



## With the EU Regulations for the Use of Single-Use Plastics, Consumers have a Question: are the Bio-Based Alternative Materials a Risk for Coeliacs?

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Currently, biodegradable tableware (cutlery, plates, straws...) made of wheat or other cereals is in use. Today, the number of alternatives to plastic is increasing fastly. While coeliac sufferers share the concern for taking care of the planet, nonetheless there is a worry about how safe are these materials are for people on a gluten-free diet. What happens when they eat a gluten-free dish from a plate made of wheat bran? And what happens if they also use a, a knife, fork, and spoon made from the same material? Or if they drink a smoothie through an edible straw? Does this contaminate their food or drink with gluten? Although the regulations are different in each country, it is true that many restaurants and food producers are using this type of tableware made from bio-based materials that are more respectful of the environment. It is even more common regarding take away food, food trucks, or events such as festivals, making it extremely difficult for coeliac patients to eat safely because they have to ensure there is no cross-contamination at these places. This fact is not always easy, and they need to have a back-up plan.

In 2019, Directive (EU) 2019/904 was approved. Its article 5 includes the reduction of certain plastic products, and establishes that EU member states will stop the introduction of single- on the European market of single-use plastic product, due to their impact on the environment.

The problem with this for the coeliac patients is that these alternative-to-plastic materials that are being developed come, in many cases, from gluten-containing cereals such as wheat or barley, but also from pasta or biscuits. For this reason, in past years some coeliac associations have promoted small studies to see if there is migration from the tableware to food, since the stability of many of these materials is highly variable and changes depending on the food and the temperature. One such study is that done by the Spanish Federation of Coeliac Societies (FACE) with the University of Seville (M. van der Hofstadt., et al. Mazorca, 2020) [1]. From the results of these small trials, it is know that the migration does occur from packaging (biodegradables made from gluten-containing cereals) to food, and therefore is an emergent risk for people with

coeliac disease. The Coeliac Association of Italy (AIC) is running a larger trial on this topic in which various types of packaging (from cereals, pasta, etc.) are studied in depth because the Regulations 1935/2004 (article 3) and 178/2002 (article 14) [2,3] include the need to monitor any migrations and protect the vulnerable population, respectively. However, the regulations cover plastic materials, cereals or preparations such as pasta or biscuits are not considered raw materials to control during the manufacturing process.

### What was researched in aforementioned small trials?

The main question they asked was whether gluten-free products were contaminated after they came into contact with biodegradable tableware products [4,5].

### The Results

It is important to noe that the tests show that gluten-free food is affected by the non-gluten-free tableware.

Coeliac societies know from conversations with the industry itself that at this time manufacturers are very focused on achieving higher incorporation rates of bio-based materials and on improving the biodegradability/compostability of their materials in different media and conditions, although it seems they are not yet thinking about other issues or potential implications. However, coeliac societies and other patient associations consider it essential not to ignore the situation. The stakeholders think more studies should be carried out with the aim of confirming the absence of allergens in these types of products, evaluating their safety for all those patients, who make up a large part of consumers.

Most biodegradable products have a significant effect on gluten-free foodstuffs, resulting in the gluten-free products no longer being gluten-free. Depending on the kind of product and the temperature, the level of contamination differs. These coeliac associations did their experiments in different laboratories, using the methods recognized by the *Codex Alimentarius* to determine the amount of gluten content in food (ELISA R5), and in some cases also used other methods to compare (G12), with the aim of having more-accurate results.

Results of the experiments with biodegradable tableware done by different coeliac societies (The Dutch Coeliac Society (NCV) and the Spanish Federation of Coeliac Societies, (FACE)).

| GF Product | Biodegradable tableware  | Gluten |
|------------|--|--------|
| Soup       | Edible bowl of wheat bran from Sligro (>8000 ppm)                    | 93ppm  |
| Milk       | Edible straws of Superhalm, made of wheat bran, apple pulp and sugar | 15ppm  |
| Sandwich   | Wheat bran plate, knife and fork of Biotrem (>40000 ppm)             | 24ppm  |

**Table 1:** Nutrilab - R-biopharm - Method: ELISA Sandwich R5.

| GF Product              | Biodegradable tableware | Gluten   |
|-------------------------|-------------------------|----------|
| Rice                    | Plate                   | 12ppm    |
| Rice - micro            | Plate                   | ND <3ppm |
| Vegetable cream         | Plate                   | >80ppm   |
| Vegetable cream - micro | Plate                   | >80ppm   |
| Hot Milk                | Plate                   | >80ppm   |
| Cold Milk - pipetted    | Straw                   | ND <3ppm |
| Hot Milk - pipetted     | Straw                   | ND <3ppm |

**Table 2:** AQUIMISA-Method: ELISA Sandwich R5.

|                                 | GlutenTox ELISA A1 - G12 | ELISA Sándwich R5 |
|---------------------------------|--------------------------|-------------------|
| Rice                            | <10ppm                   | <10ppm            |
| Rice - micro                    | <1.56ppm                 | <5ppm             |
| Vegetable cream                 | <10ppm                   | <10ppm            |
| Vegetable cream - micro         | 10-20ppm                 | 10-20ppm          |
| Hot Milk                        | 10-20ppm                 | 10-20ppm          |
| Cold Milk - pipetted with straw | <1.56ppm                 | <5ppm             |
| Hot Milk - pipetted with straw  | <1.56ppm                 | <5ppm             |

**Table 3:** University of Seville - Methods: ELISA R5 and G12.

The test results show that gluten from biodegradable tableware contaminates food and drinks. It is therefore safer not to use these products.

Thus, it should be noted that

- Recommendation 2019/794 [6]. (which is the most recent) does not specifically include biodegradable packaging made from gluten-containing cereals in the contact materials that must be sampled to test overall migration.
- Currently EFSA (*European Food Safety Authority*) has not published any opinion or benchmark study.

- AOECS (Association of European Coeliac Societies) is considering this topic, waiting for the results of the study under way in Italy. A letter was sent to the European Commission and EFSA in 2021 asking about this matter a response has not yet been received [7,8].
- It is important for coeliacs to be careful with this type of products and try to use those that come from raw materials other than plastic, in particular from cereals or materials safe for coeliacs.

**Bibliography**

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