IDENTIFICATION OF POLYMERS AND ANALYSIS OF LABELING SYMBOLS ON NON-ALCOHOLIC BEVERAGE PACKAGING

Veronica DRAGANCEA, ORCID ID: 0000-0002-5938-0410
Technical University of Moldova, Chisinau, Republic of Moldova

Rodica STURZA, ORCID ID: 0000-0002-2412-5874
Technical University of Moldova, Chisinau, Republic of Moldova

Aliona GHENDOV-MOȘANU, ORCID ID: 0000-0001-5214-3562
Technical University of Moldova, Chisinau, Republic of Moldova

Dmitri LAZACOVICI, ORCID ID: 0000-0001-9078-1098
Technical University of Moldova, Chisinau, Republic of Moldova

*Corresponding author: Veronica Dragancea, e-mail: veronica.dragancea@chim.utm.md

Packaging for non-alcoholic drinks is an important category of plastic products, with direct implications for food safety, environmental protection, and the efficiency of recycling systems. In the context of the transition to a circular economy, proper management of this packaging becomes an essential objective, contributing to the reduction of waste generation and the valorization of resources through recycling. The labeling standardizing of plastic materials, including Resin Identification Codes (RIC) and recycling symbols, represents a fundamental tool both for efficient selective collection and for correctly informing consumers. In this regard, the present study aims to identify the polymers used in soft drink packaging marketed in the Republic of Moldova and to analyze the uniformity of labeling symbols, in relation to current requirements for sustainable waste management.

For this study, 85 packages were collected from retail outlets and other commercial units. The polymer types (PET, HDPE, PP) were identified through visual examination and by verifying the resin identification codes (RIC) printed on the packages. For each sample, the presence of recycling symbols, food contact markings (the fork and glass pictogram), the Tidyman symbol (indicating consumer responsibility in waste management), and any additional symbols related to deposit-return systems or single-use product classification were recorded. All collected data were then consolidated and comparatively analyzed to evaluate the frequency and consistency of symbol application on soft drink packaging.

Polyethylene Terephthalate (PET or #1) was identified as the sole material used for all analyzed soft drink bottles. PET is clear, durable, lightweight, shatter-resistant, and provides an effective barrier against carbon dioxide, thereby helping carbonated beverages maintain their carbonation. Although the bottles themselves were made entirely of PET, 35% of the packaging included secondary components such as HDPE caps and PP labels. Regarding labeling practices, the Tidyman symbol was present on 71.42% of the samples, while the food-contact symbol appeared on 25%. The deposit-return mark was identified on 19% of the packages, and the “single-use” label on 10.71%. In 14.28% of the samples, the visible information was limited to the PET marking and a basic disposal pictogram, with no additional labeling.

The results highlight variability in the application of labeling symbols, indicating the absence of a uniform approach at the national level. The study confirms the need to harmonize labeling symbols and inscriptions on plastic packaging in accordance with European circular economy requirements. Standardizing these elements would improve the efficiency of selective collection, increase consumer awareness, and strengthen the national plastic waste management system.

Keywords: *circular economy, deposit packaging, HDPE, PET, PP, recycling symbols*

Acknowledgments. The research was funded within the project "Assessment of the risks associated with the migration of potentially toxic components from plastic food packaging on the market of the Republic of Moldova", ERMAP-MD, call "Stimulating excellence in scientific research", 2025-2026.