

CODEX ALIMENTARIUS COMMISSION



Food and Agriculture
Organization of the
United Nations



World Health
Organization

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Viale delle Terme di Caracalla, 00153 Rome, Italy - Tel: (+39) 06 57051 - E-mail: codex@fao.org - www.codexalimentarius.org

Agenda Item 11

CX/CF 22/15/11

April 2022

JOINT FAO/WHO FOOD STANDARDS PROGRAMME CODEX COMMITTEE ON CONTAMINANTS IN FOODS

15th Session
Virtual
9-13 and 24 May 2022

MAXIMUM LEVELS FOR TOTAL AFLATOXINS AND OCHRATOXIN A IN NUTMEG, DRIED CHILI AND PAPRIKA, GINGER, PEPPER AND TURMERIC AND ASSOCIATED SAMPLING PLANS

(At Step 4)

(Prepared by the Electronic Working Group led by India)

I. Background

1. At the 11th Session of the Committee on Contaminants in Foods (CCCF11, 2017), India submitted a new work proposal for the establishment of individual maximum levels (MLs) for total aflatoxins (AFT) and ochratoxin A (OTA) for five spices: nutmeg, chilli and paprika, ginger, pepper and turmeric. Based on this, the Committee agreed to start new work on MLs for AFT and OTA in nutmeg, chilli and paprika, ginger, pepper and turmeric through an Electronic Working Group (EWG) chaired by India¹. The 40th Session of the Codex Alimentarius Commission (CAC40, 2017) approved the new work².
2. The work was suspended in 2018 to ensure implementation of the *Code of practice for the prevention and reduction of mycotoxins contamination in spices* (CXC 17-2017) and to resume discussion in 3 years' time to reconsider the MLs based on new/additional data submitted to GEMS/Food. The Codex Secretariat further recalled that the JECFA Secretariat would issue a call for data in 3 years' time to assist the work of the EWGs following their re-establishment by CCCF.³ This call for data was issued on 22nd July 2021 and sought data until 15th October 2021⁴.
3. CCCF14 (2021) agreed to re-establish the EWG, chaired by India, working in English, to:⁵
 - a. consider new or additional data available on GEMS/Food
 - b. update the working paper that was last presented at CCCF12 (2018) (CX/CF 18/12/11) and
 - c. prepare revised proposals for MLs for total aflatoxins and ochratoxin A in spices: nutmeg, chili and paprika, ginger, pepper and turmeric, respectively, for comments and consideration by CCCF15 (2022) and associated sampling plans taking into account the new and old datasets available on GEMS/Food

II. Work Process

4. An invitation for nomination for EWG participants was issued by the Codex Secretariat. 17 members and 2 observers registered for the EWG. Available GEMS/Food data from the year 2011 to 2021 was analyzed and presented to the EWG members, based on the comments the document was modified and separately data from 2018-2021 was analyzed and presented in the paper. The analysis of the data is presented in Appendix II to this paper.

¹ Reports and working documents of CCCF can be found on the Codex website:
<https://www.fao.org/fao-who-codexalimentarius/committees/committee/related-meetings/tr/?committee=CCCF>
REP16/CF10, paras 143-148; REP17/CF11, paras. 118 – 124, Appendix VII

² REP17/CAC40, Appendix VI

³ REP18/CF12, paras. 116 – 119, Appendix VIII

⁴ Calls for data, summaries and full reports of JECFA meetings are available at the relevant FAO and WHO sites:
FAO: <http://www.fao.org/food-safety/resources/publications/en/>
WHO: www.who.int/foodsafety/publications/jecfa/en/

⁵ REP21/CF14, paras. 139 – 145

5. The EWG could not consider the sampling plan since the draft was circulated only once and no suggestion was received from the EWG members regarding the same. However, it is suggested to consider ISO 948 (Spices and Condiments-Sampling) for the EWG work on sampling plan.

III. Objective

6. The main objective of the work is to facilitate fair practices in international food trade and to protect public health by harmonizing the MLs of mycotoxins, specifically aflatoxins (Afs) and ochratoxin A (OTA), in dried/dehydrated forms of nutmeg, chili and paprika, ginger, pepper, and turmeric. The MLs for various mycotoxins in spices vary widely across the world (Table 2) and the lack of harmonization affects global trade of spices. Some countries have regulations for mycotoxins specifying different tolerated levels for individual foods, while others have set only one tolerated level for instance for “all foods” which also include spices.
7. This paper sets out the analysis of the data and information as presented in Appendix II based on data available from GEMS/Food and proposes MLs for total aflatoxins (AFT) and OTA in the different spices.

IV. Relevance

8. Nutmeg (*Myristica fragrans.*), chilli and paprika (*Capsicum annum L.*), ginger (*Zingiber officinale L.*), pepper (*Piper nigrum L.*), and turmeric (*Curcuma longa L.*) in dried or dehydrated forms are spices prominently produced and traded globally in both whole and ground forms. These spices are reported to have higher susceptibility towards mycotoxin contamination compared to other spices.
9. AFs were evaluated by JECFA at its 36th (1990), 46th (1996), 49th (1997), 56th (2001) and 68th (2007) meetings. Recently JECFA83 (2016) reaffirmed the conclusions of JECFA49 that AFs are among the most potent mutagenic and carcinogenic substances known, based on studies in test species and human epidemiological studies, OTA was evaluated by the JECFA at its 37th (1990), 44th (1995) and 56th (2001) meetings.
10. The hazardous nature of mycotoxins to humans and animals has necessitated the need for establishment of control measures and tolerance levels by national and international authorities. Many countries in the world have MLs for AFT and OTA in spices. But different regulations (MLs) for AFs in various countries are a potential impediment to the international trade.

