

Gluten Contamination in Commercial Spices in the United States

Cynthia Kupper, Sara Boswell, Channon Quinn and Laura Allred
Gluten Intolerance Group, Auburn, Washington, USA

AIMS: The U.S. Food and Drug Administration recently conducted the largest recall in the agency’s history after it was reported that peanut protein was present in several lots of cumin from various suppliers. This incident combined with data from a 2011 survey in Canada that found low-level gluten contamination in 24% of commercially available single-ingredient spices led to an investigation of the presence and level of gluten in commercial spices sold in the U.S.

METHODS: Samples of eight common single ingredient spices (cumin, coriander, cloves, fenugreek, sage, thyme, white pepper and mace) from multiple suppliers were analyzed for gluten using the AgraQuant Gluten G12 ELISA (Romer Labs, Union, MO USA) the AllerTek Gluten Skerritt ELISA (ELISA Technologies, Gainesville, FL USA) and the R5 Gliadin ELISA (R-BioPharm, Washington, MO USA).

| Sample ID | Spice | G12 ELISA | Skerritt ELISA | R5 ELISA |
|-----------|--------------|-----------|----------------|----------|
| 932B | Cloves | <4 | <5 | <5 |
| 143C | Cloves | <4 | 6 | <5 |
| 201A | Cloves | <4 | 10.8 | <5 |
| 201D | Cloves | <4 | 8.2 | <5 |
| 143B | Coriander | 15.0 | 40.2 | 8.7 |
| 143A | Coriander | 4.8 | 53.6 | 6 |
| 201C | Coriander | <4 | 9.8 | 5.6 |
| 143D | Cumin | <4 | 5.2 | <5 |
| 143B | Cumin | <4 | 7.6 | <5 |
| 201C | Cumin | <4 | <5 | <5 |
| 143A | Cumin | <4 | <5 | <5 |
| 201A | Fenugreek | 18.9 | >80 | 28 |
| 143B | Fenugreek | 24.2 | >80 | 49.7 |
| 201B | Mace | <4 | 15 | <5 |
| 143A | Mace | <4 | <5 | <5 |
| 143A | Sage | <4 | 5.7 | <5 |
| 932C | Sage | <4 | 11.5 | 15.1 |
| 201B | Sage | <4 | 13.2 | 17.9 |
| 143B | Thyme | 7.3 | 20.1 | 24.5 |
| 143D | Thyme | <4 | 5.0 | <5 |
| 201C | Thyme | <4 | <5 | <5 |
| 201A | Thyme | <4 | <5 | <5 |
| 143B | White Pepper | <4 | 5.5 | <5 |
| 932A | White Pepper | <4 | 8.7 | <5 |

RESULTS: Of the 25 total samples analyzed, 18 (72%) had detectable gluten levels in at least one assay, and 8 (32%) were detected by at least two of the assays used. Gluten levels were greater than 10 ppm (the GFCO threshold) by at least one method in 9 (36%) of the samples tested, and in at least two methods in 6 (24%) samples. Three (12%) of the samples, representing two different spices, had levels of gluten greater than 20 ppm in at least two of the assays.

CONCLUSION: The generally low level of gluten in these products indicates issues with cross-contamination rather than economically motivated adulteration, but the large number of samples that contain gluten draws attention to the need for tighter allergen/gluten controls in spice production and packaging facilities. All eight spices gave at least one positive result, indicating the widespread nature of the contamination. The greatest discrepancy in test results was the number of low-level positive results (10) detected by the Skerritt assay in samples that were below the limit of detection in the R5 and G12 assays. This may result from contamination with a processed product such as wheat starch that contains higher levels of residual glutenins than gliadins, and some spice companies have reported using wheat starch for “push through” cleaning between spice batches. These results indicate that spices should be screened for gluten as well as allergens, and that the choice of test method should be based on the likely contamination source.

