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Nathalie Gontard

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Towards a Zero Plastic Bio-Economy

Professor Nathalie GONTARD

UMR IATE, INRA, UM, Bat 31, Pl. P Viala, 34060 Montpellier, France. nathalie.gontard@inra.fr

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Every year we use and discard the equivalent of our body weight in plastic, 90% of which will be released and will remain in our environment long after we have disappeared (Thompson et al. 2009).

Food and agricultural sectors consume most short usage duration and single use plastics (e.g. a few hours only for fresh foods), **almost half of the total plastic production** (more than 40% for food packaging, the largest sector of plastic application, and agriculture more than 5%) and constitute the bulk of the plastics already dispersed in the environment (Ellen Mc Arthur foundation, 2015). Plastic was a remarkable petrochemical discovery in the 1960s. They have revolutionised everyday life in all sectors: construction, the automotive industry, electronics and, above all, the food industry, where, when used as a lightweight, inexpensive packaging material, plastic has led to enormous progress in terms of food safety. Plastic packaging is indeed the essential element in preventing external contamination (chemical or microbial), preserving quality and product traceability as well as reducing losses and waste by protecting our food.

Today, providential plastic has turned into a time bomb, with the revelation of its long-term effects on health and the environment. It is accused of contaminating our food and polluting our environment.

Petro-chemical plastic is persistent and 90% ends up in our environment where it will degrade into micro- and nano-particles in a few hundred years. **Plastic particles have already been detected in many foods, including tap water. Once they reach the micro and nanometric size, they have the ability to diffuse everywhere**, even from landfilling stations where they accumulate, up to the organs of living beings (including humans) where they are expected to accumulate and lead to potential dysfunctions.

Most efforts are currently focused on intensive recycling to kill two birds with one stone: both to solve the environmental issue and to develop a plastic waste economy. However, recycling aligns with circular economy principles if, and only if, it is a closed loop recycling i.e. the recycled material is similar to the virgin one. Closed loop recycling is applicable to only a few percentage of specific plastic (e.g. PET bottles, Barthelemy et al. 2014). **Widespread recycling is a range of open-loop processes, usually called “down cycling” that just postpones, but not eradicates, the emission of plastic waste in the environment**, as the resulting material is partially degraded and not recyclable anymore to produce the same product.

It is important to know that **recycling is only part of a circular economy if the loop can be reproduced infinitely**, which is virtually the case for glass or metal. Biodegradable materials are a natural part of the biological cycle of organic matter, which ensures unlimited renewal.

The recycling of plastic does not therefore represent a step towards saving our earth's ecosystem from the potential harm of waste, even if it can modestly contribute to delaying it.

Eco-efficient actions have still to be developed urgently in this sector to **stop the indiscriminate use of persistent plastic and start changing agricultural and food practicing for alternative eco-friendly ones.**

There is only one solution: to rethink the entire cycle of plastic materials in the more general context of a circular bio-economy where the future of waste will be a key element in our consumption choices. And coordinate our efforts internationally, because small particles of waste do not respect borders. The ban on putting plastic waste in landfills, sending it instead to be recycled or incinerated (although this option is not recommended and requires a purification stage) is a first step (EC resolution 3016/C482/09) .

Further measures are expected and must be immediately and wholeheartedly supported: (1) effectively reduce our plastic consumption by consuming plastics differently and consider phasing them out of the market¹ (2) replace plastics wherever possible with biodegradable alternatives (not to be confused with bio-sourced or compostable products) provided this does not have a negative impact on agricultural production for human consumption and does not harm the environment and (3) only retain irreplaceable plastics that are effectively recycled in a closed loop, as is potentially the case for PET bottles.

References

Barthélémy E., Spyropoulos D., Milana M.R., Pfaff K., Gontard N., Lampi E., Castle L. 2014. Safety evaluation of mechanical recycling processes used to produce polyethylene terephthalate (PET) intended for food contact applications Journal: TFAC: Food Additives & Contaminants: Part A. Vol 31(3) 490-497.

Thompson et al. 2009 Plastics, the environment and human health: current consensus and future trends. Phil. Trans. R. Soc. B 364

<https://www.ellenmacarthurfoundation.org/publications/the-new-plastics-economy-rethinking-the-future-of-plastics>

Déchets plastiques dans l'environnement - Résolution du Parlement européen du 14 janvier 2014 sur une stratégie européenne en matière de déchets plastiques dans l'environnement (2013/2113(INI)) (2016/C 482/09)

¹ http://www.socialter.fr/es/module/99999672/449/non_la_surconsommation_de_bouteilles_plastiques_nest_pas_irrmdiable_