V. Related Codex Standards for AFs and OTA in spices

11. There are no Codex MLs for mycotoxins in spices set by CAC. Relevant Codex Commodity Standards to which MLs would apply include CXS 326-2017 and CXS 343-2021. The *Code of practice for the prevention and reduction of mycotoxins contamination in spices* (CXC 78-2017) was adopted in 2017.

VI. JECFA “summary and conclusions”

12. In the JECFA83 report, it is mentioned that the high consumption of rice and wheat in some countries means that these cereals may account for up to 80% of dietary aflatoxin exposure for those GEMS/Food cluster diets. In the report, there is no mention about mycotoxins in spices.

VII. Occurrence and Consumption Data

13. Data available in the GEMS/Food database.

VIII. Observation

Based on total Aflatoxins data available GEMS/Food database during 2011-2021

14. It is observed that for Total Aflatoxins total data points available in GEMS/Food database for 5 spices Viz. Chillies (565), Nutmeg (1002), Ginger (437), Pepper (1478) and Turmeric (67) are **3549**.
15. For Ochratoxin A total data points available in GEMS/Food database for 5 spices Viz. Chillies (532), Nutmeg (1371), Ginger (515), Pepper (1986) and Turmeric (100) are **4504**.
16. The data was analyzed in the following ranges for Aflatoxins total Viz. (> 20 µg/kg), (> 15 to ≤ 20 µg/kg), (10-15 µg/kg) and ND/0 values and for Ochratoxin A Viz. (10-15 µg/kg), (> 15 to ≤ 20 µg/kg), (> 20 µg/kg) and ND/0 values.
17. Considering hypothetical ML for Total Aflatoxins [10], percentage of samples above [10] for Chillies 10.26%, Nutmeg 7.29%, Ginger 6.64%, Pepper 0.41% and Turmeric 0.0%.
18. Considering hypothetical ML for Total Aflatoxins [15], percentage of samples above [15] for Chillies 6.37%, Nutmeg 5.29%, Ginger 2.75%, Pepper 0.27% and Turmeric 0.0%.

19. Considering hypothetical ML for Total Aflatoxins [20], percentage of samples above [20] are for Chillies 4.6%, Nutmeg 3.79%, Ginger 2.06%, Pepper 0.07% and Turmeric 0.0%.
20. Considering hypothetical ML for Ochratoxin A [10], percentage of samples above [10] for Chillies 33.22%, Nutmeg 8.39%, Ginger 1.75 %, Pepper 1.51% and Turmeric 0.0%.
21. Considering hypothetical ML for Ochratoxin A [15], percentage of samples above [15] for Chillies 25.89%, Nutmeg 5.62%, Ginger 0.78%, Pepper 0.75% and Turmeric 0.0%.
22. Considering hypothetical ML for Ochratoxin A [20], percentage of samples above [20] for Chillies 20.06%, Nutmeg 4.74%, Ginger 0.39%, Pepper 0.60% and Turmeric 0.0%.
23. Considering lower rejections rate in Pepper and Turmeric, hypothetical ML for Total Aflatoxins [5], percentage of samples above [5] for Pepper 1.36% and Turmeric 1.49%.

Based on total Aflatoxins data available GEMS/Food database during 2018-2021 (Post adoption of code of practice for the prevention and reduction of mycotoxins in spices, CXC 17-2017)

