Functional classification and material characterization of plastic packaging in Flemish land litter to support effective reduction policies

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+Public Waste Agency of Flanders (OVAM)
Problem statement

• Littering, in particular of plastics, is a nuisance
• Ocean plastics largely originate from land-based sources, including littering

Need for effective measures to reduce land littering of plastics

• Little to no systematic information available on the functional and material composition of land litter
Research objectives

- Functional classification + Material characterization of plastic packaging in land litter

**Source:** Public Waste Agency of Flanders (OVAM)
Applied methodology

- Land litter sampling (OVAM), 2019 – 2021, covering all seasons
  - Public domain in Flanders divided in 10m*10m grid squares
    - Classified based on littering incidence and nuisance level
  - Selection of squares for statistical representative sampling
  - In selected squares: all litter collected
Applied methodology

8 fractions containing plastics

- Beverage cups and lids
- Other food packaging
- Single-use rigid plastic food packaging
- Single-use plastic food packaging film
- Packaging films - Non-food
- Other plastic packaging - Non-food
- Plastic bottles up to 3 l
- Plastic bags

Removal of non-plastic packaging

Plastic beverage cups and lids
Other plastic food packaging

37.3 kg
8 fractions containing plastics

- **Plastic** beverage cups and lids
- Other **plastic** food packaging
- Single-use rigid plastic food packaging
- Single-use plastic food packaging film
- Packaging films - Non-food
- Other plastic packaging - Non-food
- Plastic bottles up to 3 l
- Plastic bags

Sorting

- Beverage packaging
- Food packaging
- Non-food packaging
Functional classification

Beverage packaging
- Bottles
- Bottle caps
- Beverage pouches
- Cups and lids

Food packaging
- Rigid
- Films

Non-food packaging
- Rigid
- Films
- Bags
Materials characterization

Each classified item scanned with handheld NIR scanner

- PP, PET, PE, PS, PA, PLA, PVC and ‘other’ (identified polymers)
- Unidentified plastics (e.g., laminates)
- Plastic films with an aluminum barrier
- Black plastics
- XPS
Materials characterization

Each classified item scanned with handheld NIR scanner

- PP, PET, PE, PS, PA, PLA, PVC and ‘other’ (identified polymers)
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Each material fraction

- Weighed
- Number of items determined
Results functional classification

<table>
<thead>
<tr>
<th>Category</th>
<th>Mass%</th>
<th>Number%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottles</td>
<td>50.4%</td>
<td>10.1%</td>
</tr>
<tr>
<td>Beverage pouches</td>
<td>12.5%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Non-food - Rigid</td>
<td>8.9%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Loose bottle caps</td>
<td>5.7%</td>
<td>37.9%</td>
</tr>
<tr>
<td>Food - Rigid packaging</td>
<td>10.3%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Food - Packaging films</td>
<td>4.4%</td>
<td>26.2%</td>
</tr>
</tbody>
</table>
Results material characterization
Conclusions

• Deposit return system for PET bottles: potential reduction of 50% mass plastic packaging litter
  • Reduction only 5% of total land litter
• Packaging films: high ‘likeliness-to-get-littered’
  • Restrict use
  • Mentality change: both wrt littering and packaging use
• Plastic packaging in collected litter: 3 mass% of plastic packaging selectively collected at the source
• ‘Snapshot’ of litter composition in public domain in Flanders → not necessarily representative for other regions
Thank you!

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