation of goods and the protection of its contents, and includes items used as ancillary packaging, wrapping, bonding, sealing, preparation for dispatch and labeling (Prpa et al., 2014). The management of packaging and packaging waste is regulated by the Law on Packaging and packaging waste ("Official Gazette RS", No.36 /09, 95/2018). The management of packaging and packaging waste has a very pronounced ecological, social and economic significance.

It takes 500 years to decompose one aluminum can. By processing 1 tonne of aluminum cans energy saved ranges from 90 to 95% in relation to obtaining it from natural raw materials, and the number of recycling cycles is unlimited. Recycling 1 tonne of iron saves about 1.2 tonnes of ore, 0.7 tonnes of coal and about 60 kg of lime. Processing requires 60% less energy. Decomposition period of PET packaging is 100 years. Plastic bottles at the landfill represent 9% of the total weight of the waste, but they occupy 32% of the space. Recycling 1 tonne of old paper saves 17 trees in nature. By recycling the same amount of office paper, 24 trees are preserved. It also saves 4,200 kW of electricity and 32,000 liters of water. The recycling process requires 40% less energy. The amount of air pollutants is about 75% lower than in production of paper from raw materials. The glass thrown to the landfill will never break down, and it can be recycled countless times in a 100% share. The technological recycling process of glass requires 40% less energy than its production from natural raw materials (Report on Managing Packaging and Packaging Waste, 2017, 2018). The waste, according to the Waste Catalog, is classified into twenty groups depending on the place of origin. The waste catalog is in the scope of the Rulebook on waste categories, testing and classification ("Official Gazette of RS", No 56/2010) and is used to classify all types of waste, including hazardous waste. The waste catalog is fully harmonized with the EU waste catalog, which was designed to create a clear system for the classification of waste within the European Union. According to the place and origin of waste, waste from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing have index number 02 in the aforementioned catalog (Delić, Kalamanda, 2016).

PACKAGING FOR PLANT PROTECTION AGENTS

Packaging used for pesticide packaging must be adapted to the toxicological and technological properties of pesticides. It must be of such material that during transportation, storage and handling there can be no dispersal or evaporation of the contents, the mixing of poison/toxin with other substances, or contact of the content with the floors and walls of the transportation vehicle, warehouses or other rooms where poisons are kept, nor to influence or change the properties of poisons/toxins (Bagi and Bodnar, 2012). Packaging types for individual pesticide and fertilizer formulations are prescribed by the Regulations ("Official Gazette of FRY" No. 35/99). The marking of pesticides in traffic is done on the basis of regulations for signs of danger, warning signs and notifications, regarding the type, shape, color and symbols to mark poisons in the market (each pesticide pack). Registration, control, traffic, import and application of plant protection products in agriculture and forestry, public interest activities in the field of plant protection products, as well as other issues of importance for plant protection products are regulated by the Law on Plant Protection Products (Law on plant protection products, 2009). Under plant protection products, for the purposes of this Law, plant protection products used in organic production and plant protection products containing, or consisting of, or derived from genetically modified organisms, are considered as such, if the deliberate introduction in the environment, placing on the market

or transit of these organisms permitted on the basis of environmental and human health risk assessment, is in accordance with the law governing genetically modified organisms. The Rulebook on Types of Packaging for Pesticides and Fertilizers and on the Destruction of Pesticides and Fertilizers ("Official Gazette of FRY" No. 35/99) prescribes the type of packaging for pesticides and fertilizers for their packaging for placing on the market, disposal of pesticides that have expired, as well as the destruction of packaging in which pesticides and fertilizers were packaged. Collecting and destroying empty containers must not be carried out by throwing them into water (springs, wells, rivers, lakes, ponds and sea), pits, canals, sewerage networks, along roads, landfills, as well as other ways that may lead to environmental pollution. Pesticides are an indispensable part of the environment as, due to intensive use, their remains are often detected in nature, especially in the soil (Đurović, 2011). Although pesticides are developed through very strict regulatory processes to function with reasonable certainty and minimal impact on human health and environment, serious concerns have been raised about health risks arising from occupational exposure and from residues in food and drinking water (Damalas and Eleftherohorinos, 2011). Pesticides, seeds, fertilizers, hormonal preparations, etc. reach agricultural producers in an appropriate packaging, which after discharge becomes waste. Precisely this unconscionable handling of waste is a problem, just as the misuse of its content (Perkić, 2015). Primary treatment and classification of pesticide packaging as well as most other chemicals, immediately after the discharge of the contents by the applicants, is the only guarantee that the application of the rules of the profession for each chemical, the basic packaging (plastic and metal cans and bottles) turns from dangerous to harmless.

