

COMMITTEE ON TOXICITY OF CHEMICALS IN FOOD, CONSUMER PRODUCTS AND THE ENVIRONMENT

Position paper on the alternatives to conventional plastics for food & drinks packaging

1. In conjunction with pressure from environmentally aware consumers and the “*blue planet effect*” (Dunn *et al.*, 2020)¹, recent years have seen a major global increase in the development and use of alternative biobased materials to conventional plastics for food & drinks packaging.
2. Risk assessment advice on biobased food contact materials (BBFCMs) has been increasingly requested from the Food Standards Agency (FSA) so it was therefore considered timely for Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) to review the available toxicological information on BBFCMs.
3. The following position paper ([ANNEX A](#)) summarises discussions that have taken place so far at COT and future work including reasons for prioritisation as well as identifying the individual BBFCMs that will be further reviewed.

Questions for the Committee

- i) Does the position paper outline and summarise the discussions thus far on alternatives biobased materials to conventional plastics for food & drinks packaging?
- ii) Any other comments on the structure and content of the position paper?

Secretariat
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¹ Dunn, M.E., Mills, M. and Veríssimo, D., 2020. Evaluating the impact of the documentary series Blue Planet II on viewers' plastic consumption behaviors. *Conservation Science and Practice*, 2(10), p.e280.



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Background and Introduction

1. In conjunction with pressure from environmentally aware consumers and the “blue planet effect” (Dunn *et al.*, 2020)², recent years have seen a major global increase in the development and use of alternative biobased materials to conventional plastics for food & drinks packaging.

2. These alternatives are a diverse complex set of materials and blends. The materials are usually derived from living matter (animal, plant or fungal biomass) and are partially or wholly made of substances that are naturally available or are synthesised from biomass, such as sugarcane, corn, and algae. Some examples include but not limited to wheat straws; beeswax wraps to replace clingfilm; and bamboo/rice husk for paper coffee cups. In the past, British fish and chips were served in a wrapping of old newspapers³ serving as paper/cardboard⁴.

3. They are usually classified into three main groups:

- Biobased or partially biobased non-biodegradable plastics and biobased technical performance polymers;
- Bioplastics that are both biobased and biodegradable;
- Plastics that are based on fossil resources and are biodegradable.

4. Advice on biobased food contact materials (BBFCMs) has been increasingly requested from the Food Standards Agency (FSA) so it was therefore considered timely for Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) to review the available toxicological information on BBFCMs. The following position paper summarises preliminary discussions at COT and their future work including reasons for prioritisation as well as identifying the individual BBFCMs recommended for further review.

² Dunn, M.E., Mills, M. and Veríssimo, D., 2020. Evaluating the impact of the documentary series Blue Planet II on viewers' plastic consumption behaviors. *Conservation Science and Practice*, 2(10), p.e280.

³ Walker, H. ed., 1998. *Fish: Food from the Waters*. Oxford Symposium.

⁴ A practice used until the late 1980s when it was ruled unsafe for food to come into contact with newspaper ink without grease-proof paper in between.

This is a draft statement for discussion. It does not reflect the final views of the Committee and should not be cited

COT discussions and papers

5. There have been several papers presented to the COT which included an array of information: the limited research that has been undertaken into the development of BBFCMs and the associated risks to the consumer (TOX/2020/24⁵); relevant market data⁶ and reports⁷ (TOX/2020/50⁸); a table of enquiries received from the FSA Food Contact Material (FCM) Policy Team (TOX/2020/50⁹) -these included Non-intentionally added substances (NIAS¹⁰) (e.g. formaldehyde in bamboo cups) and allergic potential enquiries (e.g. chitin and wheat); as well as a discussion paper focussing on the immunogenicity and allergenicity of chitin and chitosan-based BBFCMs (TOX/2020/42¹¹).