24. Total Aflatoxins total data points available in GEMS/Food database for 5 spices *Viz.* Chillies (303), Nutmeg (152), Ginger (124), Pepper (449) and Turmeric (48) are **1076**.
25. For Ochratoxin A total data points available in GEMS/Food database for 5 spices *Viz.* Chillies (181), Nutmeg (247), Ginger (146), Pepper (557) and Turmeric (13) are 1144.
26. The data was analyzed in the following ranges for Aflatoxins total *Viz.* (**> 20 µg/kg**), (**> 15 to ≤ 20 µg/kg**), (**10-15 µg/kg**) and **ND/0** values and for Ochratoxin A *Viz.* (**10-15 µg/kg**), (**> 15 to ≤ 20 µg/kg**), (**> 20 µg/kg**) and **ND/0** values.
27. Considering hypothetical ML for Total Aflatoxins [10], percentage of samples above [10] for Chillies 10.89%, Nutmeg 11.84%, Ginger 7.26%, Pepper 0.89% and Turmeric 0.0%.
28. Considering hypothetical ML for Total Aflatoxins [15], percentage of samples above [15] for Chillies 6.27%, Nutmeg 10.52%, Ginger 2.42%, Pepper 0.89% and Turmeric 0.0%.
29. Considering hypothetical ML for Total Aflatoxins [20], percentage of samples above [20] are for Chillies 4.95%, Nutmeg 8.55%, Ginger 0.81%, Pepper 0.22% and Turmeric 0.0%.
30. Considering hypothetical ML for Ochratoxin A [10], percentage of samples above [10] for Chillies 36.46%, Nutmeg 7.28%, Ginger 2.05 %, Pepper 0.9% and Turmeric 0.0%.
31. Considering hypothetical ML for Ochratoxin A [15], percentage of samples above [15] for Chillies 25.41%, Nutmeg 5.66%, Ginger 0.68%, Pepper 0.72% and Turmeric 0.0%.
32. Considering hypothetical ML for Ochratoxin A [20], percentage of samples above [20] for Chillies 16.57%, Nutmeg 4.45%, Ginger 0.68%, Pepper 0.54% and Turmeric 0.0%.
33. Considering lower rejections rate in Pepper and Turmeric, hypothetical ML for Ochratoxin A [5], percentage of samples above [5] for Pepper 2% and Turmeric 2.08%.
34. Percentage rejections were noted to be higher for the Chillies, Nutmeg and Ginger; however for Pepper and Turmeric the percentage rejections were lower (Annex I). It is also noted that based on GEMS/Food cluster diets- the global average consumption of spices is 2.6 g/day which is very less as compared to tree nuts with an average consumption of 36.9 g/day (Table 1). The Codex MLs for Aflatoxin Total are set at 10 µg/kg for ready to eat tree nuts and 15 µg/kg for tree nuts destined for further processing. Since the consumption of spices is very low setting a higher MLs may not affect consumer health, however considering many spices are a high value commodity in international trade, a harmonized ML would ensure fair practices in trade as it is noted that there are different MLs set by various countries (Table 2).

IX. Sampling plan

35. See paragraph 5. The EWG could not consider the sampling plan since the draft was circulated only once and no suggestion was received from the EWG members regarding the same. However, it is suggested to consider ISO 948 (Spices and Condiments-Sampling) for the EWG work on sampling plan.

X. Conclusions

36. The EWG concludes that there is sufficient justification to recommend MLs as indicated in Appendix I.
37. Sampling plans have not been considered at this stage. It is suggested to consider ISO 948 (Spices and Condiments- Sampling) for the EWG work on sampling plan.

XI. Recommendations:**38.** CCCF is invited to consider:

- a.** consider the recommendations for maximum levels as presented in Appendix I based on the consideration provided in Section VII and the data/information provided in Appendix II and the possible advancement of the MLs to final adoption by CAC45 (2022) and
- b.** further work of sampling plans as indicated in paragraphs 5 and 37.

APPENDIX I**(For consideration by CCCF)****1. Aflatoxin Total**

Please consider separate MLs for (1.1) nutmeg, chillies and paprika, ginger and (1.2) pepper and turmeric or (1.3) a single ML for all the considered spices i.e. chillies, nutmeg, ginger, pepper and turmeric:

1.1 Nutmeg, Chillies and Paprika, Ginger: = 20 µg/kg

1.2 Pepper and Turmeric: 10 or 15 or 20 µg/kg

1.3 For all the considered spices Chillies, Nutmeg, Ginger, Pepper and Turmeric: 20 µg/kg

2. Ochratoxin A

Please consider a single ML for chillies, nutmeg, ginger, pepper and turmeric:

2.1 Chillies, Nutmeg, Ginger, Pepper and Turmeric: 20 µg/kg

3. Sampling Plans

Please consider whether ISO 948 is an appropriate sampling plan or provide other suitable alternatives:

3.1 ISO 948 (Spices and Condiments- Sampling).

APPENDIX II
(For information)

Table 1. Cluster diet of Spices and Tree nuts*

Levl CODE	Lev2 CODE	Lev2NAME	G01	G02	G03	G04	G05	G06	G07	G08	G09	G10	G11	G12	G13	G14	G15	G16	G17
			g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day	g/day
2	22	Tree nuts (excl. groundnut)	3.6	3.3	5.1	8.6	15.9	9.3	5.2	7.0	13.2	4.2	9.2	28.3	6.7	157.2	4.0	0.0	347.3
5	53	Spices & condiments	2.1	1.3	2.0	6.5	4.4	2.0	1.3	1.3	1.8	1.9	3.3	2.5	2.2	7.0	3.3	0.5	1.4

*Source: GEMS/ Food cluster diets- 2012

(<https://www.who.int/data/gho/samples/food-cluster-diets>)