WASTE MANAGEMENT

Consumption increases with the rise in living standards. With the increase in consumption, the quantity of packaging waste, especially plastic waste, is growing (Trumić et al., 2012). Proper waste management has become the imperative of modern society. The management of packaging waste is the planning and organization of activities related to the collection, transport, storage, treatment and disposal of packaging waste, including the supervision of these activities and the care of waste management facilities after closure (Official Gazette RS, No. 36/09, 95/2018 – State Law, Article 5). Adequate management of packaging waste and its reduction through reuse or recycling contributes to the preservation and protection of the environment, as well as balance with the economic development of society (Matijasevic-Obradovic, Milojevic, 2018). Non-hazardous waste is waste which, due to its quantity, concentration or physical, chemical and biological nature, unlike hazardous waste, does not endanger human health or the environment and does not have the characteristics of hazardous waste ("Official Gazette of RS" No. 36/2009 and 88/2010, Article 5). Based on the procedures and characterization of paper and cardboard packaging, plastic, wood and metal packaging are considered as harmless waste. Hazardous waste is any waste that, by its origin, composition or concentration of hazardous substances, can cause danger to the environment and human health and has at least one of the hazardous characteristics spe-

cified by special regulations, including packaging in which hazardous waste has been or is packaged ("Official Gazette of the Republic of Serbia", No. 36/2009 and 88/2010, Article 5). Packaging that contains residues of dangerous substances (e.g. pesticides) belongs to hazardous waste. Regardless of whether the packaging and packaging waste in terms of destination will end up with the end user, the operator or distributor, packaging and packaging waste must be primarily treated, sorted and classified according to the categories of waste and according to the categorization are deposited at the local landfills of hazardous or non-hazardous waste, i.e. collection points of the contracting operator (Prpa et al., 2014). The final user, as the keeper of the waste, must ensure that packaging waste that is contaminated with dangerous or other substances that are not part of the packaged goods is handled in accordance with the law governing waste management (Official Gazette of RS, No. 36/09 , 95/2018 – State Law, Article 22).

HANDLING OF EMPTY PACKAGING

It is forbidden to throw packaging into the seas, lakes, natural and artificial water-courses, sewage, as well as to spill unused content into water, to the ground, bury it in the land and bring to the landfill, as well as other places that would cause environmental pollution. The regulations require that the remains of poisons or toxins and the packaging containing the plant protection product are removed or destroyed in a way that does not endanger the life and health of people, animals and the environment. Emptied packaging of plant protection products in the form of solid formulations which are applied without dilution (granules, powder for dusting and the like) should be strongly shaken so that the least of the content of the plant protection product remains in the packaging ("Official Gazette of RS" no. 21/2012, Article 10). Emptied packaging of the plant protection product in the form of solid and liquid formulations applied by diluting (water-soluble powders, dross powder, emulsion concentrate, concentrated suspension, water-dispersible granules and the like) should be washed immediately after use, as the plant protection product would not dry out inside the packaging ("Official Gazette of RS", No. 21/2012, Article 11). It is very important that the pesticide packaging is washed with triple rinsing or pressure washings so that the washed out liquid is added to the working fluid for treatment. The method of triple rinsing means that after the discharge of the contents, the packaging is well decanted into the reservoir with a working solution. Then water up to 1/3 of the volume of the packaging is added, and after the strong shaking, the washed out liquid is poured into the spray tank and the same procedure is repeated two more times, taking into consideration that pure water is used when repeating the washing procedure each time. Afterwards the rinsed pack is punctured in three places and thus rendered unusable. Discharged packaging from Articles 10 and 11 of the said Rulebook shall be handled in accordance with the instructions for proper handling of the discharged packaging indicated on the label of the plant protection product, or in accordance with the regulations governing packaging and packaging waste. On the label of all herbal remedies, the following label is added, which, if necessary, is supplemented with the textual

part in brackets: SP 1 Prevent the water contaminants from the plant protection product or its packaging (or: Do not clean the devices for plant protection near the surface of the water / Prevent pollution of drainage channels from agricultural surfaces and roads). Untreated treatment liquids are thrown far away from livestock, pastures, water sources, so they can be broken down by microbiological activity, sunlight or in some other chemical way.