COT conclusions

6. The COT acknowledged the challenges and complexities associated with BBFCMs as well as highlighting several limitations and knowledge gaps on BBFCMs research and regulation. These included labelling¹², composition (including biodegradability), contaminants and standardisation. Members noted that quantitative information was needed on contamination, degradation, migration of chemicals and allergens during the manufacture of commercial BBFCMs, as well as environmental impacts after disposal (e.g. formation of micro/nano-plastics upon entering landfill or from energy-from-waste processes). Specifically, limited evidence exists to demonstrate BBFCMs in direct food-contact applications meets similar standards of safety as conventional plastics.

7. Members agreed that there was a general lack of information on the presence of nanomaterials in BBFCMs. Therefore, overall, and specific migration of all the possible migrating substances (nanofillers, plasticizers, antimicrobial additives, micron and nano sized plastic particles etc.) under different testing conditions would improve identification of potential hazards and provide an estimation of exposure data. This would allow better demonstration that these novel biodegradable packages meet comparable requirements. Furthermore, toxicity studies including long term *in vivo* studies may be needed for a more comprehensive risk assessment.

Priority BBFCMs to review for health risk assessment and next steps

⁵ https://cot.food.gov.uk/sites/default/files/2020-08/tox202024plasticpackagingalternatives_accessibleinadobeopro_0.pdf

⁶ https://docs.european-bioplastics.org/publications/market_data/Report_Bioplastics_Market_Data_2019.pdf

⁷ Market and safety analysis of alternatives to plastic food packaging (Renton, 2020).

<https://www.food.gov.uk/research/research-projects/market-and-safety-analysis-of-alternatives-to-plastic-food-packaging>

⁸ https://cot.food.gov.uk/sites/default/files/2020-10/TOX_2020_50%20BBFCM%20paper%20update.pdf

⁹ https://cot.food.gov.uk/sites/default/files/2020-10/TOX_2020_50%20BBFCM%20paper%20update.pdf

¹⁰ Non-intentionally added substances are chemicals that are present in a FCM but have not been added for a technical reason during the production process

¹¹ <https://cot.food.gov.uk/sites/default/files/2020-09/TOX-20-42%20Chitosan%20%26%20chitin%20BBFCMs.pdf>

¹² The COT was informed that that there was currently no legal requirement to have labelling on packaging to state if it was biobased, or whether it contained allergens.

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8. The COT agreed a priority BBFCMs list for health risk assessment based on potential health hazards, usage, and UK policy interest (TOX/2021/01¹³). The prioritised materials to be reviewed are: polylactic acid (PLA), starches, bamboo biocomposites and polyhydroxyalkanoates (PHA)¹⁴. This was not a closed list, other priority BBFCMs could be added as necessary based on these criteria.
9. Health risk assessments of the prioritised BBFCMs should be considered within the context of life cycle assessment studies, which included environmental hazards to address indirect impacts on human health. It was recognised that this was not all within the remit of the COT. It was noted that the Department for Environment, Food and Rural Affairs (DEFRA) (and its expert scientific committee, the Hazardous Substances Advisory Committee, HSAC), the Organisation for Economic Co-operation and Development (OECD), and the Environment Agency were assessing the wider environmental impacts. These should be monitored to identify additional potential hazards to human health.
10. Further assessments of intelligent packaging¹⁵ (also known as smart packaging) and nanomaterials used within food packaging will be reviewed as policy priorities and resources permit as part of the Committee's work¹⁶ and would include bio sensors as well as nano coatings.

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¹³ <https://cot.food.gov.uk/sites/default/files/2021-01/TOX-2021-01%20Matters%20Arising%20Final.pdf>

¹⁴ <https://cot.food.gov.uk/sites/default/files/2021-01/TOX-2021-01%20Matters%20Arising%20Final.pdf>

¹⁵ Intelligent packaging: packaging system that is capable of carrying out intelligent functions (such as sensing, detecting, tracing, recording and communicating) to facilitate decision making to extend shelf life, improve quality and enhance safety.

¹⁶ <https://cot.food.gov.uk/sites/default/files/2021-05/COT%20Draft%20Minutes%20Feb%20Final.pdf>