Average Consumption of Spices & Condiments = 2.6 g/day

Average Consumption of Tree nuts = 36.9 g/day

G01, Afghanistan, Algeria, Azerbaijan, Iraq, Jordan, Libya, Mauritania, Mongolia, Morocco, Occupied Palestinian Territory, Pakistan, Syrian Arab Republic, Tunisia, Turkmenistan, Uzbekistan, Yemen
G02, Albania, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyzstan, Montenegro, Republic of Moldova, Ukraine
G03, Angola, Benin, Burundi, Cameroon, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Ghana, Guinea, Liberia, Madagascar, Mozambique, Paraguay, Togo, Zambia
G04, Antigua and Barbuda, Bahamas, Barbados, Brunei Darussalam, French Polynesia, Grenada, Israel, Jamaica, Kuwait, Netherlands Antilles, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Saudi Arabia, United Arab Emirates
G05, Argentina, Bolivia Plurinational State of , Brazil, Cape Verde, Chile, Colombia, Costa Rica, Djibouti, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, India, Malaysia, Maldives, Mauritius, Mexico, New Caledonia, Nicaragua, Panama, Peru, Seychelles, South Africa, Suriname, Tajikistan, The former Yugoslav Republic of Macedonia, Trinidad and Tobago, Venezuela Bolivarian Republic of
G06, Armenia, Cuba, Egypt, Greece, Iran Islamic Republic of , Lebanon, Turkey
G07, Australia, Bermuda, Finland, France, Iceland, Luxembourg, Norway, Switzerland, United Kingdom, Uruguay
G08, Austria, Germany, Poland, Spain
G09, Bangladesh, Cambodia, China, Democratic People's Republic of Korea, Guinea Bissau, Indonesia, Lao People's Democratic Republic, Myanmar, Nepal, Philippines, Sierra Leone, Thailand, Timor Leste, Viet Nam
G10, Belarus, Bulgaria, Canada, Croatia, Cyprus, Estonia, Italy, Japan, Latvia, Malta, New Zealand, Republic of Korea, Russian Federation, United States of America
G11, Belgium, Netherlands
G12, Belize, Dominica
G14, Comoros, Fiji Islands, Kiribati, Papua New Guinea, Solomon Islands, Sri Lanka, Vanuatu
G13, Ethiopia, Erythrea, South Sudan, Botswana, Burkina Faso, Central African Republic, Chad, Ethiopia PDR, Gambia, Haiti, Kenya, Malawi, Mali, Namibia, Niger, Nigeria, Senegal, Somalia, Sudan, Swaziland, United Republic of Tanzania, Zimbabwe
G16, Gabon, Rwanda, Uganda
G17, Samoa, Sao Tome and Principe
G15, Serbia, Czech Republic, Denmark, Hungary, Ireland, Lithuania, Portugal, Romania, Serbia and Montenegro, Slovakia, Slovenia, Sweden

Table 2: Maximum levels of mycotoxins set by some countries for spices/all food products

Sl. No.	Sl. No. Country/ Organization	Product	Aflatoxin Total (µg/kg)	Ochratoxin A (µg/kg)
1	Armenia	All foods		10
2	Barbados	All foods	20	
3	Brazil	Spices	20	30
4	Bulgaria	Spices	5	
5	Chile	Spices	10	
6	Colombia	All foods	10	
7	Cuba	All Foods	5	
8	European Union	Spices*	10	15a
				20b
9	Finland	All Spices	10	
10	Honduras	All Food Stuffs	1	
11	Hong Kong (SAR of China)	All Food Stuffs	15	
12	Iceland	Spices	10	15
13	India	All Spices	30	
14	Indonesia	Spices powder	20	
15	Iran (Islamic Republic of)	Spices	10	
16	Jamaica	Food and Grains	20	
17	Japan	All Foods	10	
18	Liechtenstein	Spices	10	
19	Malaysia	Other foods not specified , including spices	5	
20	Mauritius	All foods	10	
21	Norway	Spices	10	
22	Pakistan	Chilli	30	
23	Salvador	All foods	20	
24	Singapore	All foods except food for infants or young children	5	
25	South Africa	All food stuffs	10	
26	Sri Lanka	All foods	30	
27	Switzerland	Spices excluding Nutmeg	10	20
		Nutmeg	20	
28	Thailand	All foods	20	
29	Turkey	Spices	10	
30	USA	All food except milk	20	
31	Uruguay	All foods and spices	20	
32	Vietnam	All foods	10	

Spices*: Capsicum spp. (dried fruits thereof, whole or ground, including chillies, chilli powder, cayenne and paprika); Piper spp. (fruits thereof, including white and black pepper); Myristica fragrans (nutmeg); Zingiber officinale (ginger); Curcuma longa, based on Commission Regulation (EC) No 2174/2003. a - Spices mentioned in footnote*, except from Capsicum spp. (Ref: Commission Regulation (EC) No 2015/1137) b - Spices mentioned in footnote* from dried fruits of Capsicum spp. (Ref: Commission Regulation (EC) No 2015/1137