CONCLUSION

Taking into account that no packaging has yet been found to fully meet all ecological criteria, it is necessary to find the most adequate solution which will at least reduce the harmful effects of the packaging on the environment. One of the ways to reduce the amount of this kind of waste is organic production in which many plant protection products are practically made at home, from natural raw materials, such as herbal extracts and, above all, in reusable containers. Collecting and destroying empty packaging is done in such a way that it does not adversely affect human health, beneficial organisms and the environment. Proper management of packaging waste and its reduction through reuse or recycling surely contributes to the preservation and protection of the environment.

LITERATURE:

1. Bagi F., Bodnar K.: *Fitomedicine*, Faculty of Agriculture, University of Novi Sad, Novi Sad (2012).
2. Damalas A. C., Eleftherohorinos G. I.: *Pesticide Exposure, Safety Issues, and Risk Assessment Indicators*, Int. J. Environ. Res. Public Health 8, 1402–1419, (2011).
3. Delić-Jović M., Kalamanda O.: *Analysis of waste management in the Republic of Srpska and Serbia with a reference to some European countries*, Journal of Business Theory and Practice, p. 15–16, (2016).
4. Đurović R. *Processes that determine the fate of pesticides in soil*, Pesticides and Phytomedicine, vol. 26, no. 1, p. 9–22, (2011).
5. Report on the Management of Packaging and Packaging Waste in 2017, Ministry of Environmental Protection, Belgrade, June 2018.
6. Report on the Management of Packaging and Packaging Waste in 2018, Ministry of Environmental Protection, Belgrade, May 2019.
7. Matijašević-Obradović J., Milojević G.: *Waste management – current strategic approach and analysis of the work of authorized operators in the area of recycling of packaging waste*, Law – theory and practice, vol. 35, no. 7–9, p. 1–14, (2018).
8. Perkić S. *Packaging waste in plant production* (2015).
9. Ordinance on the types of packaging for pesticides and fertilizers and on the destruction of pesticides and fertilizers ("Official Gazette of FRY" No. 35/99).
10. Regulation on categories, testing and classification of waste ("Official Gazette of RS", No. 56/2010).

11. Ordinance on the content of the declaration and instructions for the use of plant protection products, as well as the specific requirements and indications of risks and warnings for humans and the environment and the manner of handling the empty packaging of plant protection products ("Official Gazette of the Republic of Serbia" No. 21 / 2012).
12. Prpa G., Prpa Đ, Jovanović I., Mitrić D.: *Packaging and packaging waste management – with index numbers and procedures for flushing and inactivating toxic substances –* Belgrade, (2014).
13. Trumić M., Trumić M., Bogdanović G.: *Recycling processes for plastic waste with a special emphasis on mechanical treatment*, Recycling and sustainable development no. 5 p. 39–52, (2012).
14. Law on Packaging and Packaging Waste (Official Gazette of RS, No. 36/09, 95/2018 – State Law).
15. Law on Plant Protection Products (Official Gazette of the Republic of Serbia, No. 41/09).
16. Law on Waste Management "Official Gazette of RS", no. 36/2009 and 88/2010.

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AMBALAŽA ZA PESTICIDE I NJEN UTICAJ NA OČUVANJE ŽIVOTNE SREDINE

Abstrakt

Ambalaža kao neizostavni deo većine industrijskih proizvoda, zauzima veoma značajno mesto, kako u ekonomskom, tako i u ekološkom pogledu. Postizanje visokih prinosa danas se ne može zamisliti bez upotrebe mineralnih đubriva i pesticida za suzbijanje bolesti, štetočina i korova. Proizvodnjom i primenom raznih hemijskih supstanci u poljoprivredi ostaje pesticidno onečišćena ambalaža. Cilj rada je doprinos upoznavanju problematike upravljanja ambalažnim otpadom od primenjenih hemijskih supstanci u poljoprivredi, kao bitnom komponentom ukupne količine otpada u Srbiji i u drugim zemljama. Prikupljanje i uništavanje prazne ambalaže vrši se tako da ne deluje štetno na zdravlje ljudi, korisne organizme i životnu sredinu.

Ključne reči: *ambalaža, upravljanje otpadom, reciklaža, pesticidi, životna sredina*

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