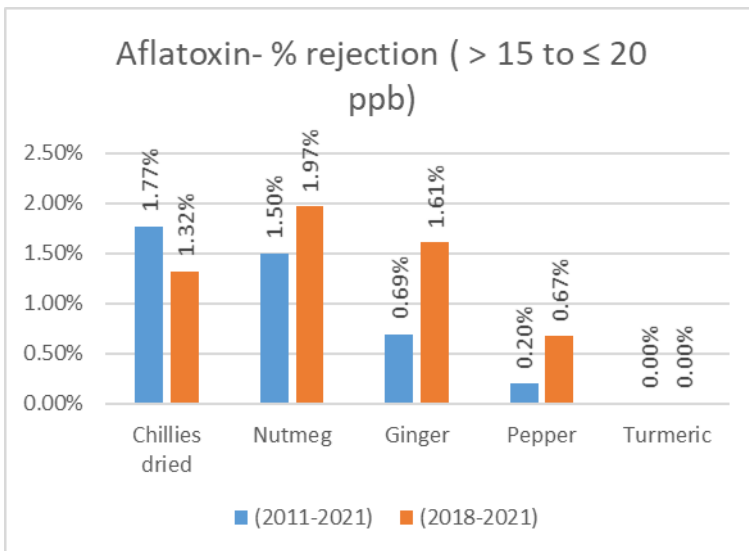
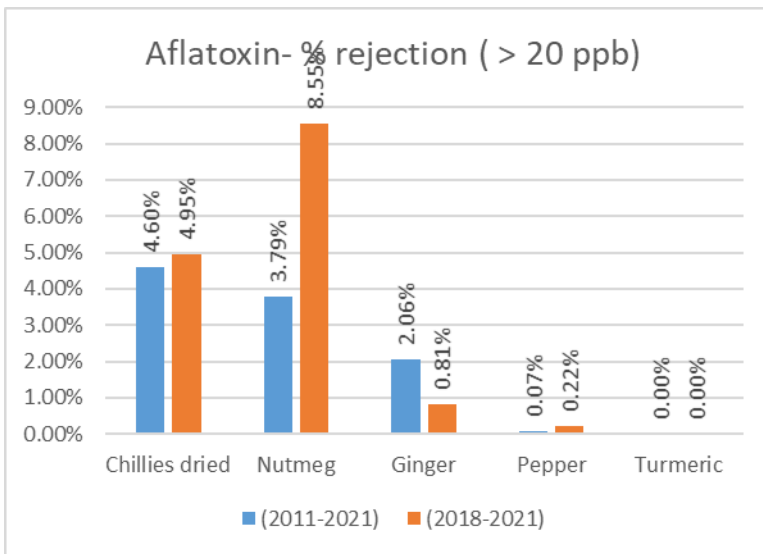
Source: Worldwide regulations for mycotoxins in food and feed in 2003 (FAO); Pakistan Standard and Quality Control Authority (PSQCA) standard # PS: 1742- 2010; Agri-Food and Veterinary Authority of Singapore; Commission Regulation (EU) No 105/2010 of 5 February 2010 amending Regulation (EC) No 1881/2006 setting maximum levels for certain contaminants in foodstuffs as regards Ochrotoxins A: www.anvisa.gov.br; The National Agency on Drugs and Food Control, Republic of Indonesia: # HK. 00.06.1.52.4011-2009. Chilean Sanitary Food Regulation [http://web.minsal.cl/sites/default/files/files/DECRETO_977_96%20actualizado%20a%20Enero%202015\(1\).pdf](http://web.minsal.cl/sites/default/files/files/DECRETO_977_96%20actualizado%20a%20Enero%202015(1).pdf)

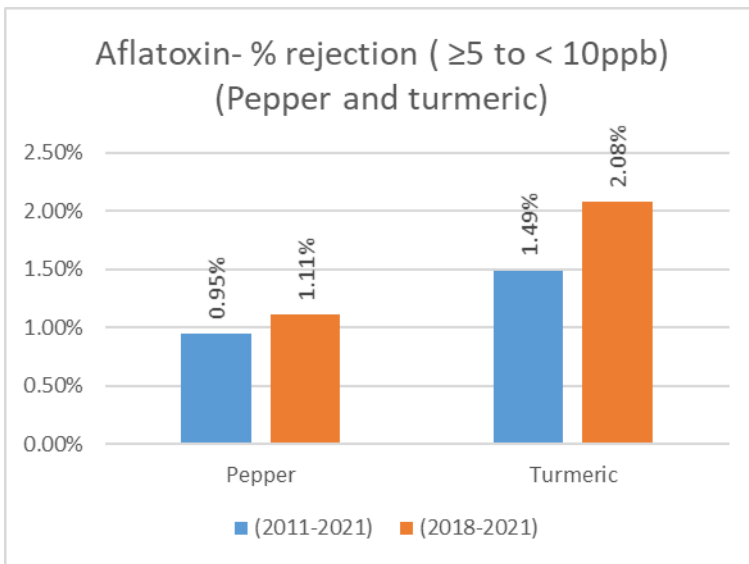
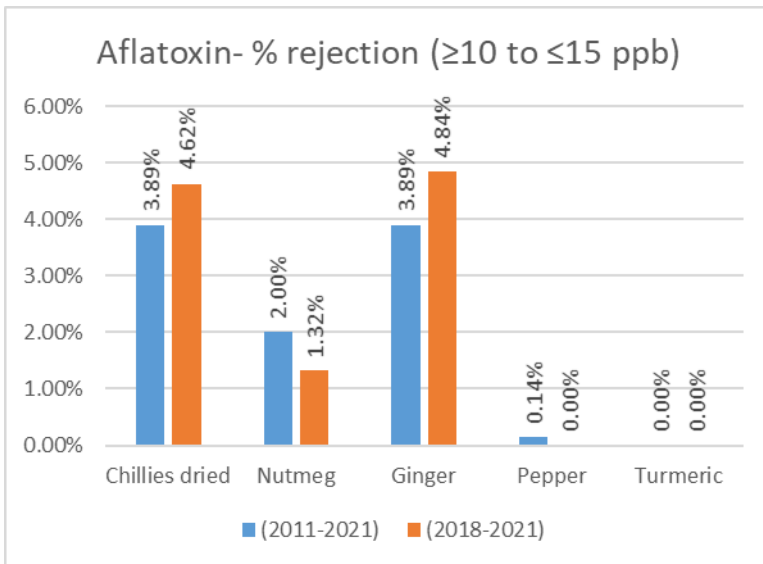
Statistical analysis of the GEMS/Food data

AFLATOXIN (Total)						
		Spice				
Total no. of samples		Chillies dried	Nutmeg	Ginger	Pepper	Turmeric
	(2011-2021)	565	1002	437	1478	67
	(2018-2021)	303	152	124	449	48
Range 1 (> 20 ppb)	Percentage of samples with result value > 20 ppb					
	(2011-2021)	4.60 %	3.79 %	2.06 %	0.07 %	0.00 %
	(2018-2021)	4.95 %	8.55 %	0.81 %	0.22 %	0.00 %
Range 2 (> 15 to ≤ 20 ppb)	Percentage of samples with result value (> 15 to ≤ 20 ppb)					
	(2011-2021)	1.77 %	1.50 %	0.69 %	0.20 %	0.00 %
	(2018-2021)	1.32 %	1.97 %	1.61 %	0.67 %	0.00 %
Range 3 (10- 15 ppb)	Percentage of samples with result value (≥10 to ≤15 ppb)					
	(2011-2021)	3.89 %	2.00 %	3.89 %	0.14 %	0.00 %
	(2018-2021)	4.62 %	1.32 %	4.84 %	0.00 %	0.00 %
Range 4 (≥5 to < 10ppb)	Percentage of samples with result value (≥5 to < 10ppb)					
	(2011-2021)	-	-	-	0.95%	1.49%
	(2018-2021)				1.11%	2.08%
Range 5 (< 5 ppb)	Percentage of samples with result value (< 5 ppb)					
	(2011-2021)	-	-	-	98.65%	98.51%
	(2018-2021)	-	-	-	98.00%	98.92%
ND/0 value samples	Number of samples with result value given as ND/ 0					
	(2011-2021)	268	503	268	1192	55
	(2018-2021)	148	86	65	389	38
	Percentage of samples with result value ND/ 0					
	(2011-2021)	47.4 %	50.199 %	61.33 %	80.65 %	82.09 %
	(2018-2021)	48.84 %	56.58 %	52.42 %	86.64 %	79.17 %

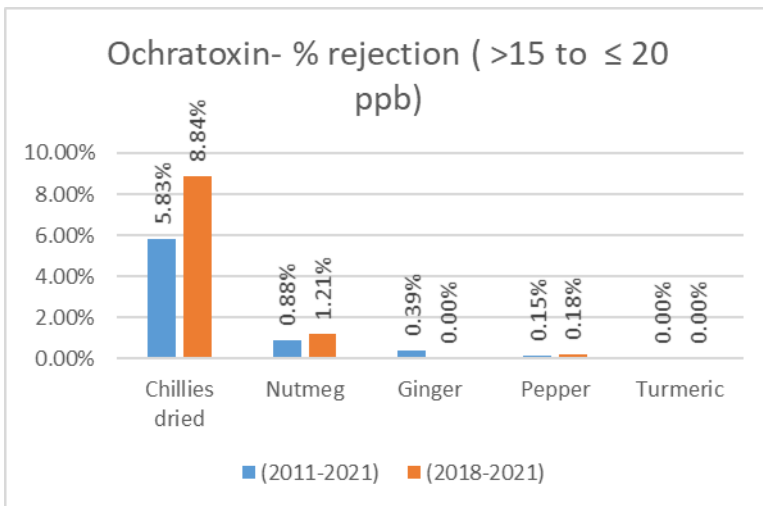
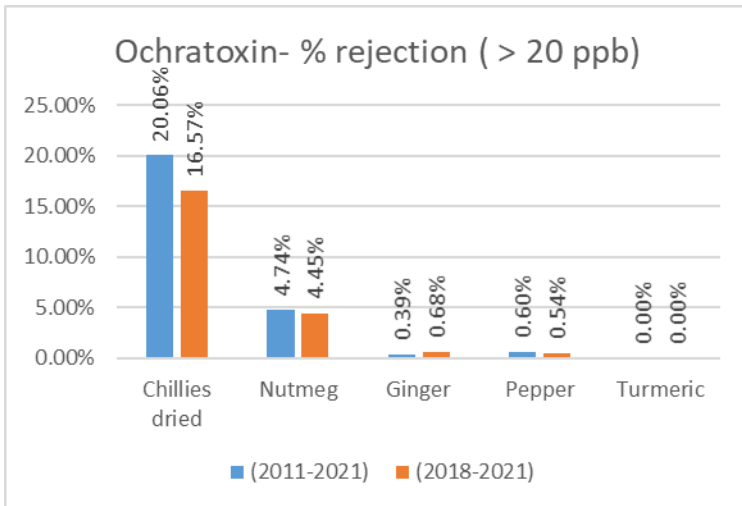
	OCHRATOXIN A					
	Spice					
Total no.of samples		Chillies dried	Nutmeg	Ginger	Pepper	Turmeric
	(2011-2021)	532	1371	515	1986	100
	(2018-2021)	181	247	146	557	13
Range 1 (> 20 ppb)	Percentage of samples with result value > 20 ppb					
	(2011-2021)	20.06 %	4.74 %	0.39 %	0.60 %	0.00 %
	(2018-2021)	16.57 %	4.45 %	0.68 %	0.54 %	0.00 %
Range 2 (> 15 to ≤ 20 ppb)	Percentage of samples with result value (>15 to ≤ 20 ppb)					
	(2011-2021)	5.83%	0.88%	0.39%	0.15%	0.00%
	(2018-2021)	8.84%	1.21%	0.00%	0.18%	0.00%
Range 3 (10-15 ppb)	Percentage of samples with result value ((≥10 to ≤15 ppb)					
	(2011-2021)	7.33%	2.77%	0.97%	0.76%	0.00%
	(2018-2021)	11.05%	1.62%	1.37%	0.18%	0.00%
Range 4 (≥5 to < 10ppb)	Percentage of samples with result value (≥5 to < 10ppb)					
	(2011-2021)	-	-	-	3.12%	3.00%
	(2018-2021)	-	-	-	5.57%	0.00%
Range 5 (< 5 ppb)	Percentage of samples with result value (< 5 ppb)					
	(2011-2021)	-	-	-	95.37%	97.00%
	(2018-2021)	-	-	-	93.54%	100.00%
ND/0 value samples	Number of samples with result value given as ND/ 0					
	(2011-2021)	93	748	311	1452	55
	(2018-2021)	10	87	92	455	8
	Percentage of samples with result value ND/ 0					
	(2011-2021)	17.48 %	54.56 %	60.39 %	73.1 %	55.0 %
	(2018-2021)	5.52 %	35.22%	63.01 %	81.69 %	61.54 %

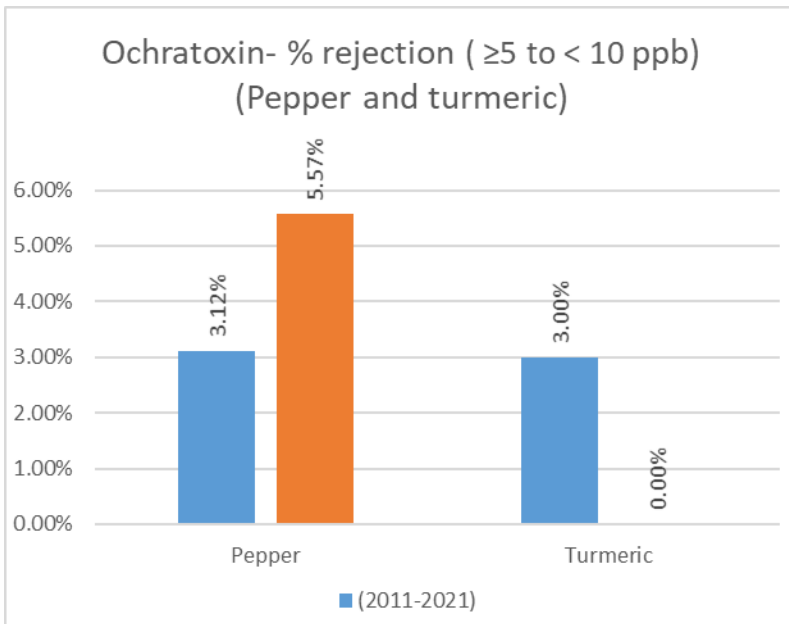
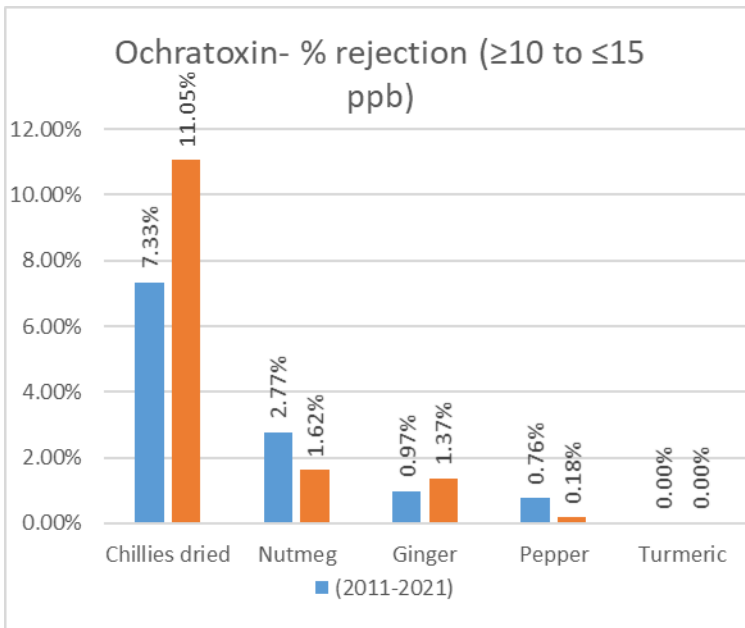
Aflatoxin- % Rejection





Ochratoxin- % Rejection





APPENDIX III**List of Participants**

EWG Chair

Dr Dinesh Singh Bisht, Scientist C

Quality Evaluation Laboratory,

Spices Board (Ministry of Commerce & Industry, Govt. of India),

India

Codex members and observer organization	Name, Designation and Address of Participant
Brazil	Ligia Lindner Schreiner Brazilian Health Regulatory Agency Larissa Bertollo Gomes Porto Brazilian Health Regulatory Agency
Canada	Ian Richard Scientific Evaluator, Food Contaminants Section Bureau of Chemical Safety, Health Canada Elizabeth Elliott Scientific Evaluator, Food Contaminants Section Bureau of Chemical Safety, Health Canada
China	Yongning WU Professor, Chief Scientist China National Center of Food Safety Risk Assessment (CFSA) Director of Key Lab of Food Safety Risk Assessment, National Health and Family Planning Commission, CHINA Shuang ZHOU Associate Professor China National Center for Food Safety Risk Assessment (CFSA) Key Lab of Food Safety Risk Assessment, National Health and Family Planning Commission, CHINA Yi SHAO Associate Professor Division II of Food Safety Standards China National Center of Food Safety Risk Assessment (CFSA), CHINA Yiping REN Professor Yangtze Delta Region Institute of Tsinghua University, Zhejiang, CHINA Di WU, Ph.D. Yangtze Delta Region Institute of Tsinghua University, Zhejiang, CHINA Guoliang LI Professor School of Food and Biological Engineering Shaanxi University of Science and Technology CHINA

Codex members and observer organization	Name, Designation and Address of Participant
Egypt	<p>Noha Mohammed Atyia Food Standards Specialist Egyptian Organization for Standardization & Quality (EOS) Ministry of Trade and Industry</p>
Guatemala	<p>Oscar Efarin Alvarez, Advisor</p>
Indonesia	<p>Yusra Egayanti Coordinator for certain food standardization Indonesian Food and Drug Authority</p>
India	<p>Vakdevi Validandi Scientist-C Food Safety Division ICMR-National Institute of Nutrition, Jamai Osmania PO, Tarnaka, Hyderabad-500007 Dinesh Singh Bisht</p>
Japan	<p>Naofumi IIZUKA (official representative) Deputy Director Food Safety Standards and Evaluation Division Pharmaceutical Safety and Environmental Health Bureau Ministry of Health, Labour and Welfare Tomoaki MIURA Associate Director Plant Products Safety Division Food Safety and Consumer Affairs Bureau Ministry of Agriculture, Forestry and Fisheries (MAFF)</p>
Kenya	<p>Lawrence Aloo Chief Biochemist National Public Health Laboratories Samuel Imathiu Senior Lecturer Jomo Kenyatta University of Agriculture and Technology Maryann Kindiki Manager National Codex Contact Point Kenya Bureau of Standards</p>
Morocco	<p>Hanaa Abdelmoumen Professor at the Faculty of Sciences of Rabat, Mohammed V University Kadiri Khadija Head of Standardization and Codex Alimentarius at the National Office of the Food Safety (ONSSA) Sara Saad Engineer in Service of Plant Products and Plant Origin at (ONSSA)</p>

Codex members and observer organization	Name, Designation and Address of Participant
	Sanae Ouazzani Engineer in Standardization and Codex Alimentarius at ONSSA (official representative)
Netherlands	Nikki Emmerik Senior Policy Officer Ministry of Health, Welfare and Sport - Nutrition, Health Protection and Prevention Department The Netherlands
New Zealand	Sarah Guy Adviser Chemistry New Zealand Food Safety Ministry for Primary Industries Jeane Nicolas Lead Senior Adviser Toxicology New Zealand Food Safety Ministry for Primary Industries
South Korea	Yeon Ju Kim Codex researcher Ministry of Food and Drug Safety (MFDS) Republic of Korea Miok Eom Senior Scientific Officer Residues and Contaminants Standard Division, Ministry of Food and Drug Safety (MFDS) Republic of Korea Lee Geun Pil Researcher Ministry of Agriculture, Food and Rural Development (MAFRA), Republic of Korea
Turkey	Sinan ARSLAN Expert Turkey (Ministry of Agriculture and Forestry) Bengi Akbulut PINAR Engineer Turkey (Ministry of Agriculture and Forestry)
Uganda	Yusuf B Byaruhanga (HD) Assoc. Professor School of Food Technology, Nutrition and Bioengineering, Makerere University Dr. Denis Male Lecturer Makerere University Dr. Moses Matovu Senior Research Officer National Agricultural Research Organization

Codex members and observer organization	Name, Designation and Address of Participant
	<p>Grace Akao National Relay – COLEACP</p> <p>Joseph Iberet Senior Analyst Uganda National Bureau of Standards Siya Balaam Jeffer; Consultancy Officer Food Safety Associates Limited</p> <p>Ruth Awio Standards Officer Uganda National Bureau of Standards</p> <p>Rehema Meeme Standards Officer Uganda National Bureau of Standards</p> <p>Hakim Mufumbiro Principal Standards Officer Uganda National Bureau of Standards</p>
United Kingdom	<p>Craig Jones Senior Policy Advisor</p>
United States of America	<p>Lauren Robin Branch Chief/US Delegate FDA</p> <p>Anthony Adeuya Chemist/US Delegate FDA</p> <p>Quynh-Anh Nguyen Consumer Safety Officer/US Delegate FDA</p>
Institute of Food Technologists (IFT)	<p>Dojin Ryu Official Representative Professor – Food Science University of Idaho, USA dryu@uidaho.edu</p> <p>Martin Slayne Vice President Regulatory Affairs Ingredion</p>
International Organization of Spice trade Association (IOSTA)	<p>Laura Shumow Executive Director American Spice Trade Association</p>